

SDG 14 Future of the Ocean

MM6: Problem to Pitch Marine Plastic Waste



Micro Module 6: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 10 - 11: Design Thinking- Prototyping 2.0

Subjects: Design, Technology, Maths, Environment, Science, Sustainability

Lesson Title and Summary: Developing designs on paper and building prototyping skills

In these lessons, learners will begin to consider their ideas for their prototype, develop a concept statement and look at ways to prototype their ideas depending on their gamers / audience.

They will also develop their designs on paper using their user profiles and proposed ideas. They will begin to prepare materials and ideas for their vision board.

Vocabulary: Concept Statement, Enterprise, Innovation, Prototype

In this lesson, the learner will:

- explore how to evolve ideas
- iterate their ideas
- develop a concept statement
- explore prototyping methods using paper and card
- develop prototyping skills

Materials

- Worksheet: RSB Rapid Response Prototyping
- Worksheet: Concept Statement
- Video: 'Design Thinking - Prototype'
- Pens, pencils
- Paper and card
- Internet Access



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Activity Instructions

Lesson 10: Activity 1 - Prototyping – Rapid Response (10 mins)

1. Watch Video: 'Design Thinking: Prototyping'.
2. Discuss the benefits of prototyping.

Activity 2 - Creating a Concept Map (20 mins)

1. Review Worksheet: Concept Statement to ensure task understanding.
2. Ask learners to complete a concept statement for their marine plastic waste idea.
 - *Learners focus on their idea and its selected problem area e.g. circular design approach to marine plastic waste. Using their empathy maps the learners will create a concept statement. It is important that learners document this process as they will use images in their vision board (lessons 12 / 13 and Pecha Kucha lessons 14 - 16.*

Activity 3 - Developing your Prototype (20 mins)

1. Ask learners to complete page 1 of Worksheet: Rapid Response Prototyping.
2. Ask learners to begin developing their designs on paper for their ideas and prototype using their concept statements.

Lesson 11: Activity 1 - Developing your Prototype

1. Using pages 2 - 4 of Worksheet: Rapid Response Prototyping, ask learners to complete one of each of the elements of construction.

****Learners can watch the videos at home as a flipped classroom or together in class****

Activity 2 - Completing your Prototype

1. Learners use this lesson to begin their paper prototype. This can then be extended across a number of lessons to complete a more substantial 3D prototype.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- 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

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

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EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, divide the tasks in Lessons 10 - 11 across more lessons or set some of the worksheet tasks as Flipped Classroom tasks.

Extension: For a longer class, extend the prototyping tasks to begin the work on their 3D prototype.

Additional Class: Learners can also take part in a Ready Steady Design challenge - see the video in the Media Box and P5 RSB Rapid Response Prototyping worksheet.

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

'Design Thinking: Prototyping' (4:54mins) <https://www.youtube.com/watch?v=Q4MzT2MEDHA>

'What is a Prototype?' (4:11mins) <https://www.youtube.com/watch?v=4XengN5lb9o>

'Paper Prototyping' <https://www.youtube.com/watch?v=85muhAaySps>

'Rapid Prototyping' (7:31min) <https://www.youtube.com/watch?v=JMjozqJS44M>

'Ready Steady Design' (3:26min) https://www.youtube.com/watch?v=jlXSuZg2awA&feature=emb_logo

This and the following lesson links to lessons 12-13 and 14g - 16 guide learners in consolidating and presenting their ideas, while learning presentation and communication skills.

Local Trip / Expertise / Additional Work and Assessments

- Research iForm, National Research Centre in Advanced Manufacturing at University College Dublin - <https://www.i-form.ie>
- Arrange a meeting or presentation with their community engagement and education team about rapid prototyping <https://www.i-form.ie/communityengagement/overview/>

3D printing training for teachers <https://www.iform.ie/communityengagement/3dprintingforteachers/>

Arrange a visit or meeting with a local engineering company or one of the net manufacturing companies to find out more about product design and their prototyping process.

MM6: L10WS CREATING A CONCEPT STATEMENT

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What is a Concept Statement?

A concept statement summarises a project's meaning, purpose, direction, and depth. Concept statements are used at the beginning of the project planning stage. Within innovation and product development, the concept statement helps to focus ideas and keep the team on task.

Use the prompt boxes below to help your team create a concept statement for your game and its users.

1. Define the need in two sentences



You are developing a product, system, service or solution for... Who? (tell us about your user / client). To do what? (This is the purpose of the product, system, service or solution include your specific idea / focus).

2. The problem / issue - explain how your concept will address the problem



3. Users' / Clients needs - tell us about your user / client and their needs



4. Details- explain how your ideas's concepts meets this need





INTRODUCTION

Watch the following video: 'What is Design Thinking?' This <https://www.youtube.com/watch?v=a7sEoEvT8l8>

Answer the questions below. You can re-watch the video as many times as you need to.

a) What or who does design thinking help you focus on?

b) How do design thinkers learn? _____

c) What do simple prototypes do? _____

d) What do rapid prototypes do? _____

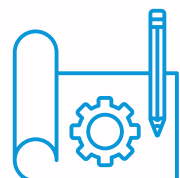
e) If you ideate, prototype and test too early - what are three mistakes that can be made?

f) Write down the two reasons for using design thinking.

g) What are the five stages of design thinking?

Watch the video: 'How to make a cardboard prototype'

https://www.youtube.com/watch?v=k_9Q-KDSb9o Write down as many tips as you can.



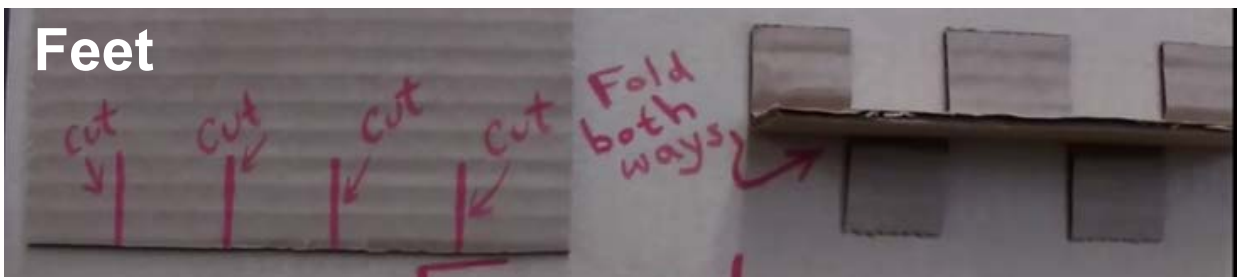
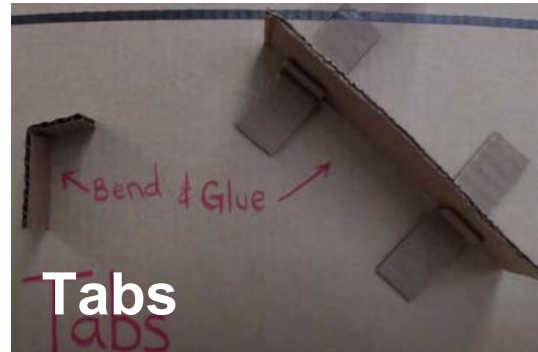


READY, STEADY, BUILD: KNOWLEDGE GATHERING

Today we are going to experiment with rapid prototyping with materials that we have at hand. You will explore three basic elements - useful for rapid prototyping:

- Structure
- Fastening / Joining
- Surface

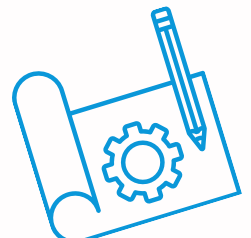
1. Structure - this will provide support and form to your prototype. The structure provides strength by load-bearing if re-enforced or solid, e.g. columns or supports for covering or other materials, e.g. tent poles. Here's some simple tips for creating structure.



Watch the short video from Megan Peterson on structural techniques - all these processes can be scaled up to make bigger models and forms.

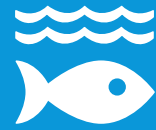
Write down the key ideas in the video. Use bullet points.

Creating 3D sculptures <https://www.youtube.com/watch?v=pi6Y7yCz7Y8>

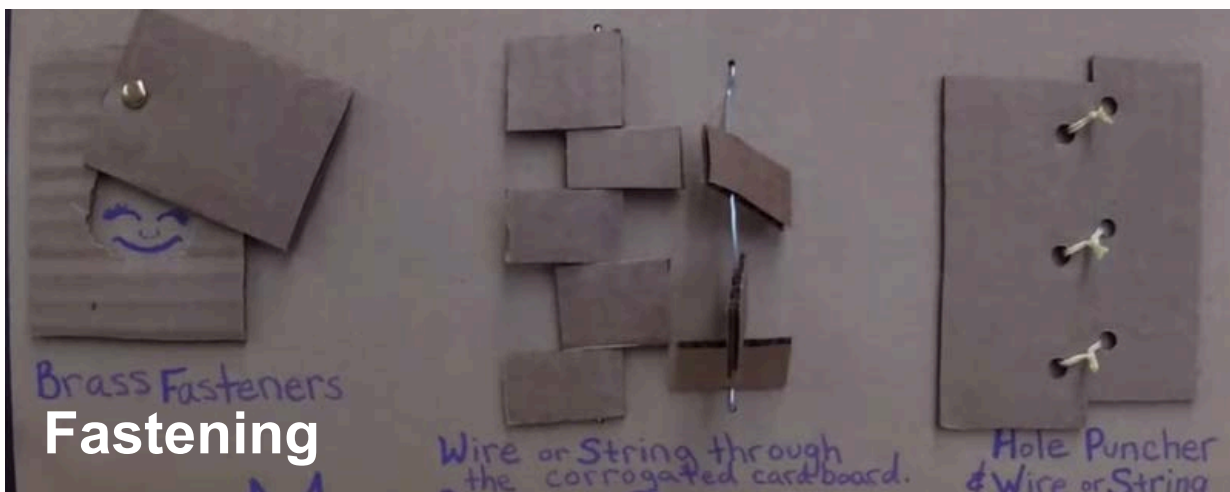
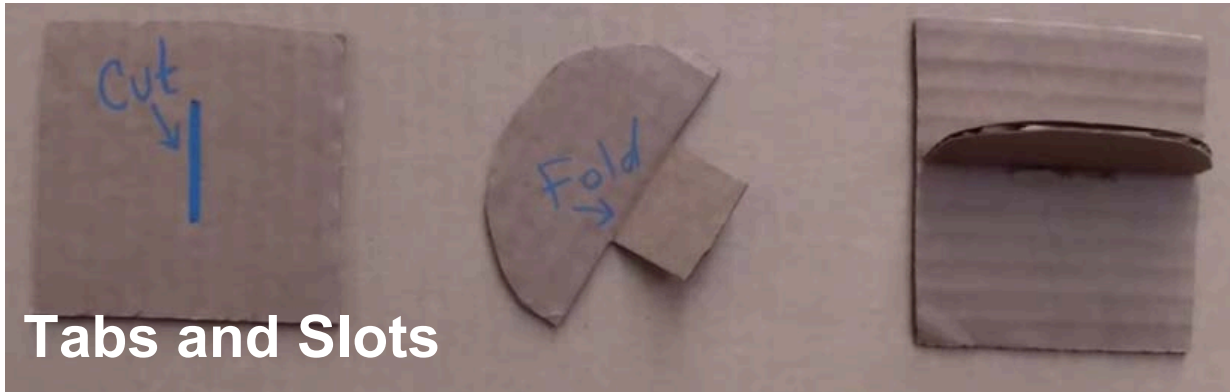


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2. Fastening / joining and attaching - this can be done using structural approaches such as slots and tabs or using other materials like pins, paperclips, string tape or glue.



Some techniques can be both structural and used to join things together like the slots / tabs - here on the left.

What other ways do you know of joining things together? Discuss this in your group and make a list.

Knots are another useful joining technique- here's a useful website for learning to tie knots <https://www.animatedknots.com/complete-knot-list>

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3. A surface - a surface has a number of functions, e.g. protection, decorative, textural, adhesive, and are made from numerous materials, e.g. plastic, wood, fabric, paper, both natural and synthetic.



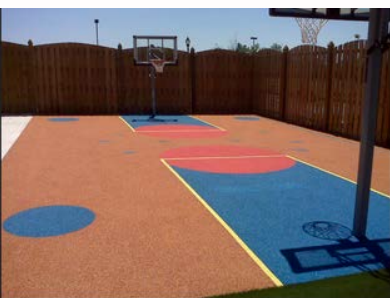
Sometimes they can be structural as well as serving other functions. This surface material could provide support and be used as an attachment or joining function as well as offering a decorative purpose.



Natural materials often have other properties such as insulation, waterproofing, protection as well as being structural, making them good for outdoor construction.



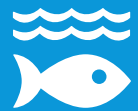
Waterproof or those that are water repellent materials, (hydrophobic) are often inspired by nature, whether a rough surface that minimises water contact and absorption or the nanopatterns of insects who fly in the rain undisturbed. You can also treat materials with sprays to make them waterproof.



Safety surfaces can be both decorative and functional. They often use bright colours and recycled materials from other processes. They can be highly durable and so reduce maintenance.



Interior design surfaces, e.g. upholstery, curtains, wallpaper, bedding, worktops, are increasingly synthetic and made from recycled materials, e.g. SeaQual or Econyl from recycled fishing nets. They can be durable and easily cleaned and pleasurable to look at.



READY, STEADY, BUILD: THE CHALLENGE

The Challenge:

1. Indoor activity - set by the teacher.
2. Outdoor activity - selected from the list below in Challenge 2.

The rules of the challenge:

1. 5 minutes to plan + 15 mins to build a prototype.
2. You must include at least one material / object from each element:
 - o Structure
 - o Fastener / Joiner
 - o Surface

Challenge 1 (Indoor): Set by the teacher.

Challenge 2 (Outdoor):

Select one of the following challenges to complete in your team.

1. Create something to shelter from the weather - wind, sun, rain.
2. Create something to encourage more biodiversity or wildlife to the area.
3. Create a raised bed that stops animals eating what's growing but looks good and is interesting.
4. Create a table / seating that allows buggies, and wheelchairs to fit comfortably.

Post-Challenge Discussion

Let's discuss each teams' design. Use these questions to help focus the discussion:

- o How would you help them?
- o What might be the next stage of the project?
- o If this was to be developed, what are the issues that should be considered e.g. users' needs, surveys, market research?
- o Is there anyone local that they could talk to if this was a real project?

