

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



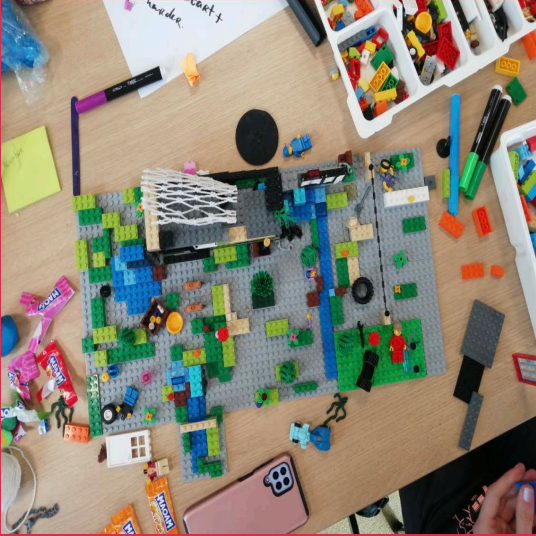
12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



Problem to Pitch



CURRICULUM AREAS

Science, Design, Technology,
Maths Environment, Sustainability

Problem to Pitch - Project Management

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.

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

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EDUCATION



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AND PRODUCTION



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ACTION



Problem to Pitch – Module Overview

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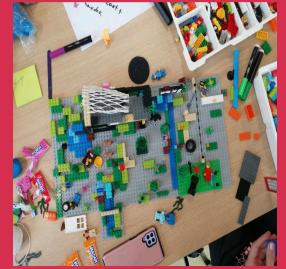
11 SUSTAINABLE CITIES AND COMMUNITIES



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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: Ready Steady prototype 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.

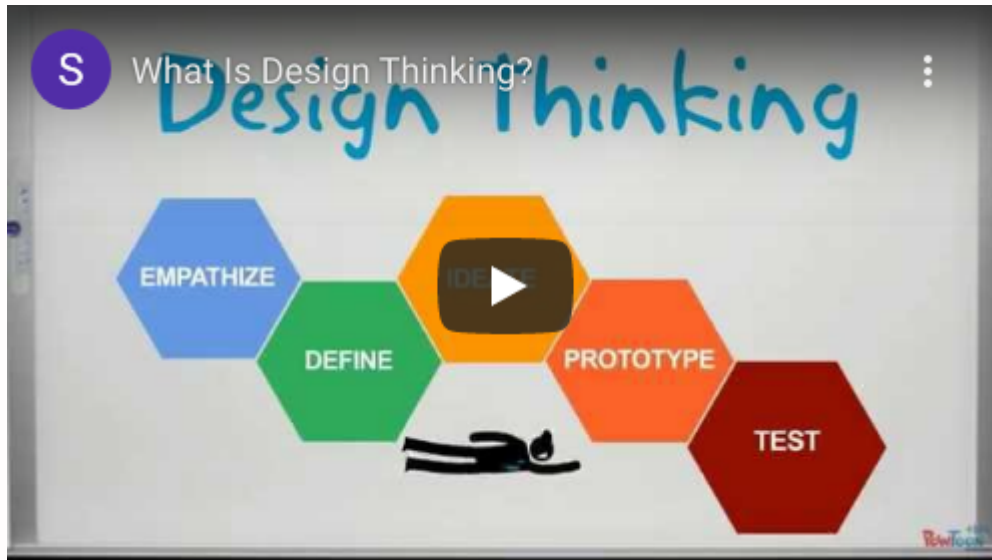
Worksheets Include: 5 Ws of Business planning, 8Ws Business planning, Lean Canvas and Zone Map

LESSON 1 DESIGN THINKING INTRODUCTION

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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. Ergonomic -

2. Context -

3. Culture -

4. Stakeholders -

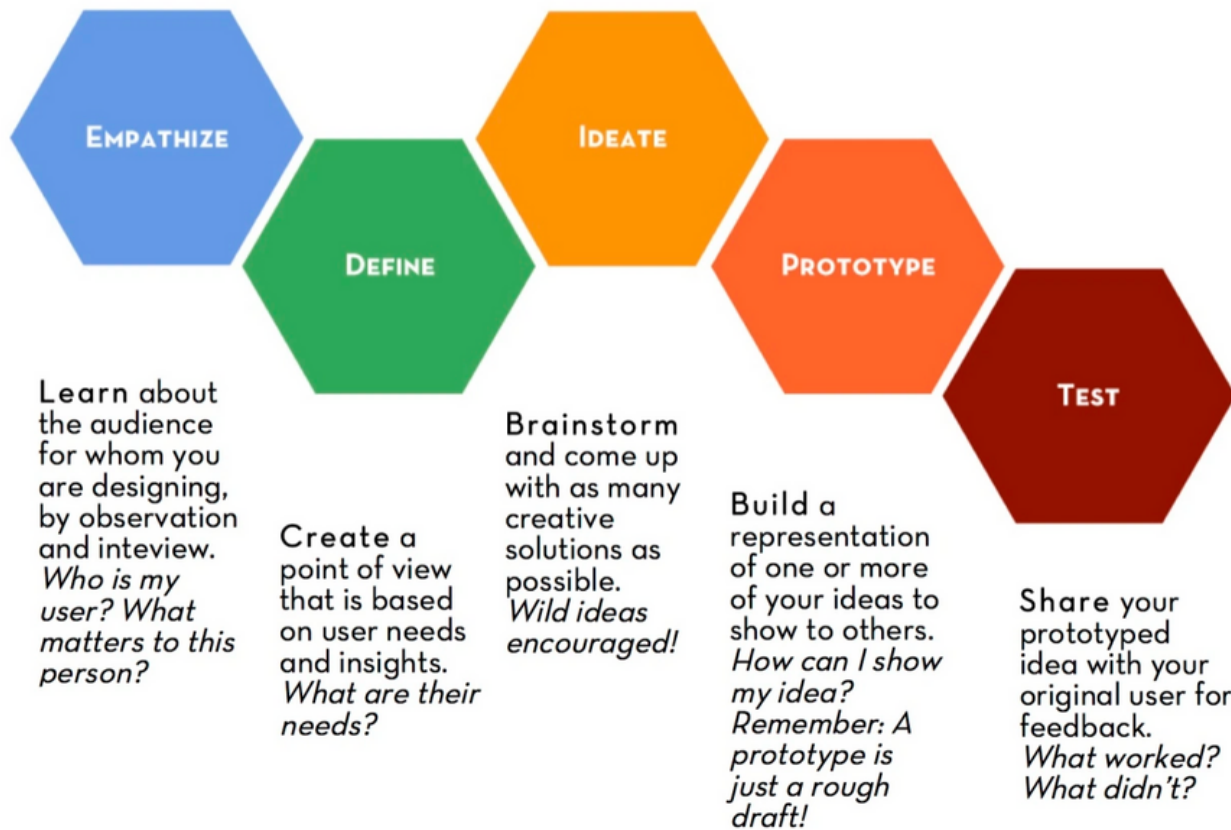
Your answers will be shared with the class to build a vocabulary list and definitions - this is called a glossary



LESSON 1 RECORDING INFORMATION



The 5 stages of Design Thinking:



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.



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.

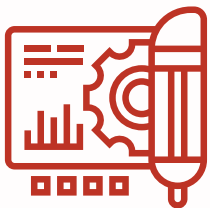
Good Ideas

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 experiment 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

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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.



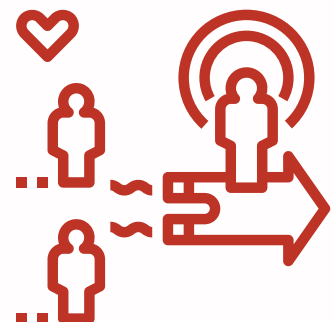
SERVICES / PROVIDERS



**USERS /
BENEFICIARIES**



GOVERNANCE



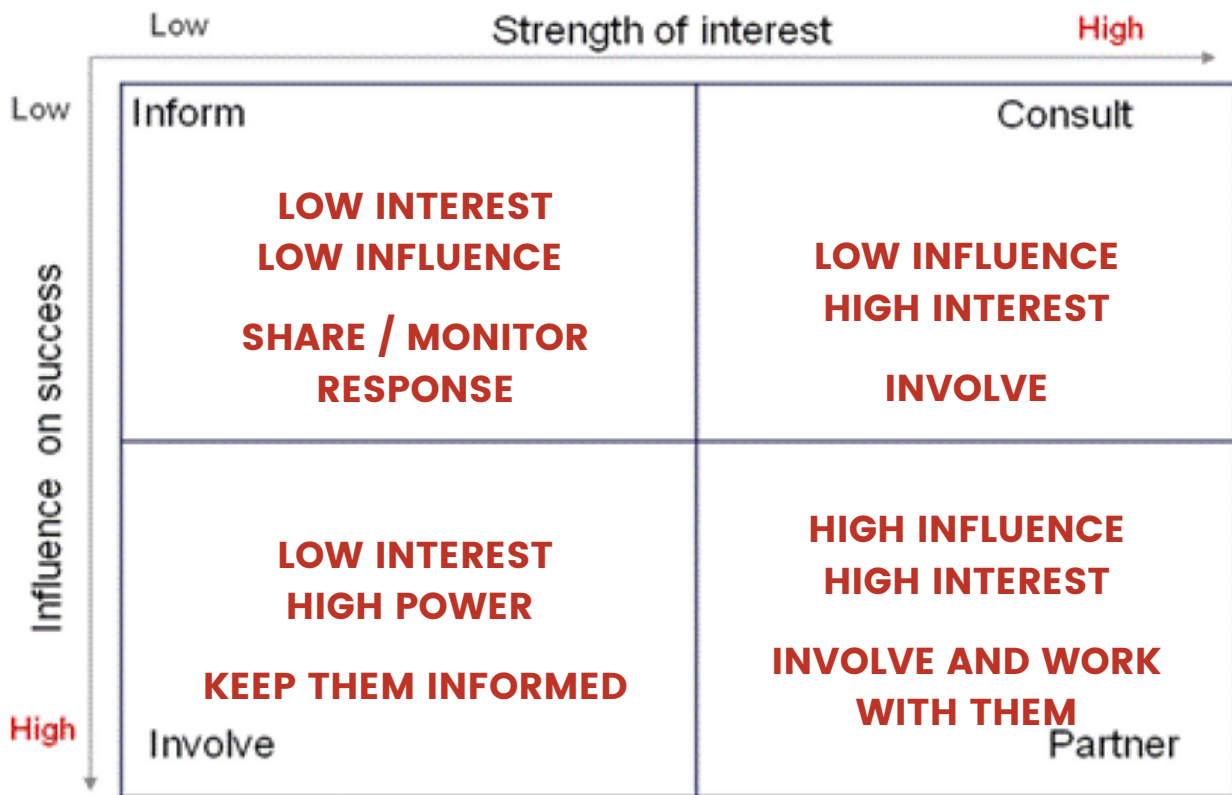
INFLUENCERS

DESIGN THINKING STAKEHOLDER MAPPING 1



DIFFERENT WAYS OF MAPPING

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



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=IOKpB4KtUZ8>

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=XR0CxS6n53U>

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



LESSON 2 STANFORD DESIGN USER PROFILES

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The 5 chairs Design Thinking exercise

This exercise engages students with 5 users each with different needs. This forms the basis of the lesson.

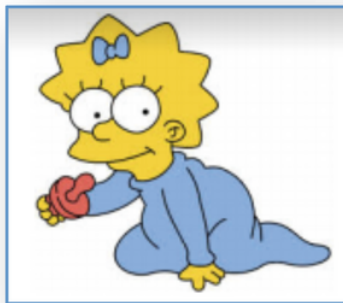
Use these users to develop the design principles for the users chairs.



5 Chairs users profiles – Stanford d.School



Grandpa 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.



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 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?



What does your user see?

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

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

Lesson 3 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: _____

Assessment : _____

Date: _____



LESSON 3 P2P DEFINE YOUR PROBLEM

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.

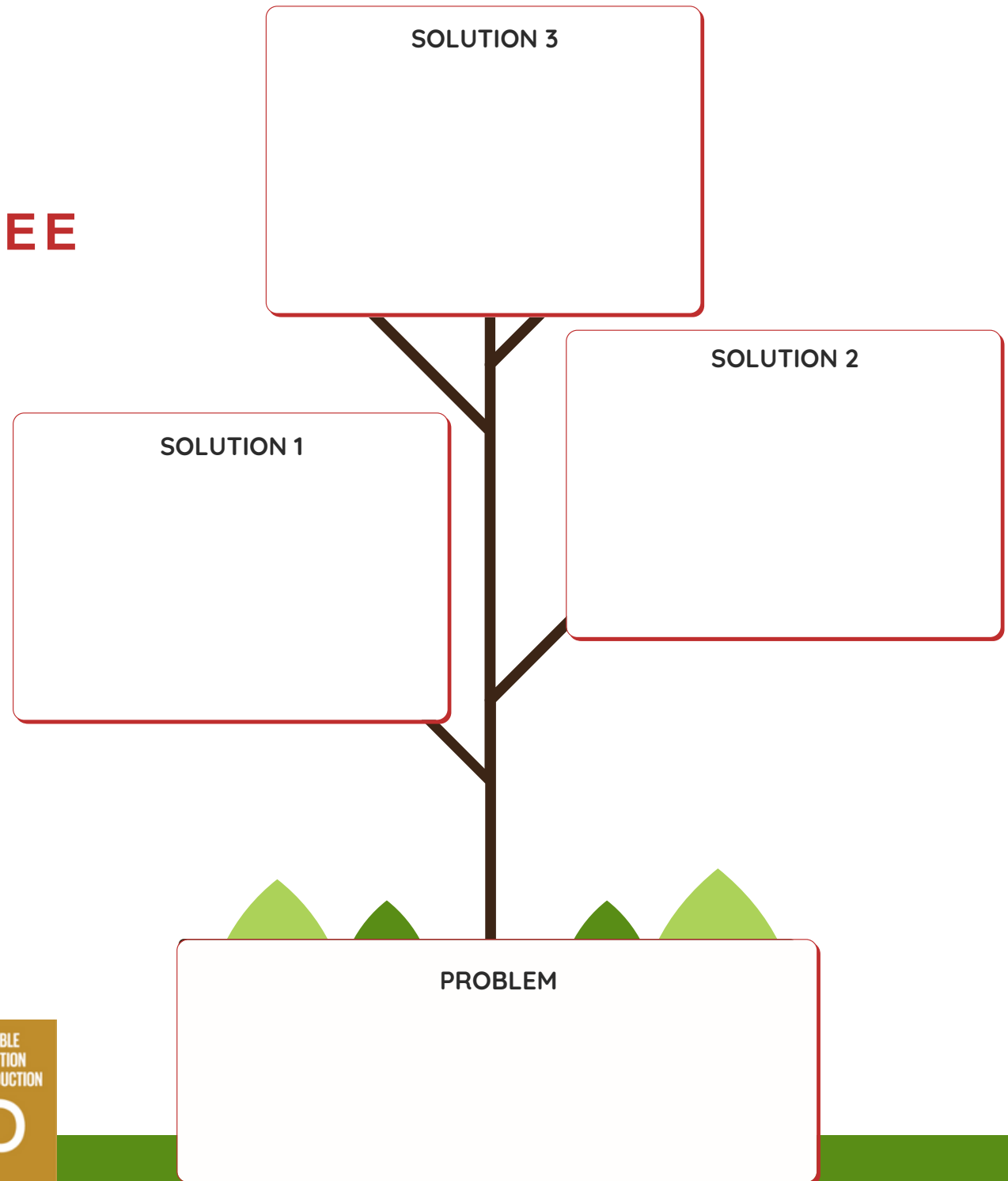
In the next phase you will think of how to turn your idea into a reality. Start to make a make a list of any questions or concerns that come to mind. Its never too egrly!

- 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?

LESSON 3

PROBLEM SOLVING TREE

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



I choose solution number _____
because _____

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9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Lesson 4 REMIX

Idea 1

Team Name _____

Date _____

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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 _____



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

Lesson 7 Test - (present and share your work ideas)

CREATE A VISION / MOOD BOARD

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**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.

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

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 you define your customers.



**Vision board examples on
Pinterest.**

<https://www.pinterest.ie/scrap-pinmichele/vision-board-samples/?lp=true>



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 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.*

Lesson 7 Test - Present and Share Your work and Ideas

CREATE A VISION / MOOD BOARD

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

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 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 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.



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.

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.

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?*

Lesson 7 Test - Present and Share Your Work and Ideas

CREATE A VISION / MOOD BOARD

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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



[HTTPS://WWW.PINTEREST.IE/SUNFLOWERWAYS/CREATING-A-VISION-BOARD/](https://www.pinterest.ie/sunflowerways/creating-a-vision-board/)

LESSON 6 READY SET DESIGN FOR TEACHERS

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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.

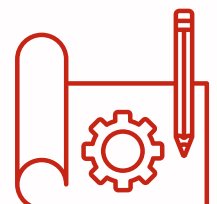
2. Set - either have students select or give them three materials from each of the following types

- 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?





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?



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?





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
- Zone 5** - Location of province or country e.g. Ireland or Europe

