Problem to Pitch

STEAM EDUCATION FOR SUSTAINABLE DEVELOPMENT

UNIT FOCUS: PROBLEM TO PITCH - PROJECT-BASED LEARNING, PROJECT DEVELOPMENT AND MANAGEMENT

CURRICULUM AREAS:

Science, Design, Technology, Maths Environment, Sustainability

4 QUALITY EDUCATION
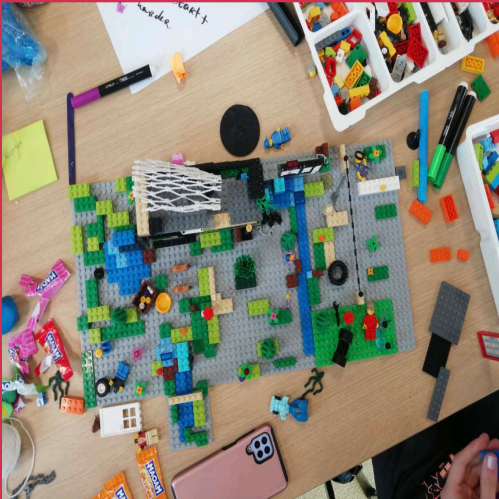
11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

CURRICULUM AREAS
Science, Design, Technology, Maths Environment, Sustainability

Problem to Pitch - Project Management

QUALITY EDUCATION 4

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

Problem to Pitch is a generic project management module that can be adapted to any topic. It introduces students to the concept and process of Design Thinking; the cognitive, strategic and practical processes for creative problem solving.

The module encourages students to engage with their local context to enable them to explore real-world problems in meaningful and tangible ways that are manageable.

The module encourages the development of 21st Century skills supporting students to keep up with the lightning pace of a constantly changing technologised world.Design thinking helps the students to understand that they can create their own future by enabling them to design their own experiences and participation.

Using linked learning and systemic thinking with practical methods of learning, including inquiry and project-based methods, the activities support teachers and students to undertake projects that address contemporary issues on a local scale, in line with the Sustainable Development goals and the 2030 agenda.
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In this project-based learning module, the learner will...

- develop skills of organising, planning and scheduling
- develop awareness of the basics of design-thinking for problem-solving
- practice problem solving and critical thinking skills as individuals and part of a group
- be introduced to project management tools such as Lean Canvas, Logic models, 5Ws (who, what when, why where)
- Vision boards and a Pecha Kucha presentation

This module includes:

- Lesson plans
- Accompanying resources
- Optional assessments
- Skill support resources
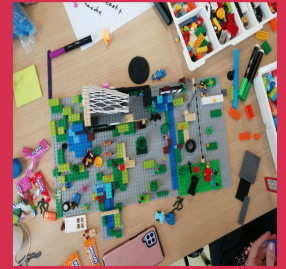
Problem to Pitch – Introduction to Design Thinking, Project Development and Management

Lesson 1: What is Design Thinking? Design Thinking is the cognitive, strategic and practical processes for creative problem solving. This lesson will introduce students to the 5 stages of Design Thinking to build a foundational understanding of the process.

Worksheets include: Introduction to Design Thinking, Stakeholder Mapping, Flipped Classroom

Lesson 2: Empathy 1- Stanford Design School's five chairs exercise encourages students to learn how to develop design principles for a user profile. Students will consider the 5 users needs (this sets the design principles) and develop ideas on paper and create 3D prototypes of their designs. This activity encourages students to iterate on their designs and practice using different materials.

Worksheets include: User profiles worksheet – there are also project specific worksheets related to specific goals and other project modules, Empathy Map, Step into the Problem worksheet.

Lesson 3: Defining the Problem: In this lesson students will begin to understand how to define a problem. Students are asked to begin to identify a real problem they have wanted to address on a local or global level, using the SDGs as a starting theme. Students also have an opportunity to develop an awareness of a local problem

Worksheets include: Define the Problem support sheet, Problem Tree worksheet

Lesson 4: Ideate, Generating and Remixing - Ideas This lesson enables students to develop an understanding of the process of generating ideas starting with their personal experience and then moving into project themes.

Worksheets Include: Ideate Remix worksheet and Remix SWOT worksheet

Lesson 5: Ideate 2 Generating and Remixing Ideas 2.0 Good Idea / Bad Idea. This lesson builds on lesson 4 and enables students to develop an understanding of the importance of developing ideas and looking for opportunities to iterate and improve on existing ideas. Students are also introduced to Open Source concepts e.g. iteration and collaboration.

Lesson 6: Prototype Your Idea - In this lesson students will begin to consider their ideas for prototyping, develop a concept statement and look at ways to prototype their ideas depending on their users / audience.

Worksheets Include: Rapid Response prototyping worksheet and Ready, Set, Design worksheet

Lesson 7: Test Your Idea - Evaluating an idea is a key aspect of Design Thinking. In this lesson students will begin the process of testing their ideas with potential users. Students will learn that this is not the end of the process and that they may learn something that means they might need to return to an earlier stage e.g. Define or Ideate.

Worksheets Include: 5 Ws of Business planning, 8Ws Business planning, Lean Canvas and Zone Map

Problem to Pitch – Lesson 1
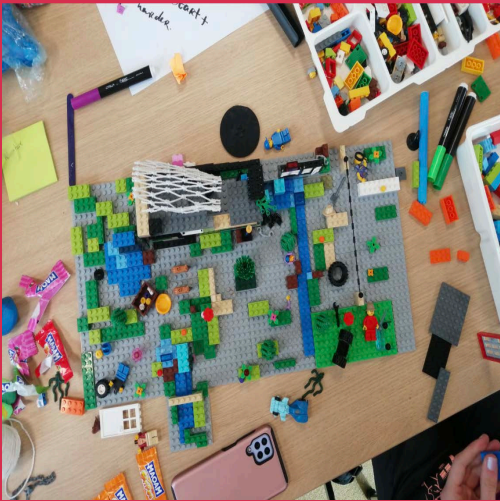
Problem to Pitch - Project Management

Introduction to Design Thinking

Lesson Title and Summary: What is Design Thinking?

Design Thinking is the cognitive, strategic and practical processes for creative problem solving. This lesson will Introduce students to the 5 stages to build a foundational Understanding of the process.

Vocabulary: Empathy; Context, Culture; Qualitative; Users; Stakeholders

In this lesson, the learner will:

- be introduced to Design Thinking

- explore the 5 stages of Design Thinking

- create their own understanding of the stages through quick practical tasks

- work as pairs and individuals to begin to understand the iterative processes

- practice time management

Materials:

- Introduction to Design Thinking worksheet

- A4 paper

- Internet access

- Lesson 1 Flipped Classroom worksheet

- Stakeholder mapping activity

Problem to Pitch – Lesson 1
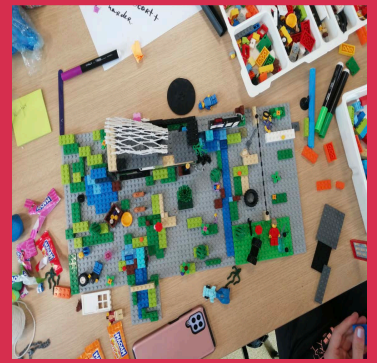
Activity Instructions

Activity 1 Introduction to Design Thinking (25mins) Use

1) If working digitally share the worksheet or this can also be projected. You can also circulate handouts and ask them to keep all their work in a folder to be assessed at the end of the module. The first activity completes the worksheet up to the section on Define.
2) Watch the short video on Design Thinking Introduction worksheet then have students working in pairs to find the meanings of the words and re-write them in their own words.
3) Have each pair share their meanings with the class, photograph each groups answers and use this to create a 'group' design thinking vocabulary list / glossary.
4) As a class discuss the 5 stages of Design Thinking image – reviewing any terms that are new

Activity 2 – Ideate - Worst Idea Good Idea – (30 mins)

1) Allow students 30 minutes to complete the Ideate and Prototype task of the worksheet in pairs. Remind them that they will have to manage their time to allow for the prototyping and testing stage. The aim is not to create masterpieces but to work quickly and experimentally – it should be made clear that given the limitations, it's just to quickly show the idea in 3D.

Have students complete the Flipped Classroom worksheet before the next lesson.

Reflective exercise – see below (5 mins)

REFLECTIVE EXERCISE: 3-2-1

· Three things they feel they have learnt from the tasks

· Two things they found most interesting and would like to explore more

· One – their opinion they have about the tasks

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class remove activity 2 and spend more time in building the collective vocabulary list – have each student type up their words and definition and add to a shared document.

Extension: For a longer class give students more time and materials for the Ideate – Prototype stages of Design Thinking.

If students have project themes in mind they could also begin to research their stake holders and local organisations through the stakeholder mapping worksheets – see media box

Problem to Pitch – Lesson 1
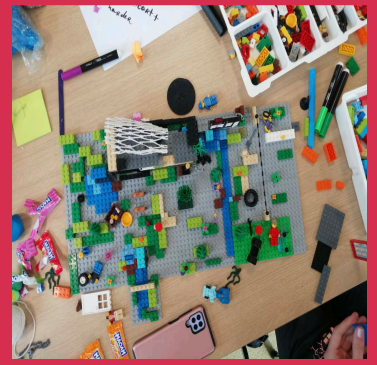
4 QUALITY EDUCATION   **11 SUSTAINABLE CITIES AND COMMUNITIES**   **12 RESPONSIBLE CONSUMPTION AND PRODUCTION**   **13 CLIMATE ACTION**

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **Design thinking Mindsets**
  https://drive.google.com/file/d/0B9jWVyCVFZu6RWFSem1TYlljeEU/view

- **Design Thinking introduction worksheet**

- **Flipped classroom worksheet** - introduction to complexity

- Stakeholder Mapping worksheet supports students to focus on their local place, its issues and its audience.

- **Linked learning:** Communication Skills and Media Communication Skills micro-modules support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration. Tutors are encouraged to work with other tutors to develop the project through multiple outcomes such as video, poster, Pecha Kucha, Interviews or Podcasts and SDG 4 supporting Skills - reports.

SDG Focus: See Introduction to Sustainable Development Goals lessons

- **Introdduction to SDGs for Young People** https://www.un.org/sustainabledevelopment/youth/
- **Explore the SDGs** https://sdgs.un.org/

To focus on SDG 14: combine SDG 4 Problem to Pitch with SDG 14 Problem to Pitch Marine Plastic Waste micro-module lesson plans and worksheets

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Local Trip / Expertise / Additional Work and Assessments

If students have some ideas or issues they wish to work with have them undertake a local stakeholder mapping to begin to find out what's in their area.

Have students complete Lesson 1 Flipped classroom on wicked problems for next lesson

Have students complete a stakeholder mapping of their local place – village, town or city.
See also stakeholder mapping sheet additional tasks

Encourage students to keep a folder of all their work and worksheets of the Design Thinking module

LESSON 1 DESIGN THINKING INTRODUCTION

WHAT IS DESIGN THINKING?

Working in pairs google these words (or use a dictionary) to find out what they mean and re-write the definitions in your own words

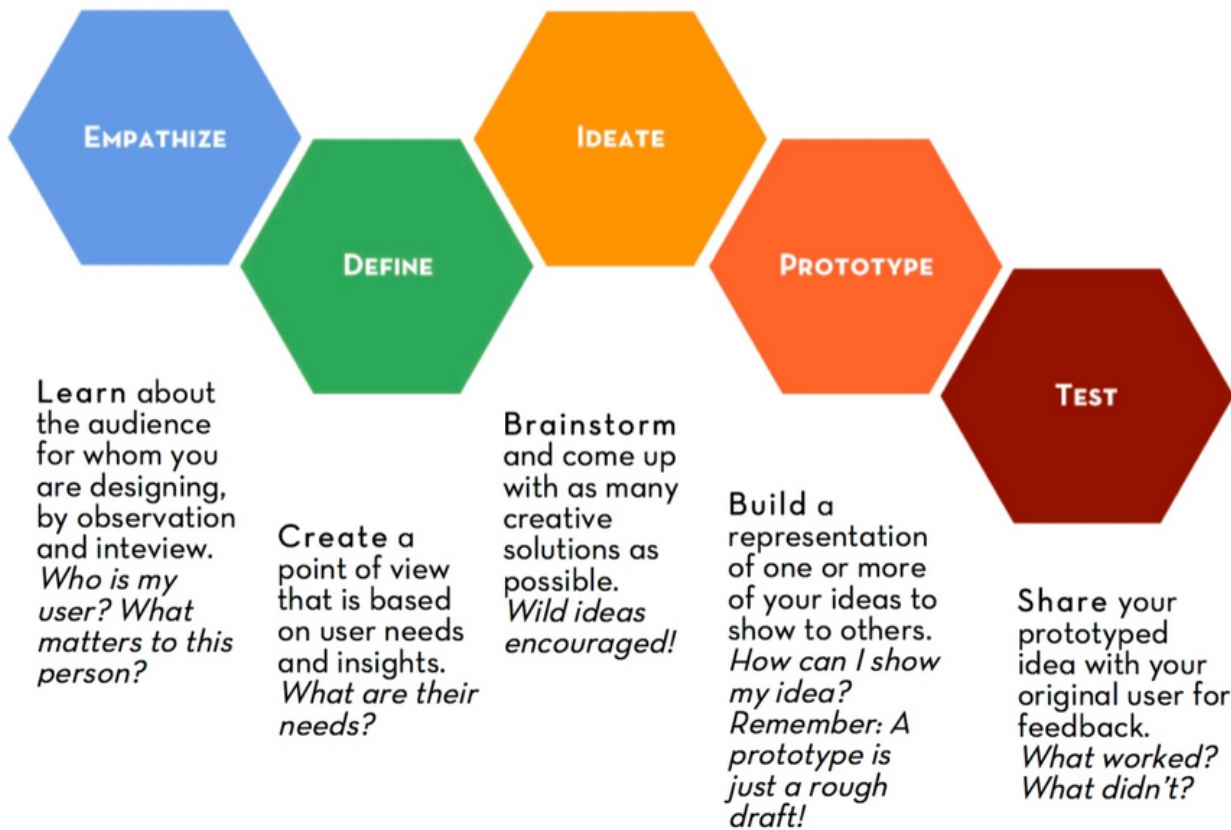1. Ergonmic -

2. Context -

3. Culture -

4. Stakeholders -

Your answers will be shared with the class to build a vocabulary list and definitions - this is called a glossary

4 QUALITY EDUCATION

The 5 stages of Design Thinking:

EMPATHIZE

DEFINE

IDEATE

PROTOTYPE

TEST

Learn about the audience for whom you are designing, by observation and inteview. *Who is my user? What matters to this person?*

Create a point of view that is based on user needs and insights. *What are their needs?*

Brainstorm and come up with as many creative solutions as possible. *Wild ideas encouraged!*

Build a representation of one or more of your ideas to show to others. *How can I show my idea? Remember: A prototype is just a rough draft!*

Share your prototyped idea with your original user for feedback. *What worked? What didn't?*

Before you start to work on your problem or project have a look at each stage and see what you need to think about in any project. You will also have to manage your time as the last three tasks will take more time.

Empathise - Most projects will involve people at some point. What might you need to think about - Discuss with your partner and write down 3 things that might matter to a user / audience member

1.

2.

3.

Define - What's your problem? Often we deal with symptoms - a runny nose, a sore throat but we need to deal with our immune system. In defining your problem you will look at the whole system. Write down 3 problems you know of in your community or the world.

1.
2.
3.

LESSON 1 RECORDING INFORMATION

The 5 stages of Design Thinking:

Ideate – This is the stage in the process to think about as many ideas as possible. For now, write down the 2 worst ideas you can think of - swap them with your partner and try to create three good ideas from each others bad ideas.
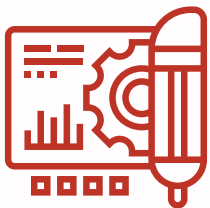
Bad Ideas.	Good Ideas
1	1.
2.	2.

Prototype– using only 1 piece of paper build or make one of the good ideas above. You will have to be creative, how will you make the shapes; folding, tearing? If you are to fix it together, how might you do this - links, cutting, what other ways of joining things together can you experriment with?

Remember: There is no right answer this is about experimentation - have fun.

Test – The final stage is testing. In this stage you learn about the product, service or idea you have created . Share your 'good idea' prototype with your partner and they will share with you.

Things to discuss / consider:

Test – The final stage is testing. In this stage you learn about the product, service or idea you have created . Share your 'good idea' prototype with your partner and they will share with you.

Things to discuss / consider and questions to ask:

1. Who might the user be?
2. Look at how it is made – remember there were limits to materials so you are looking at their problem solving and creativity.
3. Is there anything they could try to make it better or improve it using the materials they had?
4. How might you explore the idea further if time and materials were not a limit?

DESIGN THINKING STAKEHOLDER MAPPING 1

**4 QUALITY EDUCATION**

Stakeholder Mapping

A project's stakeholders are the people or groups of people who can impact or are impacted by a project. If doing a project you will need to understand the different parties involved and how you will need to communicate and engage with them

You will now begin to undertake a stakeholder mapping of your local place. Usually you will start this by having your decision challenge at the centre of your mapping..

Individually or as a class create a list of all the different individuals, groups, or organisations that you can begin to identify and categorise who you might need to discuss or share your project with.
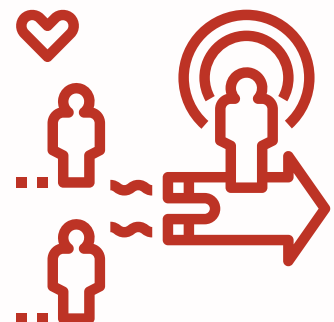
SERVICES / PROVIDERS
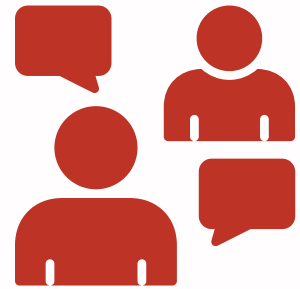
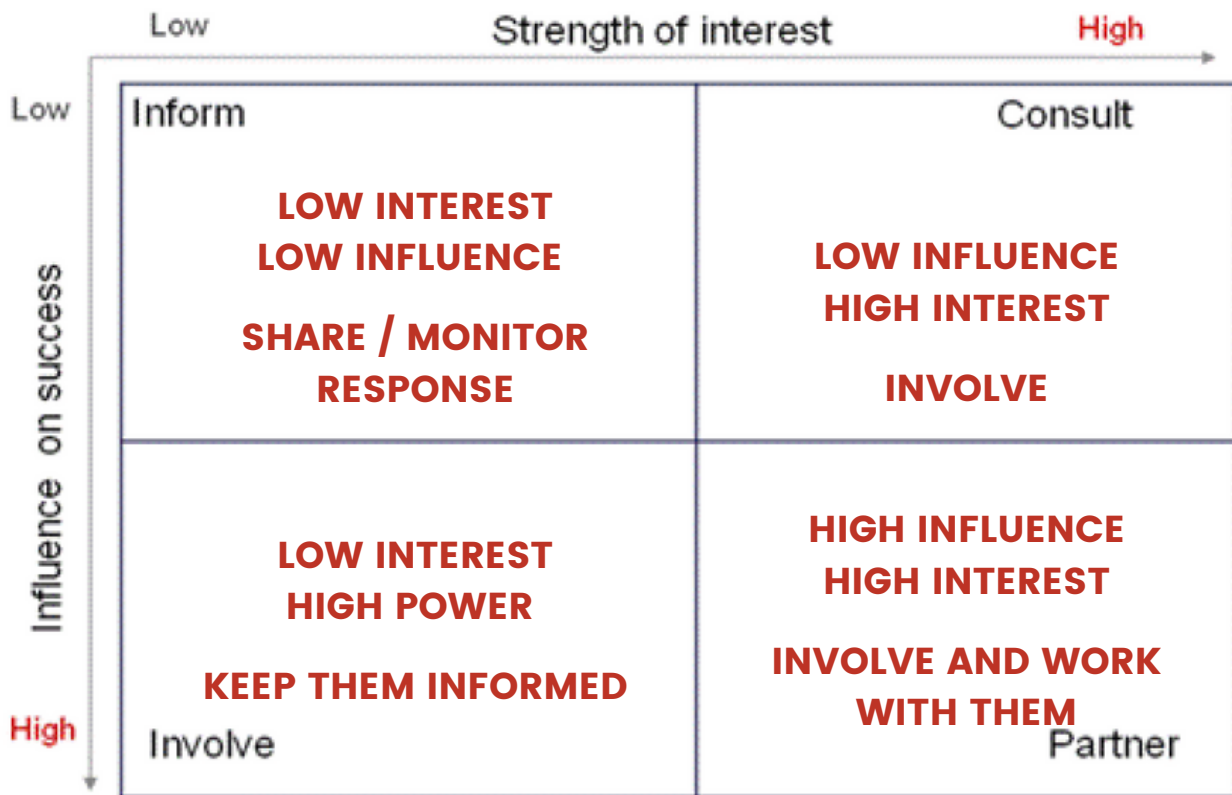**USERS / BENEFICIARIES**

YOUR Place

GOVERNANCE

INFLUENCERS

DESIGN THINKING STAKEHOLDER MAPPING 1

DIFFERENT WAYS OF MAPPING

Now you have a list you are going to practice organising them with project samples

	Strength of interest	
Low		**High**

Influence on success — Low (top) / High (bottom)

Inform	Consult
LOW INTEREST LOW INFLUENCE **SHARE / MONITOR RESPONSE**	**LOW INFLUENCE HIGH INTEREST** **INVOLVE**
LOW INTEREST HIGH POWER **KEEP THEM INFORMED** Involve	**HIGH INFLUENCE HIGH INTEREST** **INVOLVE AND WORK WITH THEM** Partner

1. You are developing a skate park in a square in the centre of town - use your own town / village and pick the most central spot.

   Use the grid above to organise your list of stakeholders and how you will need to communicate and engage with them.

2. You are want to create a youth music festival for your town / village.

   Use the grid above to organise your list of stakeholders and how you will need to communicate and engage with them.

You will undertake another stakeholder mapping once you have your own project idea..

LESSON 1 FLIPPED CLASSROOM ACTIVITY

Learning about Complexity

Why are systems complex? https://www.youtube.com/watch?v=FW6MXqzeg7M&ab_channel=SustainabilityScienceEducation

What is a Wicked Problem (Rittel, 1973)?

What is a wicked problem https://www.youtube.com/watch?v=lOKpB4KtUZ8

Watch the video and give 4 qualities of a wicked problem.

1.
2.
3.
4.

Climate Change is a Wicked Problem

https://www.youtube.com/watch?v=XRoCxS6n53U

How can Design Thinking help with wicked Problems?

https://www.youtube.com/watch?v=WrdSkqRypsg

Watch both the videos above and give 3 areas you might use Design Thinking to work on an aspect of climate change

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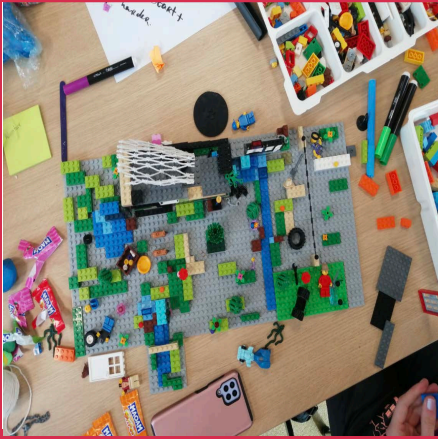
Problem to Pitch - Project Management

Design Thinking Stage 1 Empathy

Lesson Title and Summary: Empathy 1

Stanford Design School's five chairs exercise encourages students to learn how to develop design principles for a user profile. Students will consider the 5 users needs (this sets the design principles) and develop ideas on paper and create 3D prototypes of their designs. This activity encourages students to iterate on their designs and practice using different materials.

Vocabulary: Assumptions; (Biases, Judgement) Design Principles; Empathy; Identify; Immersion.

In this lesson, the learner will:

- understand empathy in design
- develop critical thinking through the practical tasks of asking students to analyse their user's profile to find their needs.
- build, test and iterate design ideas grounded in a user's needs.
- practice group work and develop the ability to work through design challenges collaboratively.

Materials:

- User profiles worksheet
- Pens, pencils
- Paper
- Scissors
- Corrugated Cardboard
- Pipe Cleaners
- Modelling Clay
- Tape
- Match sticks or toothpicks
- Empathy Map

Problem to Pitch – Lesson 2
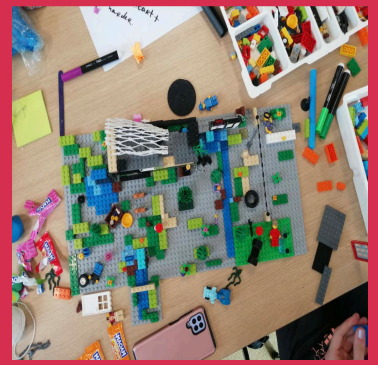
Activity Instructions

Activity 1 Developing design principles from user profiles (15 mins)

1. Organise students into groups of 2 or 4
2. Introduce the lesson and the importance of empathy in design
3. Hand out the user profile worksheet, one per group
4. Explain the task to the students and ask different groups to read out each of the user profiles from the user profile worksheet.
5. Students will develop the design principles (rules / needs) for the users' chairs based on needs of user for all profiles

Activity 2 – Developing paper designs – (15 mins)

1. Have students select a user they wish to work on and identify two needs (design principles) they see in the description of their user

2. Students will develop design ideas on paper for two of the users that integrates the users needs (design principles)

   Empathy Questions Checklist - use the empathy map to expand on the users

   • Did you identify the design principles required for your user?
   • Did you make any assumptions about your user?
   • Did you discover any biases / judgments about your user that you might have?

**Activity 3 – Develop a 3D prototype – (25 mins)**

1. Students will select one of their 2 paper designs and build a 3D prototype using the materials provided.
2. Students will build two design principles (needs) into their prototype
3. Students will add one more design principle - this is to try to reflect your own style as a designer, if your goal is to create something delightful/cool for your user
4. Include further discussion – see media box

Reflective exercise – see below (5 mins)

REFLECTIVE EXERCISE: 3-2-1 (5mins)

·   Three things they feel they have learnt from the tasks

·   Two things they found most interesting and would like to explore more

·   One – their opinion they have about the tasks

Problem to Pitch – Lesson 2
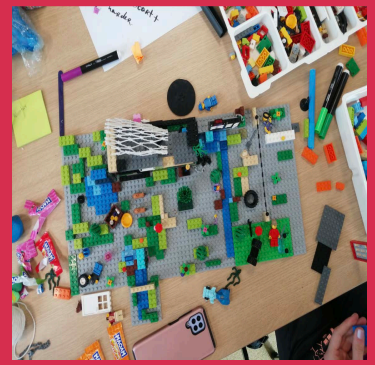
EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class select a user and story card randomly - make paper designs only for that user. Follow up with 3D designs in secondary class

Extension: For a longer class do both activities with more additional user profiles.

If students have project themes in mind they could also begin to develop their user profiles based on their stakeholder mapping and local organisations using the empathy map – see media box

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MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **The importance of Empathy** https://www.youtube.com/watch?v=UzPMMSKfKZQ
- **Empathy mapping** https://www.youtube.com/watch?v=QwF9a56WFWA
- **Empathy not Sympathy** https://www.youtube.com/watch?v=HznVuCVQd10

- Using empathy maps for users profiles - Activity 2

- To focus on SDG 14 combine SDG 4 Problem to Pitch with SDG 14 Problem to Pitch Marine Plastic Waste micro-module lesson plans and work sheets

- **Linked learning:** Communication Skills and Media Communication Skills micro-modules

  support the development of the 4Cs skills – Creativity, Communication, Critical Thinking

  and Collaboration

  Activity 3 Design discussion questions

  - What was it like to build your chairs using the design principles you identified?
  - What was it like to create different iterations of your design?
  - What did you change along the way? What did you learn from your prototypes?
  - Did anyone get stuck at any point? What was that like? What did you do to get unstuck?
  - Which material did you enjoy working with the most? Why?
  - Which material did you like the least? Why?
  - Which material best expresses the essence of the chair your drew?

Local Trip / Expertise / Additional Work and Assessments

- Connect to one of the organisations in the local town or village and develop a new service based on their general user profiles

- Develop an empathy map for a user of a local service

LESSON 2 STANFORD DESIGN USER PROFILES

The 5 chairs Design Thinking exercise

This exercise engages students with 5 users each with different needs. This forms the basis of the lesson.
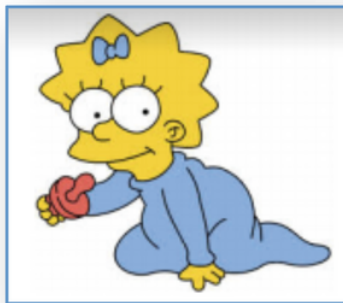Use these users to develop he design principles for the users chairs.

5 Chairs users profiles – Stanford d.School

Grandad is an old man who is achy and sometimes a bit grouchy. He has trouble getting around, so he walks with a cane. He also has difficulty getting into and out of his chair, though he sits in his chair most of the day.

Maggie is a 1 year old who loves to play and crawl around everywhere. Maggie likes to explore on her own and be independent while she sucks on her dummy. When it's time for her to sit still she gets whiny and squirmy.

Ralph is at secondary school and spends 8 hours a day in class. Most of the time, Ralph has to sit in uncomfortable chairs, sitting up and facing the front of the room. When Ralph moves between classes, he carries a large backpack. When he gets to class he needs a place to put his stuff.

What do you notice about their needs?

Underline the important points of each of the user – the clues are in the descriptions.

4 QUALITY EDUCATION

The 5 chairs Design Thinking exercise

Continue the exercise with the final two users.

Underline the important points of each of the user - the clues are in the descriptions.

Neil is an astronaut who travels to space. When he is in his space ship, he is in a weightless environment. This is cool most of the time, but it is a challenge when he needs to sit down and drink his Sprite. Neil also has a bulky space suit that often gets in the way.

Lisa is a marathon runner who runs every single day. She hates being stationary, and because she exercises so much she has really sore muscles. When she finally does sit down it's really important that her chair be very comfortable to help her relax and recover for her run the next day.

Empathy in Design

Empathy is the ability to put your self in someone else's shoes. It is important to use empathy within design otherwise our designs will not be useful. In a world with limited resources sustainable design must make sure that designs are not wasting valuable resources because they don't work and there was no engagement with the user.

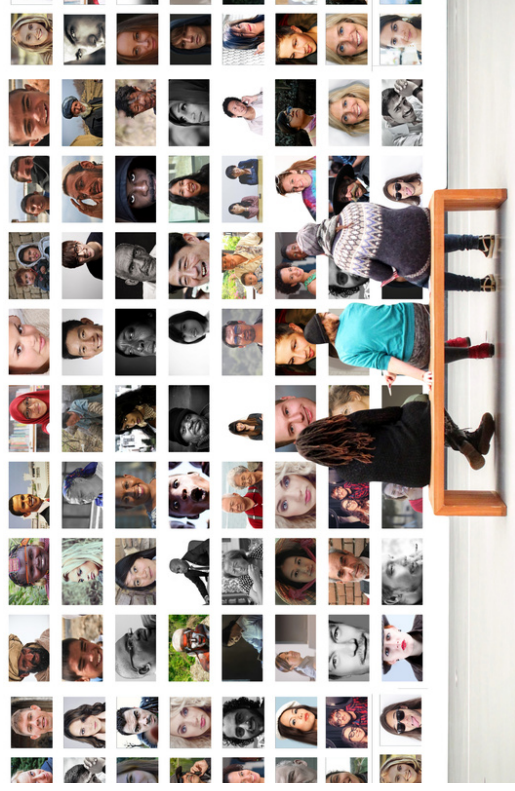**What does your user think and feel?**

- What really matters to them?
- What do they think about?
- What are their worries, dreams or aspirations?

What does your user see?

- When do they use the town and what do the see - do they walk, cycle or drive through the town?
- What might they notice?

What sort of things does your user hear / listen to?

- Where does your user get their information?
- Who might your user listen to or be influenced by?

SEE

THINK AND FEEL

HEAR

WHAT DO THEY SAY AND DO

- What other things might your user do?
- What other things are they interested in?

Step into the problem

This worksheet helps you think about your users and any issues they might have

● What's the Problem – A

● Empathy A, Step into the problem

● Possible ideas / Solutions:

● What's the Problem – B

● Empathy B, Step into the problem

● Possible ideas / Solutions:

● What's the Problem – C
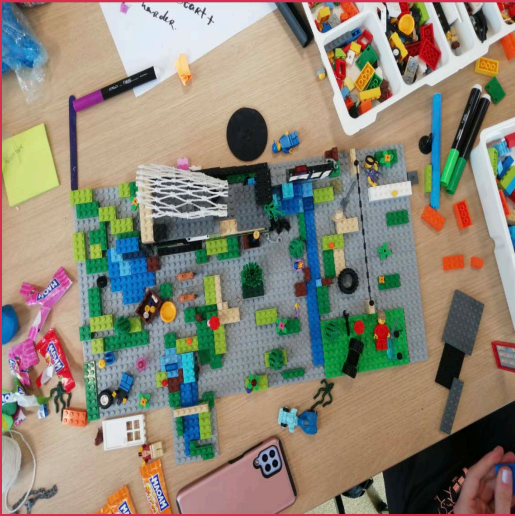
● Empathy C, Step into the problem

● Possible ideas / Solutions:

Name: _____

Date: _____

Assessment :

Problem to Pitch – Lesson 3

Problem to Pitch - Project Management

Design Thinking Stage 2 Define

Lesson Title and Summary: Defining the Problem

In this lesson students will begin to understand how to define a problem. Students are asked to begin to identify a real problem they have wanted to address on a local or global level, using the SDGs as a starting theme.

Students also have an opportunity to develop an awareness of a local problem

Vocabulary: Assumptions; Analyse; Conflicts; Define; Source;

In this lesson, the learner will:

- understand the importance of getting to the source of a problem

- become more accustomed to the SDGs

- develop and awareness of how to localise the SDGs

- develop an understanding of the connection of local and global issues

- complete a problem tree

- understand the complexity of wicked problems in their location

- develop critical thinking about problem solving

Materials:

- Pens, pencils
- Paper
- Local Newspapers
- Problem tree worksheet
- P2P Define support sheet
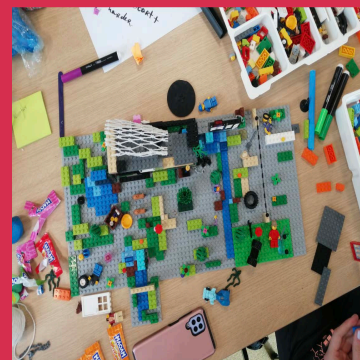
Activity Instructions

Activity 1 Finding and defining your local problem, issue or concern (20 mins)

1. Organise students into groups of 2 or 4
2. Give each group of students a local news paper and ask them to search for local problems, issues and concerns.

- Alternatively, if using the internet, ask students to search online versions of local newspapers for local problems, issues and concerns.
- Ask each group to feedback at least one problem, issue or concern.
- As a class begin to think about your local area list of problems, issues and concerns.

Activity 2 Aligning your problem area to the Sustainable Development Goals (10 mins)

1. Visit the Sustainable Development Goals (SDGs) knowledge platform- see Media Box
2. Students will use the SDGs knowledge platform to select the SDG which is most closely aligned to their problem area e.g. Health – SDG 3, Gender – SDG 5, Climate – SDG 13
3. In their groups ask them to look at the targets and indicators of their selected SDG and begin to think about the potential impact their solution might need to address

Activity 3 Use a Problem Tree (20 mins)

1. As a class watch the *Defining the Problem* video - see Media Box
2. After visiting the SDG knowledge platform write your main challenge on the problem tree trunk
3. As a group, discuss the causes of this problem and write them underneath the problem. These become the "roots" of the tree.
4. Discuss the effects or consequences of this problem and write them above the problem. These become the "branches" of the tree.
5. For each cause, ask what causes it. For each effect, ask what the consequences are. Continue this process until no further causes and effects are mentioned. You may not have all the answers at this point, so make notes of any assumptions, questions, conflicts, or gaps in knowledge.

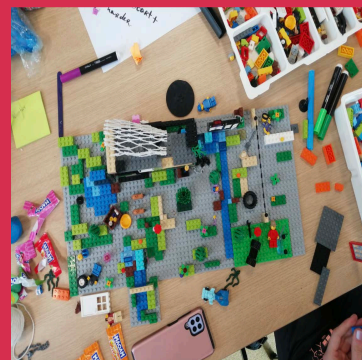*Reflective exercise – see below (5 mins*

REFLECTIVE EXERCISE: 3-2-1

Three things they feel they have learnt from the tasks

Two things they found most interesting and would like to explore more

One – their opinion they have about the tasks

Problem to Pitch – Lesson 3

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class undertake activities 1 and 2 only

Extension: For a longer class, watch the *What is a Problem Statement* video and begin to try to develop a problem statement. In addition, ask students to read the P2P define supporting sheet and discussion

- Discuss the SDG diagram https://www.researchgate.net/figure/The-interconnected-nature-of-the-SDGs-Credit-Adopted-from-Azote-Images-for-Stockholm_fig1_327884976
- Students can also begin to research the organisations and stakeholders for their problem area, students can undertake a stakeholder mapping.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **Defining the Problem** https://www.youtube.com/watch?v=2rJRVv-NOaA\

- **UN SDGs Knowledge Platform** https://sdgs.un.org/goals

- **What is a Problem Statement** – https://www.youtube.com/watch?v=ezxp_yt4kDA

- **Link to SDG 4 Supporting skills** – SDG Web quest lesson plan, Interview skills

- To focus on SDG 14 combine SDG 4 Problem to Pitch with SDG 14 Problem to Pitch Marine Plastic Waste micro-module lesson plans and work sheets

- **Linked learning:** Communication Skills and Media Communication Skills micro-modules support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration

Local Trip / Expertise / Additional Work and Assessments

- Contact the local librarian to collect back issues of the local news paper for students look at for local problems

- Students to visit local town and map the organisations and institutions in their local place – they can use the pCr Zoning map or the stakeholder mapping or both

- Students can begin develop an empathy map for a user of a local service that seeks to 'solve' their problem area

- Students can interview local organisations to find out more about their problem issue through primary source research

4 QUALITY EDUCATION

Problem Solving

First Step in problem-solving - Understand the Problem:

While it may seem obvious, identifying the problem is not always as simple as it sounds. The biggest issue can be identifying the wrong source of a problem. This could mean your attempts to solve it are inefficient or even useless. Remember: Once the correct source of the problem has been identified you need to fully define it before it can be solved effectively.

Things to think about:

- What do I know already about the problem? – Make a list.
- Can a picture or diagram help you? Try to visually draw or map the problem.
- Who's telling me about this problem? What is their perspective?
- What do I need to find out?
- Do I need to speak with anyone else about this problem?
- Try rewriting the problem in your own words?
- What do you think the problem is?

Step two: BRAINSTORM

In this phase, you will need to think, talk, sketch, doodle, contemplate, or journal, in order to start allowing ideas to formulate. Then, set aside some daydreaming time and get started. Think big and let all the ideas you have hit the page without editing them.

Step Three: Research: How are you going to turn the idea into a reality?
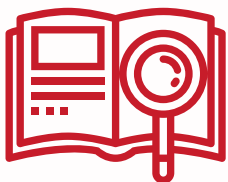
Brainstorming, researching and refining your problem go hand in hand. You will be going back and forth between the three until you come up with a plan.Once you brainstorm some great ideas for your business, you will need to research to learn more about the problem, product or service. In turn, that leads to more brainstorming and refining your problem.

In the next phase you will think of how to turn your idea into a reality. Start to make a make a list of any questions or concerns that come to mind. Its never too egrly!

- What materials do you need?
- What will it cost?
- Can you build it yourself or will you need help?
- If you will need to collaborate on this piece, decide who that will be and make plans to work together?
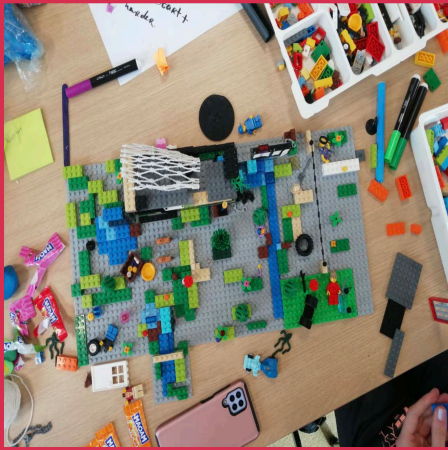
PROBLEM SOLVING TREE

**Find out different ways to solve a problem.
Pick the best one.**

SOLUTION 3

SOLUTION 2

SOLUTION 1

PROBLEM

I choose solution number _____

because _____
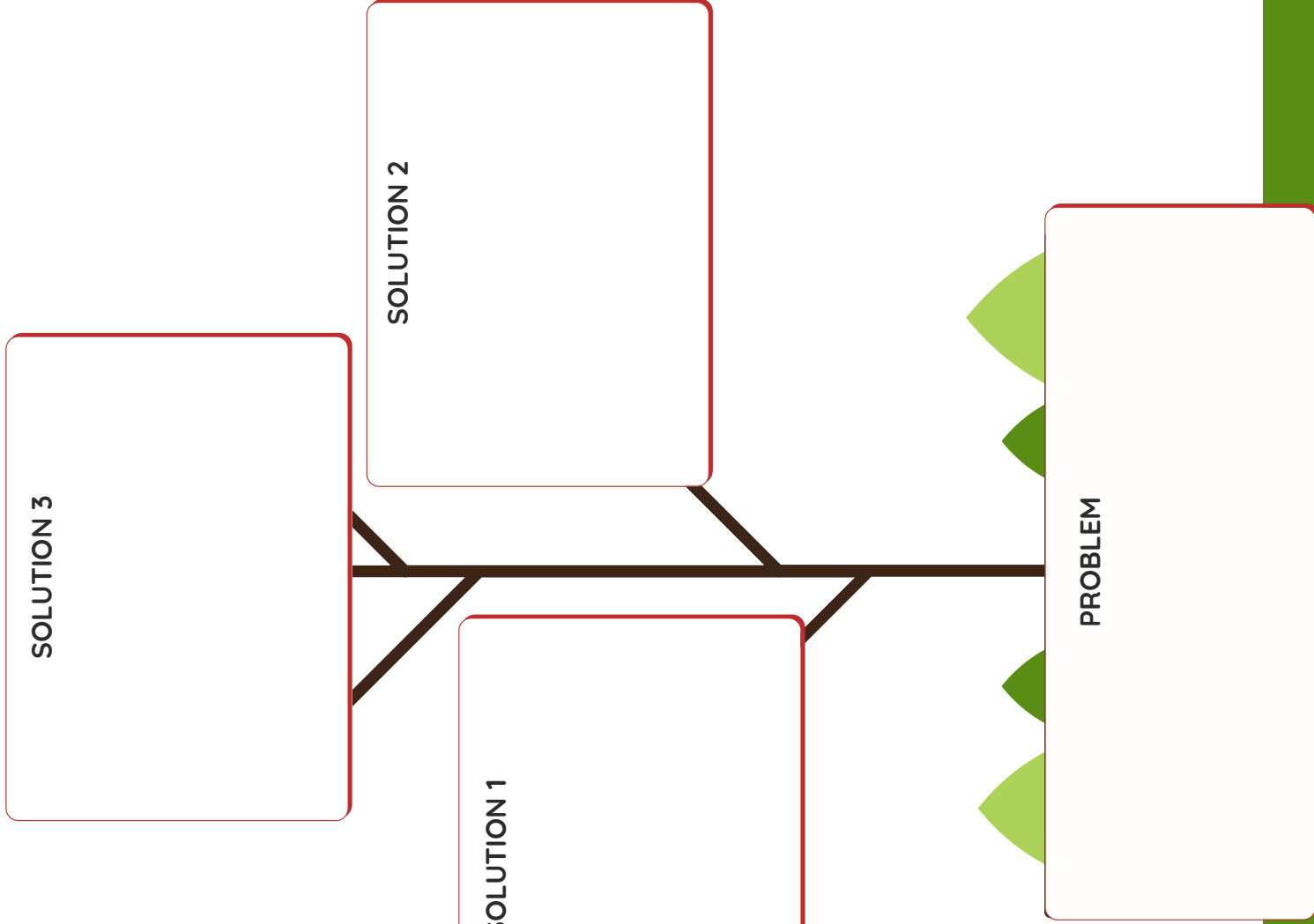
Problem to Pitch – Lesson 4 - Ideate

Problem to Pitch - Project Management

Design Thinking Stage 3 Ideate

Lesson Title and Summary: Generating and Remixing Ideas

This lesson enables students to develop an understanding of the process of generating ideas starting with their personal experience and then moving into project themes.

Vocabulary: Agility**;** Creativity; Disruptive Innovation; Enterprise; Problem Finding and Solving

In this lesson, the learner will:

- explore their own experience as a source of ideas
- feel comfortable with exploring experimental approaches
- develop skills around idea generation
- accommodate variables and limits into design processes
- learn to transfer and apply skills

Materials:

- Pens, pencils
- Paper
- Ideate Remix activity sheet
- Remix SWOT extension task

Activity Instructions

Activity 1 Remixing ideas – Rapid Response (20 mins)

1. Explain the activity – students will use aspects from their own experience to practice the concept and begin to understand how to develop creative problem solving skills
2. Organise students into groups of 3
3. Working in groups each person in the group fills in a row on Ideate Remix 1

   - naming a hobby,
   - what they like about it,
   - the obstacles - what annoys them or stops them from doing it
   - and how they would change that.

They can make this up – encourage them to be creative, be funny but make sure that the row entries are related - put on 10 min timer.

Teacher Prompt - Ask the group for input from the grid randomly e.g. "Group one tell me what's written in the second column, row 2, write their answer on the board.

Repeat three more times until you have something on the board from each of the columns e.g. group 4 tell me what's written in the column 3, row 1, group 2 tell me what's in column 4, row 2, group 3 tell me what's in the column 2 row 3 – see example

Hobby	What they like about the hobby	Obstacles to undertaking the hobby	What change would remove the obstacles
Football	Meeting others	Not enough opportunities to meet others	Transport

Tutor models the activity. Ask the groups to start coming up with possibilities for a business, activity or service that include the 4 variables, the more random the variables the better to push their creativity.

Activity 2 Remixing ideas Rapid Response 2 (20 mins)

1. Repeat the activity replacing the category headings with local theme / issue (this can build on lesson 4 outcomes, current product, service or activity, the problem and the change required.

REFLECTIVE EXERCISE: 3-2-1 (5mins)

- Three things they feel they have learnt from the tasks

- Two things they found most interesting and would like to explore more

- One – their opinion they have about the tasks
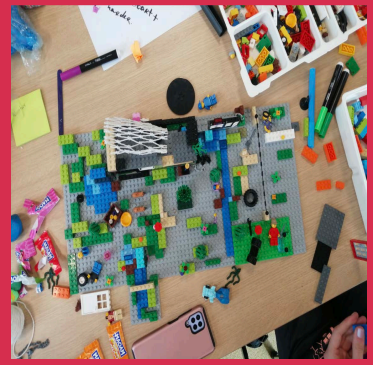
EXTENSION / REDUCTION ACTIVITIES:

- **Reduction:** For a shorter class undertake activities 1 only and use activity 2 in a follow up class

- Ask students to generate 3 business, enterprise, product or service ideas from the variables used in the class

- **Extension:** For a longer class, use the work in activity 2 with the **Remix SWOT** worksheet. Ask the class to undertake the same process for the Idea Remix using one of the businesses, services or activity 1 ideas that has come out of the first part of the lesson. Students can begin to develop an empathy map for a user of the ideas, products or service that have come out of activity 1

- Students can also integrate learning from DT 1 Empathy by using the **Step into the Problem** worksheet to work through the ideas generated

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **UN SDGs Knowledge Platform** https://sdgs.un.org/goals

- **Design Thinking Ideate -** https://www.youtube.com/watch?v=zbLxs6te5to

- To focus on SDG 14 combine SDG 4 Problem to Pitch with SDG 14 Problem to Pitch Marine Plastic Waste micro-module lesson plans and work sheets

- **Linked learning:** Communication Skills and Media Communication Skills micro-modules support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration

- **Link to SDG 4 Supporting skills** – Leadership, Enterprise, Writing and Interview worksheets to explore outcomes – e.g. reports, letters to / interviewing organisations, documenting information

Local Trip / Expertise / Additional Work and Assessments

- Students visit local town and map the organisations and institutions in their local place – they can use the pCr Zoning map or the stakeholder mapping or both

- Students can begin to develop an empathy map for a user of a local service that seeks to 'solve' their problem area.

- Students can interview local organisations to find out more about their problem issue through primary source research

IDEA REMIX 1

4 QUALITY EDUCATION

This worksheet will help you play with ideas using your own experience and pastimes.

Fill in the boxes - we will then work with the whole group to develop a number of possible ideas.

Do you have a hobby or pastime?	What is it you like about your hobby?	Obstacles to undertaking your hobby	What would make it easier to do your hobby?

HOBBY	LIKES	OBSTACLES	CHANGE

HOBBY	LIKES	OBSTACLES	CHANGE

LESSON 7

Remix SWOT

Name

Date

4 QUALITY EDUCATION

What will you do with your project? This worksheet will help you play with ideas using a SWOT analysis. Fill in the boxes for three different ideas or versions of your team's project.

Start with your project's purpose or aim and then fill in the other boxes. Think about the Ideate Remix activity and how you developed ideas from random inputs in the boxes.
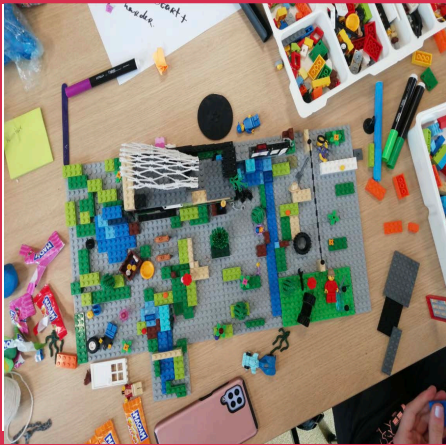
PURPOSE	STRENGTHS	WEAKNESSES	USERS

PURPOSE	STRENGTHS	WEAKNESSES	USERS

PURPOSE	STRENGTHS	WEAKNESSES	USERS

Problem to Pitch – Lesson 5

Problem to Pitch - Project Management

Design Thinking Stage 3 Ideate 2.0

Lesson Title and Summary: Generating and Remixing Ideas 2.0 Good Idea / Bad Idea

This lesson builds on lesson 4 and enables students to develop an understanding of the importance of developing ideas and looking for opportunities to iterate and improve on existing ideas.

Students are also introduced to open source concepts e.g. iteration and collaboration.

Vocabulary: Beta-test; Focus Group; Lean Canvas; Refine

In this lesson, the learner will:

- explore how to evolve ideas
- consider opportunities to improve ideas
- feel comfortable with exploring experimental approaches
- develop skills around idea generation
- learn to transfer and apply skills

Materials:

- Pens, pencils
- Paper
- Worst Idea Ever
- LEAN canvas
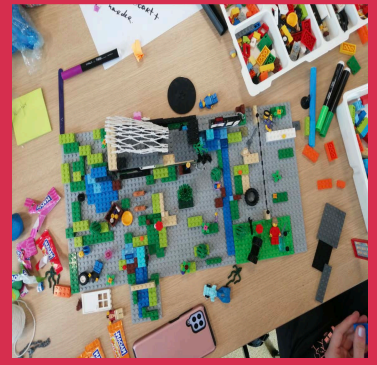
Activity Instructions

Activity 1 Worst Idea ever – Rapid Response (20 mins)

1. Explain the activity – Students will work in their groups to come up with 8 - 10 examples of the worst ideas ever. These will then be swapped amongst the groups to be transformed in activity 2.
2. Tutor to give some real-world starting ideas – see media box
3. After 15 minutes ask students to share one or two of their worst ideas eve*r*

Activity 2 Transforming Ideas   – Rapid Response (20 mins)

1. Gather up the sheets from the groups and begin to swap them with other groups
2. Give some examples of a transformation of a worst idea into a good idea
3. Give students 15 mins to transform the examples on the sheets into good ideas

Activity 3 Generating and Remixing Ideas – Rapid Response (15 mins)

1. Discuss some of the ideas that have been generated?

    - What did the students notice about the process?
    - Where they surprised at how hard / easy the task was?
    - Which activity did they find easier?
    - Can they see how they might use this method with other skills?

2. Use the activity to introduce key ideas of open source – ideas development and iteration

    Watch the Open Source As Explained by Lego video (see media box) Ask the students to think about this for the next class

Reflective exercise – see below (5 mins)

REFLECTIVE EXERCISE: 3-2-1 (5mins)

· Three things they feel they have learnt from the tasks

· Two things they found most interesting and would like to explore more

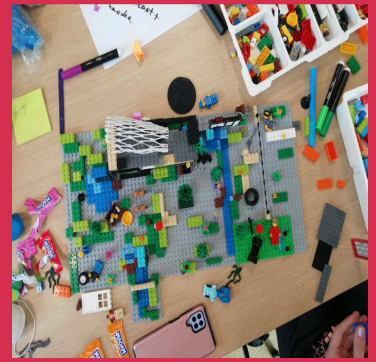· One – their opinion they have about the tasks

EXTENSION / REDUCTION ACTIVITIES:

- **Reduction:** For a shorter class, undertake activity 1 and 2 with less examples e.g. 4 – 6 of worst / transformed ideas

- **Extension:** For a longer class, undertake an empathy map and Remix SWOT analysis of some of the ideas - see lesson 4 resources

- Tutors can also extend the discussion and include some examples of open source projects for students to research – see media box
  - Open Source Ventilator
  - Crispr Editing
  - Aquaponic Greenhouse

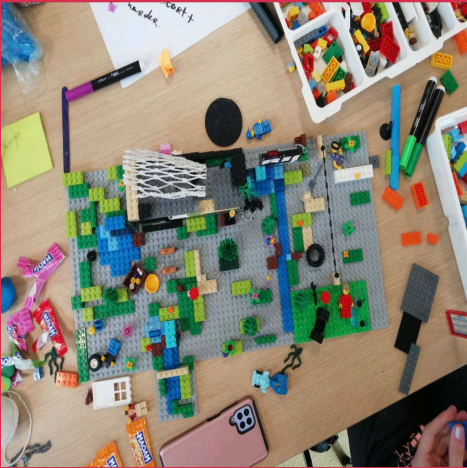Students could complete a LEAN canvas for one of the open source projects

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MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **What is open source explained by Lego**
  https://www.youtube.com/watch?v=a8fHgx9mE5U

- **Open source culture** https://www.youtube.com/watch?v=gobBQwtFeyk

- **Open Source Ventilator** https://opensourceventilator.ie/

- **Crispr Gene Editing** https://www.youtube.com/watch?v=1VaG3DpFXjs

- **Open Source Aquaponic Greenhouse** https://vimeo.com/141252002

Local Trip / Expertise / Additional Work and Assessments

- Office Light https://officelight.ie
- Kerryscitech https://kerryscitech.com/
- The Tom Crean Business Centre https://www.creancentre.com/
- Killarney Technology Innovation Centre https://www.killarney-innovation.com/
- HQ Tralee https://hqtralee.com/

Problem to Pitch – Lesson 6

Problem to Pitch - Project Management

Design Thinking Stage 4 Prototype

Lesson Title and Summary: Prototype Your Idea

In this lesson students will begin to consider their ideas for prototyping, develop a concept statement and look at ways to prototype their ideas depending on their users / audience.

Vocabulary: Concept Statement; Enterprise; Innovation

In this lesson, the learner will:

- explore how to evolve ideas
- iterate their ideas
- develop a concept statement
- explore prototyping methods
- develop prototyping skills

Materials:

- Pens, pencils
- Paper
- Rapid Response Prototyping worksheet
- Modelling material e.g. plasticene, clay, Fimo
- Ready Set Design Challenge worksheet
- Ready Set Design (RSD) materials' bags

  - A fastener e.g. pipe cleaner, pin, paper clip
  - A surface e.g. material, tin foil, card
  - A strucure e.g. sticks, straws,box,

Problem to Pitch - Lesson 6

Activity Instructions

Activity 1 Prototyping – Rapid Response (15 mins)

1. Watch the video *What is a prototype*

2. Discuss the benefits of prototyping

Activity 2 Developing your Prototype – Rapid Response (40 mins)

- Option A: Students can focus on their selected problem area and continue to work on those activities; as a team they should complete a concept statement, vision board and make 3D model of their idea based on their users and empathy map (Lesson 2)
- Option B: If students have not selected a problem area, set a design challenge – **Ready Set Design** is a quick 3D design challenge, that uses 3D prototyping (refer to Multimedia Box.

Option A

1. Students work through the rapid response prototyping worksheet to focus on their problem area.

Option B

2. Students undertake a **Ready Set Design** design challenge using the Ready Set Design worksheet, selecting an open ended problem aligned to the SDGs and a global challenge and using a bag with three items they have to use.

Reflective exercise – see below (5 mins)

REFLECTIVE EXERCISE: 3-2-1 (5mins)

· Three things they feel they have learnt from the tasks

· Two things they found most interesting and would like to explore more

· One – their opinion they have about the tasks

EXTENSION / REDUCTION ACTIVITIES:

· **Reduction:** For a shorter class have the students watch the What is Prototyping video at
· home and come into class with 3 benefits of prototyping

· **Extension:** For a longer class, have students present their concept statement and prototype or design ideas
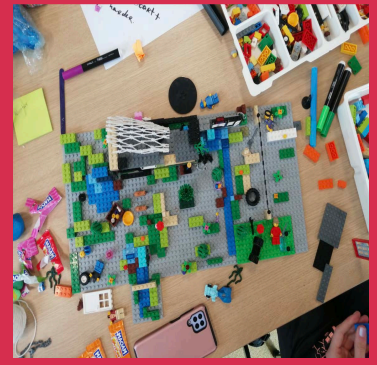
MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **What is Prototyping** https://www.youtube.com/watch?v=4XenqN5Ib9o

- **Rapid Prototyping** https://www.youtube.com/watch?v=JMjozqJS44M

- Ready Steady Design
  https://www.youtube.com/watch?v=jIXSuZg2awA&feature=emb_logo

- **Design Thinking Prototype** https://youtu.be/Q4MzT2MEDHA

- **Pat O'Leary, MD of Liebherr,Kerry** https://www.youtube.com/watch?v=8hzU6FcRWUA

- To focus on SDG 14 combine SDG 4 Problem to Pitch with SDG 14 Problem to Pitch Marine Plastic Waste micro-module lesson plans and work sheets

Local Trip / Expertise / Additional Work and Assessments

- Visit to Liebherr – explore their research and development processes and design department https://myliebherr.ie/about/

- Visit to Tom Crean Centre Innovation centre

- Dr. Breda O'Dwyer - Research & Engagement Project Lead - Munster Technology University (MTU) at Institute of Technology, Tralee

- Sean Constable – upcycled Art and Design

CREATE A VISION / MOOD BOARD

Develop the central message this is an image that will represent your business idea.

Keep it colourful and visual Our brains love images.

STEP 1 THE 'WHAT' OF YOUR BUSINESS

Develop an image that represents the reason for your business – the 'problem' you want to fix. Use pictures, texts or quotes that help you tell what your business is.
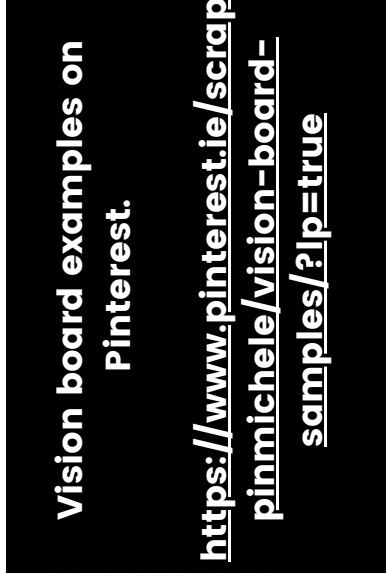
STEP 2 THE 'WHY 'OF YOUR BUSINESS

Develop an image that will show what your business will provide for people or fix their problem. Use pictures, texts and quotes that help you show how your business helps your customers.

STEP 3 THE 'WHO 'OF YOUR BUSINESS

Develop an image of the people who will use your business. Use pictures, texts, quotes, statistics that help to you define your customers.

STEP 4 THE 'HOW' OF YOUR MARKETING

How will you reach your customers? Use pictures, texts and quotes, that help you tell the reason for our business.

Use can use Pinterest, Google images, cut out images and texts from magazines and drawings

Vision board examples on Pinterest.

https://www.pinterest.ie/scrappinmichele/vision-board-samples/?lp=true

CREATE A VISION / MOOD BOARD

Will it be 1 large poster, an accordion book or 4 sections – one for each section of your project's idea

STEP 3 PLANNING YOUR BOARD

As a group you can start to plan the size, shape and format of your vision board – see examples but don't be limited. It should reflect your project.

REMEMBER MESSAGE AND AUDIENCE

1. *Will they read left to right?*
2. *Will you direct them how to read using arrows or numbers?*
3. *Will your central idea be the biggest image?*

STEP 2 DECIDE ON WHO WILL DO WHAT

Each person should in the group should be responsible for one of the four sections in the image board worksheet.

STEP 5, ORGANISE YOUR INFO

You can organise the sections in different ways – think about your audience – who are you trying to reach? Look at examples of posters, communication for that audience.

STEP 1 MATERIALS

You can choose to do your vision board online but if you make it you will need to gather card board, card /paper, glue, scissors, images.

STEP 4 GATHERING IMAGES

Begin to gather images that tell the story of your project – you can use drawings, cut outs, images printed from Google or Pinterest or if digital, you can scan your images online.
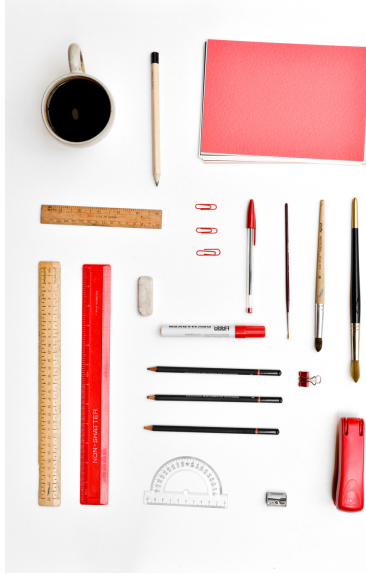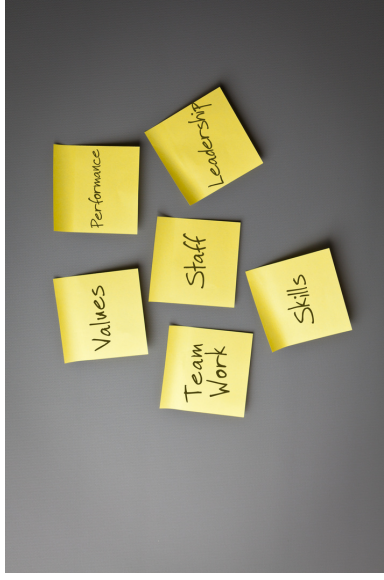
CREATING A DIGITAL VISION BOARD USING CANVA

Step 1: Gather and share your digital Images

When you have decided who is working on what section – gather your digital images and save them all together in a folder. You can create and use a shared drive folder to work in a group.

Step 2: Open an account in Canva

https://www.canva.com/

Step 3: Open a new design in Canva

Once you're signed in, you'll want to click "Create a Design," and choose the template you like, perhaps poster or photo collage.

If you plan on printing your vision board, you can choose USE CUSTOM DIMENSIONS. You can see this in the top right of the screen.

Step 4: Import your images into Canva

LESSON 6 READY SET DESIGN FOR TEACHERS

Ready Set Design - is quick fun and a great introduction to Design Thinking and related skills - teamwork, innovation, and creativity. As a strategy, it can be used in multiple classes using readily available recycled materials.

1. Ready - Share out challenge cards - these are open-ended questions that set the learners their design challenge - depending on the age or the purpose you can scale the complexity of the challenge

Challenge Card:

Using only the materials selected / in front of you create something that...

Add challenge

You have 5 minutes to plan with your team and 15 minutes to build.

2. Set - either have students select or give them three materials from each of the following types

   a. A fastener - e.g. paper clip, string, elastic band, safety pin, pipe cleaner
   b. A surface - e.g. paper, card, material, tin foil
   c. A structure - e.g. empty bottle, box, paper cup, plate, stick

3. Design - students have 20 minutes to design.

On completion ask students to talk about their ideas and thinking. Ask the other groups to contribute:
   - How would they help them?
   - What might be the next stage of the project?
   - If this was to be developed, what are the issues they should consider e.g. users' needs, surveys, market research?
   - Is there anyone local that they could talk to if this was a real project?
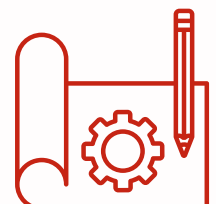
Problem to Pitch – Lesson 7
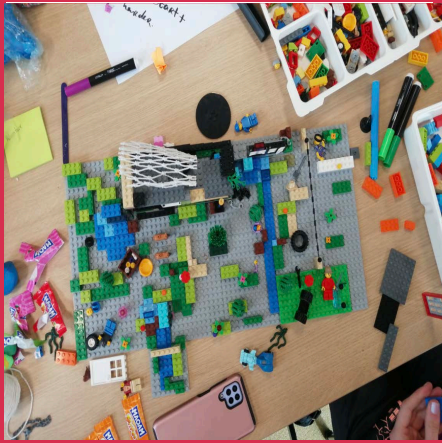
Problem to Pitch - Project Management

Design Thinking Stage 5 Test

Lesson Title and Summary: Test Your Idea

Evaluating an idea is a key aspect of Design Thinking. In this lesson students will begin the process of testing their ideas with potential users.

Students will learn that this is not the end of the process and that they may learn something that means they might need to return to an earlier stage e.g. Define or Ideate.

Vocabulary: Beta-test; Focus Group; Lean Canvas; Refine

In this lesson, the learner will:

- explore how to test ideas
- use their vision board
- complete a lean canvas
- prepare to present their ideas

Materials:

- Pens, pencils
- Paper
- Zone mapping worksheet
- 5 w's of business worksheet
- 8 w's of business planning worksheet
- Lean Canvas worksheet
- Completed prototype vision boards - Lesson 4
- Stakeholder mapping worksheet - Lesson 1
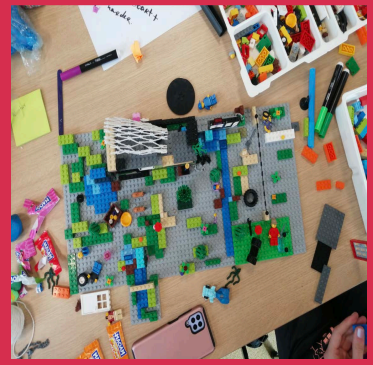
Activity Instructions

Activity 1 Testing – Rapid Response (15 mins)

1. Watch the video Design Thinking - *Test*

2. In groups, working with their prototypes and their concept statements from the last session consider who you will need to speak to in terms of your audience / user. Students can also use the Zone map worksheet to map their 'stakeholders' now that they have a prototype.

Activity 2 Testing your Prototype – Rapid Response (40 mins)

1. Have students complete the 5 Ws of business worksheet to complete a lean canvas
2. Students focus on their selected problem area using Rapid Response Worksheet and 3D model and their empathy map in combination with the 5 Ws worksheet to complete a Lean Canvas
3. This session forms the basis of their project presentation 'test' phase.
4. Circulate to support them to complete tasks.

   Reflective exercise – see below (5 mins)

REFLECTIVE EXERCISE: 3-2-1 (5mins)

· Three things they feel they have learnt from the tasks

· Two things they found most interesting and would like to explore more

· One – their opinion they have about the tasks

EXTENSION / REDUCTION ACTIVITIES:

· **Reduction:** For a shorter class have the students watch the video and complete their stakeholder map at home
· **Extension:** For a longer class, introduce the Pecha Kucha, Media Communication 3 micro-module to support students to present and pitch their idea – this can be used as an end of module assessment.

· Students use the lean canvas, stakeholder maps, vision boards and prototypes to produce a final presentation – showing their project and gaining further feedback on their 'pitch'
· Students could also use the Media communication 1 and 2 to make a video or poster.
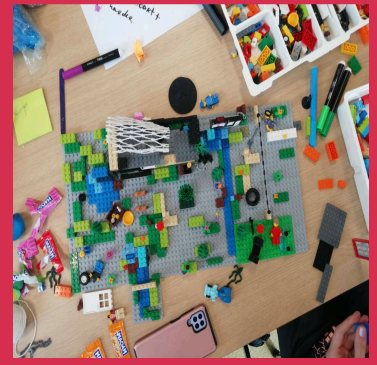
MULTI-MEDIA BOX: (materials, online video links, extra resources, case studies etc)

- **Design Thinking TEST**   https://youtu.be/UVEQCNM6X-A

- **Using a lean canvas** https://www.youtube.com/watch?v=WqjM2DdgUnA

- **How to make a pitch using a mood board** -
  https://www.youtube.com/watch?v=8dG--KvDIX8

- **Rocket Pitch – Introduction to Rocket Pitch** -
  https://www.youtube.com/watch?v=3UKzsnWU7-4

- **Rocket Pitch – Gamify your event**
  http://www.rocket-pitch.com/

- Use the Media Communication module for students to develop their pitch, create a video or poster.

- To focus on SDG 14 combine SDG 4 Problem to Pitch with SDG 14 Problem to Pitch Marine Plastic Waste micro-module lesson plans and work sheets

Local Trip / Expertise / Additional Work and Assessments

- Pitch their final idea to a Local Development company or community and business Alliance e.g. local context Acard Ltd, Cahersiveen Community and Business Alliance

- Visit from Local Enterprise Office

- Create a local enterprise event / exhibition to share their work e.g. in school end of school year, in the local library or online

- Develop a Rocket Pitch event – create a start-up event, link with other schools in your area, province or across Ireland and beyond

- Look at enterprise competitions encourage this as part of the students learning process

THE 5 W'S OF BUSINESS PLANNING

WHAT WHY WHO WHEN WHERE

1. **WHAT** Is the problem?

Give 3 reasons for your business, product or service

2. **HOW** does your solution 'fix' the problem?

3. **WHO** will use your solution? Think of 2 – 3 users

4. **WHY** should anyone buy / use your solution?

5. WHERE / **HOW** will you reach your customer?

6. **WHAT** resources do you need for your business?

WHAT WHY WHO WHEN WHERE

7. WHAT will it cost?

8 WHAT is the investment?
How will you make the money you need to fund your solution?

9. WHEN should this be done?

10. WHEN / HOW will you know you are successful?

11. WHAT do you need to do next?

THE 8W'S OF PLANNING

1. WHAT are you planning to do?

**2. WHY do you want to do this project?
WHO will benefit?**

3. WHEN and WHERE will the activity take place?

Date: _ _ _ _ _ _ _

Time: _ _ _ _ _ _ _ _

Location: _ _ _ _ _ _ _

4. WHAT funds are needed to do this activity?

THE 5 WHYS OF BUSINESS PLANNING

5. WHO needs to approve this project

8 WHAT kind of publicity is needed? WHEN?

Type of publicity When needed?

1.
2.
3.
4.

7. WHO will do the WORK?

1 Task

Person Responsible

Date Due

2 Task

Person Responsible

Date Due

3 Task

Person Responsible

Date Due

4 Task

Person Responsible

Date Due

8. We're Done!! Was it Worthwhile?

WHAT went well?   WHAT didn't go well?

WHAT would you do differently next time?

WHO needs to receive a thank you note? Name WHO will write it?

ZONE MAP EXERCISE

A zone map allows us to start from ourselves Zone 0 (our project or our town) and include other people, places or things in relationship to ourselves Zone 1 - 5

Zone 0 - the self, the project

Zone 1 - Location of project e.g. school or town

Zone 2 - Location of school or town

Zone 3 - Location of town e.g. Iveragh, Kerry

Zone 4 - Location of county e.g. Munster or Ireland

Zone5 - Location of province or country e.g. Ireland or Europe

Zone 0

Zone 1

Zone 2

Zone 3

Zone 4

Zone 5

4 QUALITY EDUCATION