Muinín Catalyst STEAM Education for Sustainable Development and Futures Literacy

SDG14 The Future Of The Ocean

Programme Phase 3: Implementation

Micro-Module 6: Problem to Pitch Marine Plastic Waste

Subject Areas: Climate Action and Sustainable Development, Engineering, Design and Communication Graphics, Design and Technology, Maths, Science

SFI Discover
Science Foundation Ireland

An Roinn Oideachais agus Scileanna
Department of Education and Skills

SDG 14 Future of the Ocean
MM6: Problem to Pitch Marine Plastic Waste

Micro-Module 6: Problem to Pitch Marine Plastic Waste

Implementation

Subjects: Climate Action and Sustainable Development, English, Design and Communication Graphics, Design and Technology, Maths, Science

Module Overview

In the SDG 14, Problem to Pitch unit, introduces learners to the concept and process of Design Thinking: the cognitive, strategic and practical processes for creative problem solving.

Learners are encouraged to engage with their local context to enable them to explore real-world- problems, e.g. marine plastic waste or ocean health, in meaningful, manageable, and tangible ways. The module encourages the development of 21st Century skills supporting learners to keep up with the lightening 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 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
- develop an awareness of marine plastic waste and the issues within that problem
- 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
- develop a minimum viable product, project, solution, system-change or service for Marine Plastic Waste using circular economic principles

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Implementation

Subjects: Climate Action and Sustainable Development, English, Design and Communication Graphics, Design and Technology, Maths, Science

This module includes:

- lesson plans
- accompanying resources
- project-specific worksheets related to specific goals and other project modules
- optional assessments skill support resources

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This module can be used as a standalone module or as a follow up to the SDG 14 MM1: Ocean Literacy Module. If used together, the two modules form a full Transition Year Unit SDG14 Ocean Health of 40hrs broken down as follows:

- SDG 14 Ocean Literacy - x10 1hr lesson Plans with extension and reduction options depending on class time - 40 mins / 1 hr.
- SDG 14 P2P Marine Plastic Waste - x15 1hr lesson plans with 15 hrs additional self-directed work in completing the tasks including prototyping, vision boards, and Pecha Kucha presentation.

The resources use blended learning and project-based learning to support learners to acquire knowledge and skills and apply them within the context of the real-world issue of Marine Plastic Waste.

Lesson Summary

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

Resources 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 consider the 5 users' needs 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.

Resources include: User profiles worksheet, Empathy Map, Step into the Problem worksheet.

Lesson 3: Empathy 2 Mapping the User
This lesson facilitates learners to develop further insight
into specific users and develop an understanding of their needs and interests. Building on Lesson 2, learners develop their understanding of empathic design and the steps required for empathic / user design.

Resources include: Stakeholder Mapping worksheet, User Journey Map, Understanding the User worksheet.

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Lesson 4: 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.

Resources include: Define the Problem support sheet, Problem Tree worksheet, Problem Tree Teachers Guide, Flipped Classroom Task: Problem search.

Lesson 5: Defining the Problem 2.0

Learners will begin to research aspects of Marine Plastic Waste, in particular the Fishing Industry, and key aspects of Marine Plastic Waste ecosystem.
Learners will research net manufacturers, net transport, net waste, fishers, activism, and community impact and collate their findings.

Resources Include: Define 2 - Fishing System / Ecology.

Lesson 6: Ideate 1.0 Worst Idea Ever - Good Idea / Bad Idea

This lesson enables learners to develop an understanding of the importance of developing ideas and looking for opportunities to iterate and improve on existing ideas. Learners are also introduced to Open Source concepts, e.g. iteration and collaboration.

Resources include: Support sheet - Worst idea ever background, examples and ways to use facilitate the lesson.

Lesson 7: Ideate 2 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.

Resources Include: Ideate Remix worksheet and Remix SWOT worksheet.

Lesson 8: Ideate 3 Exploring Biomimicry for Design

In this lesson, learners are introduced to the concept of Biomimicry and through a practical activity develop potential ideas and assess them for their potential.

Resources include: Biomimicry worksheet.

Lesson 9: Prototyping 1 - Circular Design and the Life Cycle Analysis

In this lesson, learners are asked to consider a product case study for its sustainability and learn how to break down the 'system' in which the design / product is part of. Learners will then apply this skill to thinking about their own possible ideas by undertaking a life cycle analysis by considering the input processes and inputs involved.

Resources include: Life Cycle Analysis Case study including Spider map , Life Cycle Analysis tools Zone Mapping and Support Sheet: ROLE Life Cycle Analysis.

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Lesson 10: Prototyping 2
In this lesson, students will learn some key skills for prototyping and begin to consider their ideas for prototyping, develop a concept statement, and look at ways to prototype their ideas depending on their users / audience.

Resources Include: Concept statement worksheet, Rapid Response prototyping worksheet, and Ready, Set, Design worksheet.

Lesson 11: Prototyping 3
Learners continue to develop their prototype. Learners can also be introduced to the worksheets in Lesson 15 to enable them to begin to expand their concepts for their vision boards and Pecha Kucha.

Lesson 12: Test Your Idea 1.0
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.

Resources Include: 5 Ws of Business planning, Create your idea / vision board worksheet

Lesson 13: Peer Assessment and Developing Pitch Criteria.
In this lesson, learners will define their peer assessment criteria. Peer assessment enables those directly involved in the task or project to appraise their own learning. Learners are encouraged to consider what is most important, valuable, and successful from what has been learned and the process of learning it.

Lesson 14: Pecha Kucha
In this lesson, learners will be introduced to the Pecha Kucha ('chit chat' in Japanese) format and begin to analyse what makes a good presentation so they can prepare to create their own Pecha Kucha presentation.

Worksheets include: Pecha Kucha Analysis

Lesson 15: Test your Idea 2.0 - The Pecha Kucha Pitch
The Pecha Kucha format enables learners to develop confidence and competence in sharing their ideas and presenting their work. In this lesson, learners begin to understand messaging / storytelling, the relationship between image, text, and oral presentations, and transferable skills that they will use in many contexts.

Resources include: Pecha Kucha Planning Guide, Pecha Kucha Outline, Pecha Kucha Checklist Pecha Kucha Lean Canvas and Zone Map, Lean Canvas

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Lesson 16: Test your Idea 2.0 continued
Learners, complete their presentation cross-referencing with the Lean Canvas and 5 Ws of Business Planning worksheet that they have gathered and present all the information for their pitch.

Resources include: The 5 W's of Business Planning, Lesson 15 worksheets on Pecha Kucha Planning

External expertise: Marine Plastic Waste Sprint concept and module design: Dr. Anita McKeown, originally developed through CoDesRes and iterated through the Sea Synergy MARplas project

Sprint development and expertise: Dr. Tara Baoth-Mooney and Dr. Colin Keogh.

Using the Resources:

If you wish to use these resources, we can offer an induction and online support throughout the module to help you plan integration into your projects and timetable. To register for this option, please contact us e:hello@futurefocus21c.com

For more information on the resources please visit www.muinincatalyst.com

Setting up an online learning environment for the lessons on this module:
Our lessons integrate the use of virtual learning environments. To ensure seamless use of our lessons, a module should be setup on your school's virtual learning environment such as Teams, Google Classroom, etc. Learners are encouraged to upload documents to share with their peers.

You can also use Google Sites or Microsoft Sway to encourage learners to present their work over the year - this can easily be set up to reflect the aims of TY and provide a showcase for their work as well.

Setting up a Canva Education account:
As our lessons integrate design, our lessons also refer to Canva. Educators and schools are able to open a free Canva for Education account by registering here: Setting up a Canva Education account:

Canva for Education provides primary and secondary school teachers and students with premium features and templates. You can then also set up lessons and invite your learners to the class.

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Implementation

Lesson 1: What is Design Thinking?

Subjects: Climate Action and Sustainable Development, English, Design and Communication Graphics, Design and Technology, Maths, Science

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 of Design Thinking to build a foundational understanding of the process.

Vocabulary: Complexity, Context, Design Thinking, Empathy, Place-based, Qualitative; Stakeholders, Users

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

- Teacher's Guide: Role of the pCr method
- Worksheet: Lesson 1 Flipped Classroom
- Worksheet: Introduction to Design Thinking
- Worksheet: Stakeholder mapping activity
- A4 paper
- Internet access

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L1: Introduction to Design Thinking

Activity Instructions

Activity 1 - Introduction to Design Thinking (25mins)

1) If working digitally, share the worksheet. 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 work 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 group's 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 / Bad Idea – (30 mins)

1) Allow students 30 minutes to complete the Ideate and Prototype task of the worksheet in pairs.

2) 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.

Flipped Classroom: Have students complete the Flipped Classroom worksheet before the next lesson. This can be used as a discussion activity beginning the next lesson.

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

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

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L1: Introduction to Design Thinking

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, remove activity 2 and spend more time building the collective vocabulary list – have each student type up their words and definitions 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 in the worksheet.

Option B: Begin the Flipped classroom worksheet in class to complete at home.

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

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

- Worksheet: Design Thinking: Introduction To Design Thinking
- Flipped classroom worksheet - introduction to complexity
- Applying Design Thinking in Schools poster - https://www.makersempire.com/design-thinking-for-schools-poster/

To focus on SDG 14: Use SDG 14 Problem to Pitch Marine Plastic Waste lesson plans and worksheets and the SDG 14 Ocean Literacy micro-module

- Generic SDG Focus: See Introduction to Sustainable Development Goals lessons
- Introduction to SDGs for Young People https://www.un.org/sustainabledevelopment/youth
- Explore the SDGs https://sdgs.un.org/

Local Trip / Expertise / Additional Work and Assessments

Stakeholder Mapping worksheet (lesson 3) supports students to focus on their local place, its issues and its audience.

Linked learning: Media Communication 1-4 micro-module to 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.

MM6: L1WS FLIPPED CLASSROOM

Learning about Complex Systems

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 list 3 areas you could use Design Thinking to work on an aspect of climate change.

1.
2.
3.

If you are interested in complexity and systems thinking here's a few more videos you might find interesting.

- Jamming on complexity https://www.youtube.com/watch?v=WT_zUxRTEjA
- Boundaries define complex systems https://www.youtube.com/watch?v=9o21WKsM4U8

MM6: L1TG ROLE OF THE PCR METHOD

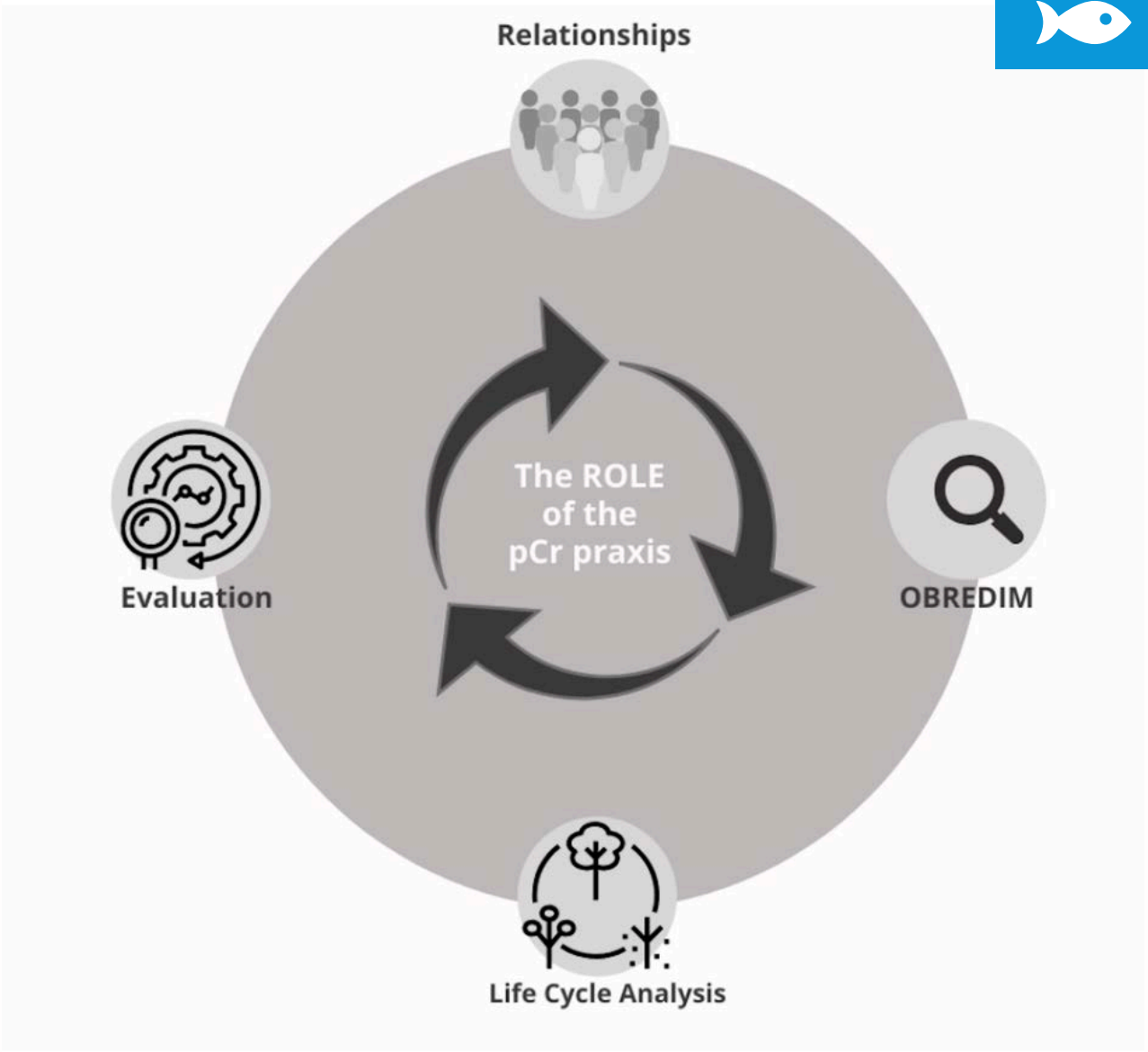


Fig.1 The ROLE of the pCr praxis, McKeown 2016

R – Relationships - Using an intensive audit tool to map cultural, economic, sociopolitical and environmental dynamics, the pCr praxis reveals relationships, resources and opportunities to help re-configure and re-imagine an understanding of place. Stakeholder consultation is the first stage in the process. The construction of flexible micro-ecologies aids the revelation of multiple knowledge cultures and entities, integrating their place-based knowledge, valued for its potential to contribute to a local resilience.

O - The OBREDIM process log is a 3-phase tool that deepens the pCr audit undertaken in advance of developing any project or intervention. The first step in the pCr process is to map the skills, activities and resources of the community using the OBREDIM log; what they already do and how this might contribute to sustainable development and community resilience. This develops the ability to see the localised system, strengths and weaknesses gaps or bridges that can be built upon. Only then will interventions be created, partnerships brokered and projects developed, seeding the praxis, adapting and iterating it as necessary.

OBREDIM AUDIT **Activity:** **Date:**

Audit Phase	**Details reference: What to look for and record.**
 O – Observation **Phase 1**	Survey all local 'organisms' e.g. organisations, stakeholders, businesses, arts and cultural orgs, community groups, charities, people, animals, vegetation, socio-cultural landscape, history, news / media, politics. Try to create as full a picture of the residency ecosystem.
Ways and things to observe: Patterns of growth, distribution, town layout business layout etc. Traffic flow, people motion, dead spots, flow of information, traffic people, the dynamics; social, cultural physical. Is there an impact? Does it last? Where's it start and stop. Natural system aspects: Weather, Sun, Water sheds, air, flora fauna animals, migration routes or diversions of water, desertification, forest, History – what's changed and why is there a pattern, does this have impact on the future? Communities; connections and relationships, distance/ proximity, inter-species, inter generational. What is successful? What has adapted are there any common traits? Are there any recogniseable patterns, numerical patterns? Are their functions of these patterns? Look at textures / shapes – Draw them, photograph them, record audio, video. Use the senses; What can you see, hear, taste, smell and touch.	
 B –Boundaries	The edges / limits of the ecosystem; the location's geo boundaries, organisational boundaries, people's responsibilities, shared values, cross-over of aims, power dynamics. Limits to growth expansion, Laws, regulations and policies. Where do things stop and start? Are there diversity, tensions and encounters? Is there a difference between the edges and centre? Zoning analysis: This can highlight responsibilities, existing partnerships, focus for effort.
 R - Resources	Physical and non-physical resources; Time, money, services, skills and knowledge, existing networks and partnerhips, groups, what already exists and how it works (or doesn't). Sample Questions: Venues: what's there, what does it do, how does it function, who sponsors events. Groups: who's doing what, when and with who?
 E – Evaluation **Phase 2**	Begin to map a web of relations – using the info from Phase 1 and the Zoning analysis. Evaluate what exists and where the gaps are – how does info flow, notice relationships and communication. Include a SWOT / SMARTER analysis
 D - Design	Design on paper, Becomes a map for the implementation stage or if there's an exisiting project in mind re-design in light of information gathered in Phase 1 and evaluation stage.
 I – Implementation **Phase 3**	Implementing design: incl logistics eg timelines, production milestones, communication, fundraising, skills needed.
 M - Maintenance	Maintaining the project and any maintenance needs or opportunities to evolve the project, handing over passwords, admin details, resource directory – anything needed to move the project forward or maintain its existence and evolve it

MM6: L1TG ROLE OF THE PCR METHOD

L - Lifecycle Analysis.

The pCr framework offers a simple visual tool that embeds an eco-social commitment by addressing the full life cycle of a project and beyond.

By plotting the position of the inputs, processes and outputs across Zones 1 - 5 of a project against the proximity to project's 'Zone 0', an initial assessment of all production process can be considered.

E – Evaluation.

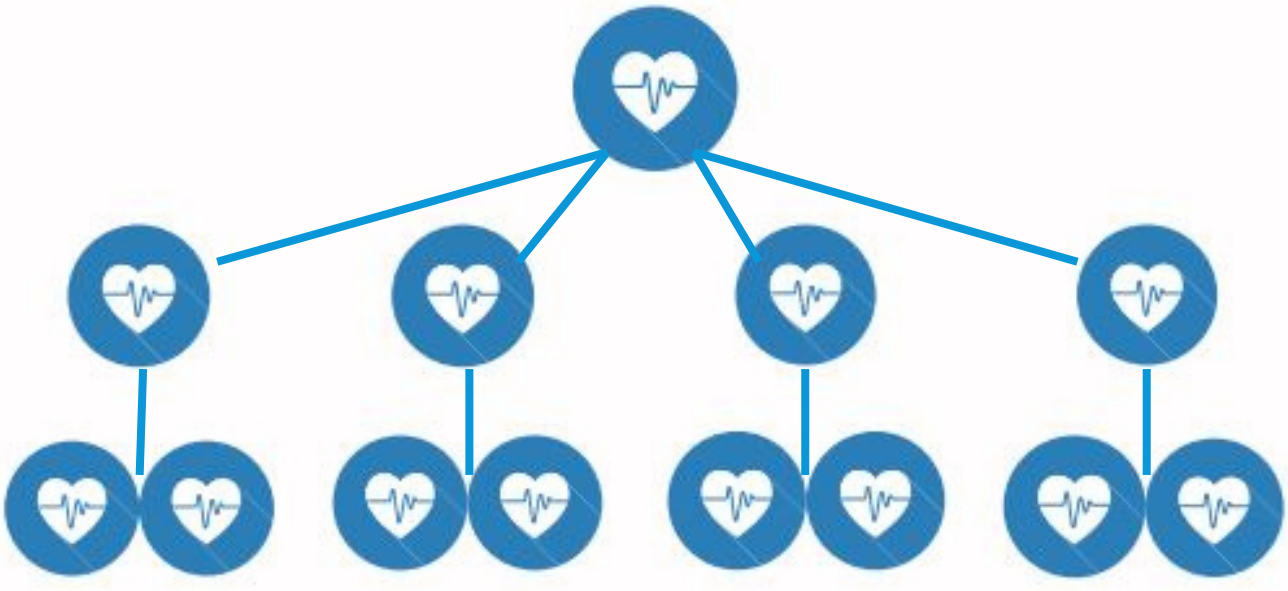
The pCr toolkit includes an evaluative matrix, The pCr Vital Signs Matrix, based on the concept of the vital signs of a project and contributing to the vital signs of a place (McKeown, 2015). The vital signs act as indicators of a healthy human and non-human system.

MM6: L1TG ROLE OF THE PCR METHOD

The pCr Vital Signs Matrix tool is both an evaluative tool and a collaborative project development tool that serves as a foundation to addresses social and environmental equity within a project; short, medium, and long-term.

	Earth care (Environment)	People care (SOCIAL)	Fair share (Economic)
Building Micro-ecologies			
Strategic Intervention Tactics			
Re-seeding Local Knowledge			
Re-situating Art and Design			

An additional indicator, the Inclusive Fitness Theory (Hamilton 1964, 1963), offers a metric to gauge project impact, used to evidence where the pCr ethos and methods spreads into other organisations or working practices towards long-term behavioural change



MM6: L1TG ROLE OF THE PCR METHOD

The methodology also developed an extended concept of SMART goals, to SMARTER, that sought to integrate goals reflective of the current and future context:

S - Socio-culturally specific, Simple, and Sincere

M - Meaningful, Manageable and Measurable

A - Appropriate, Achievable, Aspirational Ambitious

R - Relevant, Responsive, Reviewed and Revised

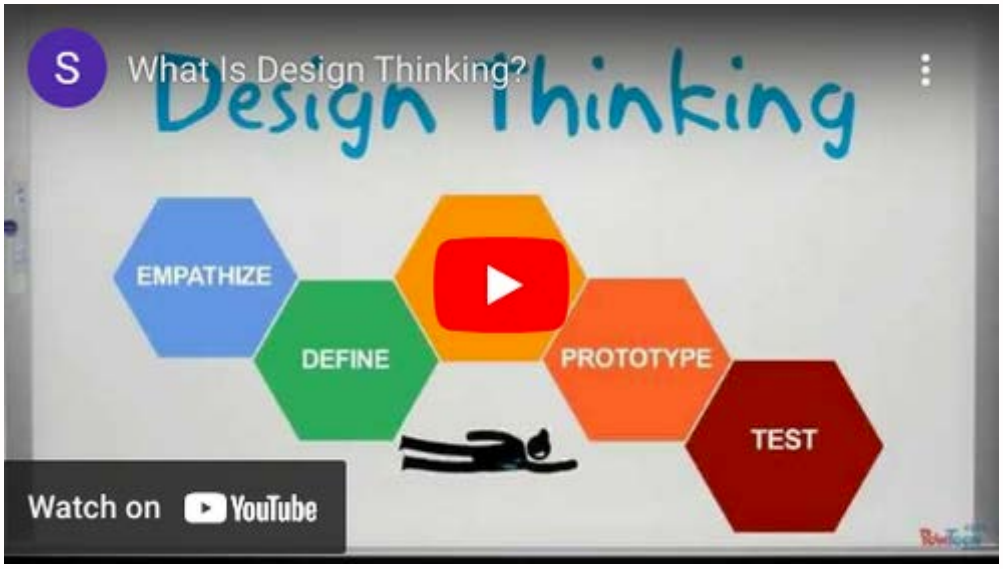
T - Timely and Time-specific

E - Eco-considerate and Ethical

R - Resilient, Resistant, Resourceful and far - Reaching.

MM6: L1WS DESIGN THINKING INTRO

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 -**

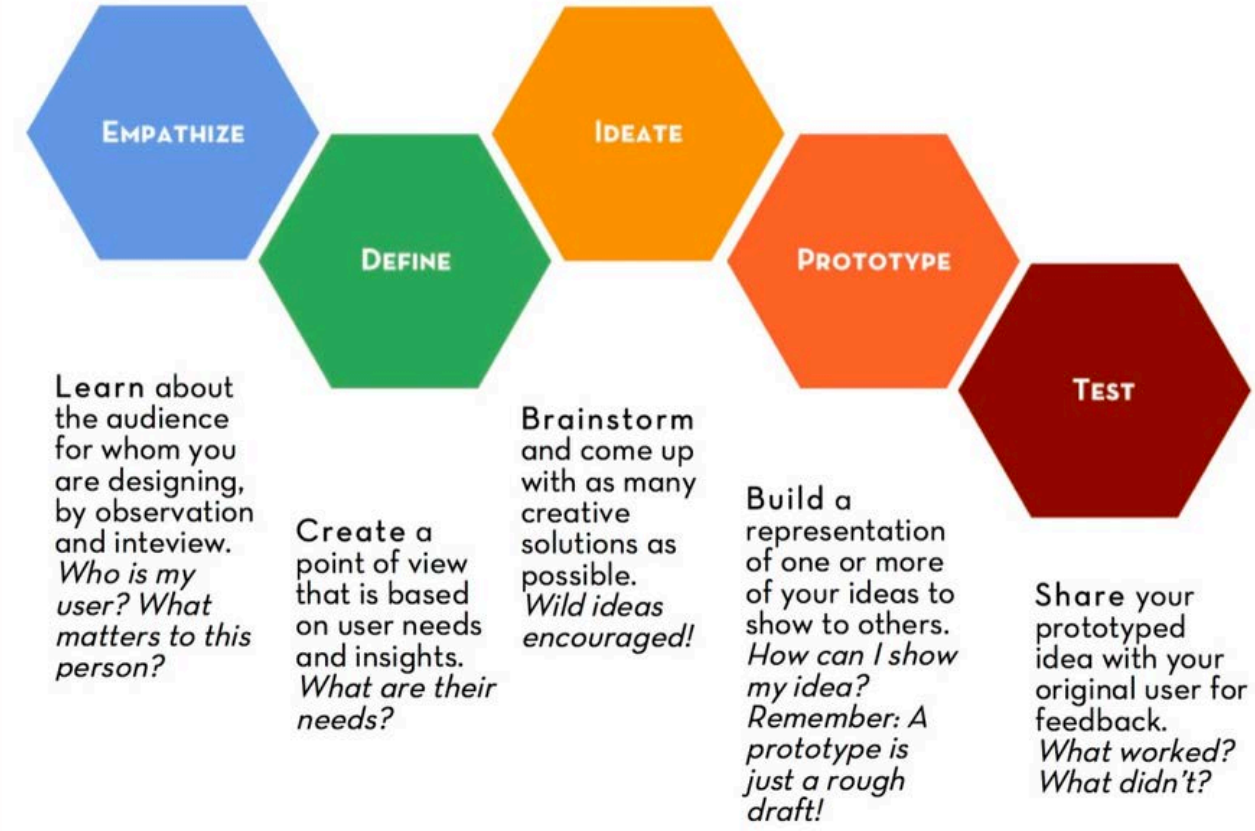
3. **Culture -**

4. **Stakeholders -**

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

MM6: L1WS DESIGN THINKING INTRO

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:

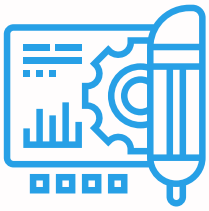
1.
2.
3.

MM6: L1WS DESIGN THINKING INTRO

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?

SDG 14 Future of the Ocean
MM6: Problem to Pitch Marine Plastic Waste

MM6: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 2: Empathy 1

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

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. This lesson is a practice lesson that enables learners to consider the 5 users' needs (this sets the design principles), develop ideas on paper and create 3D prototypes of their designs.

This activity encourages students to practice thinking about a user, iterate their designs, and practice using different materials. This is the foundation for doing a stakeholder mapping and user profile for their own project ideas. This lesson can be undertaken over a number of classes using the additional resources in the Media Box.

Vocabulary: Assumptions, (Biases, Judgement) Design Principles, Empathy, Identify, Users

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

MM6: Problem to Pitch Marine Plastic Waste
L2: Empathy 1

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 the groups to read through the user profiles from the user profile worksheet.
5. Students will highlight the users' needs and wants (design principles) for all the user profiles.
6. These will form the users' chairs based on the needs of the user.

Activity 2 – Developing paper designs – (15 mins)

1. Have students select a 2 users 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: 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

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

MM6: Problem to Pitch Marine Plastic Waste
L2: Empathy 1

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, select one of the videos as an introduction and a user randomly - make paper designs only for that user. Follow up with 3D designs in second class.

Extension: For a longer class, you can start with one of the videos to ensure learners understand the concept of empathy before developing their empathic design skills.

For an additional class, you can add additional users to the activity so learners can practice understanding users' needs and designing for them. Learners can also develop their understanding or empathic design by undertaking an empathy map with the users' profiles.

If students already have project ideas in mind, they could begin to develop their user profiles for their ideas based on the stakeholder mapping exercise from lesson 1 and develop their understanding of their users by using the Worksheet: Empathy Map – with activity 2.

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

Activity 3 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

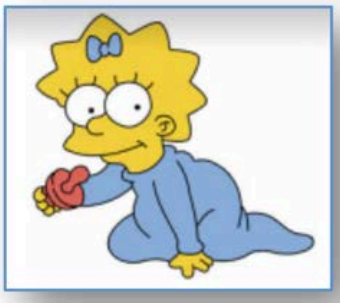
Stakeholder Mapping worksheet supports students to focus on their local place, its issues and its audience. This can be linked into the issue of Marine Plastic Waste.

Learners can link into their local FLAG region to find out about local initiatives https://bim.ie/fisheries/advisory-services/fisheries-local-action-groups-flags/

Linked learning: Media Communication 1-4 micro-module to support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration.

MM6: L2WS FIVE USER PROFILES

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.

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.

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.

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Implementation

Lesson 3: Empathy 2.0 - Mapping the User

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

Lesson Title and Summary: Mapping the User

This lesson facilitates learners to develop further insight into specific users and develop an understanding of their needs and interests.

From this lesson, learners working within their design teams will begin to identify and focus on the potential users of their minimum viable product / solution and the design principles necessary to design their product.

The lesson builds on Lesson 2 by developing learners' understanding of empathic design and the steps required to design for a user.

This supports the students to develop their concept maps in Lesson 10 and move towards creating their prototypes.

Vocabulary: Beneficiaries, Empathy Map, Design Principles, Influencers, Service Providers, Stakeholder Mapping, User Journey

In this lesson, the learner will:

- learn how to undertake a stakeholder mapping
- identify all the stakeholders that could be interested in their minimum viable product
- explore their understanding and knowledge of their user
- create an empathy map for their user and their product

Materials

- Worksheet: Stakeholder Mapping
- Worksheet: User Journey Map
- Worksheet: Understanding the User
- Pens, Pencils, Markers, Chalk Paper / whiteboard / blackboard
- Internet access - optional

MM6: Problem to Pitch Marine Plastic Waste
L3: Empathy 2.0 - Mapping the User

Activity Instructions

Activity 1 - Undertaking stakeholder mapping (25 mins)

1. Project the stakeholder mapping worksheet on the board.
2. Ensure language is clear with learners.
3. Select one of the practice projects listed on page 2.
4. As a class, begin to create a list of all the different individuals, groups and, organisations that you can begin to identify and categorise them - this is all potential stakeholders / beneficiaries that could be linked to the selected project.
5. Using the impact grid on page 2 of the worksheet, begin to place people from the list in the various grid sections.

Activity 2 - Developing design principles from user profiles (15 mins)

1. Organise learners into groups of 2 or 3 and ask them to begin answering the questions on the 'Understanding the User' Empathy Map to create the empathy map to begin to focus on a potential user / clients from the stakeholders / beneficiaries of the selected project to begin to create a profile for their product.
2. This will help them consider the look and feel of their stakeholders / beneficiaries and think about their users' needs - the design principles, and their users' journey.
3. Ask the learners to consider the following questions:
    - Did you identify the design principles (their needs) 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 assumed?

Activity 3 - Mapping your user's journey (10 mins)

1. The learners will use the 'User Journey' worksheet to begin to focus on the potential users and their journey to begin to create an outline for their product / solution.
2. Ask the learners to integrate the information about their potential users they have gathered from the process in Activity 1 / 2.
3. This activity will be used to help them refine their product design before and during Lesson 10 / 11 - 12 prototyping and vision boards.

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

MM6: Problem to Pitch Marine Plastic Waste
L3: Empathy 2.0 - Mapping the User

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter lesson, ask learners to watch the 'Importance of Empathy' video and complete the 'Stakeholder mapping' worksheet individually at home. In a follow up class, ask them to share their work with their other team members and collate their findings and complete activities 2 / 3.

Extension: For a longer lesson, watch the 'Empathy Mapping' video at the beginning of Activity 2.

- Option B: Open up the discussion using the questions for consideration in activity 2.
- Option C: Spend longer on Activity 3 'User Journey' exercise and ask each team to share their users' journey for feedback from the other learners. You can also share some of the resources in the media box.
- Watch part 3 of Mallory Dean's How to make a User Journey Map - see media box

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

The importance of Empathy (3:30 mins) https://www.youtube.com/watch?v=UzPMMSKfKZQ

What is an Empathy map? (5:36 mins) https://www.youtube.com/watch?v=QwF9a56WFWA

Creating personas for User Experience Research (10:00 mins)
https://www.youtube.com/watch?v=u44pBnAn7cM

Mallory Dean How to make a User Journey Map (7:51mins) - for UI Toolkit yet the concepts are transferable - Part 3 Good for digging deeper once a user / need is identified. A useful addition if some of the learners want more in depth information https://www.youtube.com/watch?v=3Tge09u8RQ8

Templates referenced by Mallory Dean for User Journey map
https://www.nngroup.com/articles/journey-mapping-101/

Local Trip / Expertise / Additional Work and Assessments

As a way to practice empathic design, learners can connect with organisations working with, Marine Plastic waste to find out about their issues, needs, and undertake a user journey with them.

Learners could contact a user experience (UX) designer or college lecturer in UX design and ask them about their work with users / clients and what they find most difficult. All the universities in Ireland offer UI / UX design programmes https://edurank.org/cs/ux-ui/ie/ and the National College of Art offers Interaction Design programme which includes User Interface (UI) design as well as UX.

MM6: L3WS EMPATHY 2.0 STAKEHOLDER MAPPING

14 LIFE BELOW WATER

Stakeholder Mapping

A project's stakeholders are the people or groups of people who can impact or are impacted by a project. When 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 AND MARINE PLASTIC WASTE

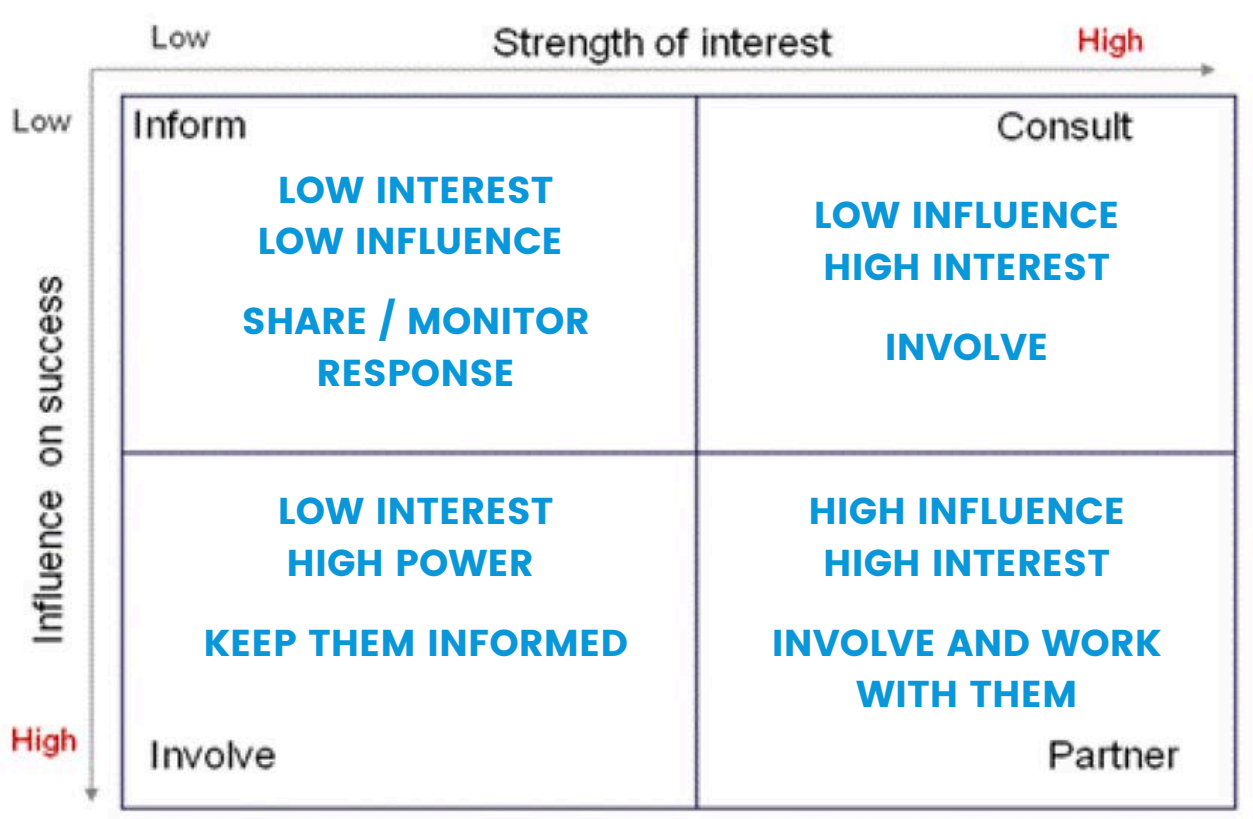
GOVERNANCE

INFLUENCERS

MM6: L3WS EMPATHY 2.0 STAKEHOLDER MAPPING

DIFFERENT WAYS OF MAPPING

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



2 Practice Examples:

1. You are developing a climbing frame in a park - using fishing net offcuts. 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 an event to raise awareness about marine plastic in your 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.

MM6: L2 and L3WS Empathy Map

What does your user think and feel?

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

THINK AND FEEL

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

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

HEAR

SEE

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 DO THEY SAY AND DO

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

14 LIFE BELOW WATER

MM6: L3WS User Journey Map

	EXPERIENCE	AWARENESS	ENGAGEMENT	AFTER PLAYING
think	What is your product's purpose?	What makes your product / idea different?	How will people use your or access your product ?	Why will people keep using your MVP / Service?
feel	How do you want your product to look or feel?	What do you want people to notice about your product?	How do you want people to feel about your product?	How do you want your user to feel after using your product?
do	What will you need to do to make it look / feel this way?	What research will you need to do to make sure this happens?	How will you know if you have been successful?	How will you follow up with your users / clients?

MM6: L2WS Understanding the User

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: _____

SDG 14 Future of the Ocean
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Micro Module 6: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 4: Defining the Problem 2

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

Lesson Title and Summary: Defining the Problem 2

In this lesson, students will begin to understand how to define a problem. Students are asked to begin to identify the aspects of the problem of Marine Plastic Waste at a local and global level.

Learners will identify and research key aspects of Marine Plastic Waste and link to the targets 14.1 and 14.2 of SDG 14 Life Below Water. Learners will have the opportunity to connect and develop awareness of their local context and any concerns with Marine Plastic Waste.

Vocabulary: Assumptions; (Biases, Judgement) Analyse, Conflicts, Define, Identify, Problem

In this lesson, the learner will:

- understand the importance of getting to the source of a problem
- become more accustomed to SDG 14
- develop an understanding of the connection of local and global issues
- develop an understanding of the complexity of wicked problems in their location
- develop critical thinking about problem solving

Materials

- Worksheet: Problem Tree
- Teachers' Guide: Problem Tree
- Supporting resource: P2P Define
- Flipped Classroom Task: Problem search (for a shorter class only)
- Pens, pencils
- Paper
- Local Newspapers / internet access

MM6: Problem to Pitch Marine Plastic Waste
L4: Defining the Problem 2

Activity Instructions

Activity 1 - Finding and defining your local problem, issue or concern (25 mins)

1. As a class, watch the video: 'Define' (4:34 min) introducing stage 2 of the Design Thinking method.
2. Organise students into groups of 2 or 4.
3. In their groups ask them to look at the SDG 14.1 and 14.2 targets and indicators for SDG 14 and begin to think about the potential impact their solution might need to address.
4. Ask learners to search online versions of local newspapers for local news, problems, issues, and concerns about Marine Plastic Waste.
5. Ask learners to feedback by putting summaries of what they have found on the board.
6. As a class, begin to think about your local areas problem of Marine Plastic Waste.

Activity 2 – Using a Problem Tree – (25 mins)

1. As a class, watch the Defining the Problem video - see Media Box.
2. Ask learners to look at the Worksheet Using a Problem Tree - learners can do this in groups or as a whole class.
3. Using the information found in activity 1 write the main problem locally with Marine Plastic Waste on the problem tree's trunk.
3. As a group, discuss the causes of this problem and write them underneath the problem, like 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.
6. For each effect, ask what the consequences are.
7. Continue this process until no further causes and effects are mentioned.

NB: You may not have all the answers at this point, so make notes of any assumptions, questions, conflicts, or gaps in knowledge.

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

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

MM6: Problem to Pitch Marine Plastic Waste
L4: Defining the Problem 2

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, ask learners to complete the Flipped Classroom Task: the local search on marine plastic waste using the internet / newspapers and watch the video: Defining the Problem at home in preparation for the next class.

Extension: For a longer class, ask learners to read Support Sheet: P2P Define and Discuss. Then watch the Video: 'What is a Problem Statement' and begin to try to develop a problem statement. The problem statement can be completed at home and discussed at the beginning of the next class.

Learners can begin to research the local organisations and stakeholders involved in the problem of Marine Plastic waste and make connections with them. They maybe able to collaborate when they come to develop their service, product or service in response to the local problem of Marine Plastic Waste.

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

- Video: (4:34min) Define https://www.youtube.com/watch?v=TNAdanuvwtc
- Video: 'Defining the Problem' (1:25min) https://www.youtube.com/watch?v=2rJRVv-NOaA\
- Video: 'What is a Problem Statement' (2:54min) https://www.youtube.com/watch?v=ezxp_yt4kDA
- Sustaining Development SDG 14 https://sustainingdevelopment.com/sdg14-indicators/
- Linked learning: Media Communication 1-4 micro-modules support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration. Use these to support learners making a video; presentation, poster or podcast / undertaking interviews

Local Trip / Expertise / Additional Work and Assessments

Stakeholder Mapping worksheet supports students to focus on their local place, its issues, and its audience. This can be linked into the issue of Marine Plastic Waste.

Link to SDG 4 Supporting skills https://www.codesres.ie/sdg-4-supporting-resources Sign up SDG 4 Web quest lesson plan, Interview skills

Learners can link into their local FLAG region to find out about local initiatives or contact BIM to ask about initiatives in their area https://bim.ie/fisheries/advisory-services/fisheries-local-action-groups-flags/

MM6: 4TG PROBLEM TREE

What is the purpose of a problem tree?

The 3 most important points of a problem tree are:

- It allows us to break down the problem, the causes and its effects, improving its analysis.
- There is a better understanding of the problem by breaking it into causes and consequences.
- Facilitates the realisation of other important components of a project in its planning stage, e.g. stakeholder analysis, risk analysis and objectives.

When introducing the exercise and worksheet: Using a Problem Tree, it might be helpful to discuss an example on the board so that students are clear on what is meant by problem, impact, cause, and effect.

Remind them that there can, and usually will be, more than one impact, cause, solution, and effect. Show them how the effect of a solution might bring up a new problem to solve and take through this process.

Step-by-Step:

- Analyse the situation: What is happening, why is it happening and what is triggering it. Collect data that will allow you to understand the problem situation, this will help
- Identify the main problems of the situation you have analysed: Use brainstorming, defining by consensus what the main problem is.
- Determine the effects and causes of the main problem: You already have the trunk of the tree, now identify the causes (roots) and the effects or consequences (leaves or branches). Again, it is better if this is done as a team, seeking to reach a consensus. If in step 2 you elaborated the Vester matrix, you will already have this step quite clear.
- Draw the tree: Simple. We will see how in the example below.

Example:

Problem = People need to access a local walking trail in the evening after work and it gets dark early in the winter.

Impact = No one uses the trail in the evenings in the winter the space is wasted.

Cause = (1) It gets dark early as there's no natural light. (2) People don't feel safe using the trail in the dark. They can't see where they are going and might trip and fall. It's dull and boring in the dark.

Solution 1 = We install lights.

Effect of solution 1: We can't just install any lights, we have to align to policy SDG 7 / carbon emissions.

MM6: L4WS PROBLEM SOLVING TREE

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

I choose solution number _____
because _____
_____

SOLUTION 3

SOLUTION 2

SOLUTION 1

PROBLEM

MM6: L4SR PROBLEM SOLVING

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.

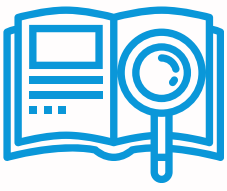
Things to think about:

- 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 early!

- 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?

MM6: L4WS FLIPPED CLASS - PROBLEM SEARCH

Watch: 'What is a problem statement "
https://www.youtube.com/watch?v=ezxp_yt4kDA

In your own words write:

1. Write the meaning of a PROBLEM STATEMENT.
2. Give a definition of PROBLEM STATEMENT.
3. Write an explanation of what a PROBLEM STATEMENT is.

Your Answers:

1.

2.

3.

Try to construct a problem statement for the local problem of Marine Plastic Waste:

Local search: Using the internet or local newspapers and newsletters, make a list of local organisations or stakeholders that are undertaking local initiatives dealing with Marine Plastic Waste - you can also do a county wide search:

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Implementation

Lesson 5: Defining the Problem 2

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

Lesson Title and Summary: Defining the Problem 2

In this lesson, learners will begin to research aspects of Marine Plastic Waste, in particular the Fishing Industry. Learners will research key aspects of Marine Plastic Waste ecosystem.

Learners will work in groups to research net manufacturers, net transport, net waste, fishers, activism and community impact. They will collate the information as a group learning how to build greater understanding of a problem collectively.

Vocabulary: Assumptions, (Biases, Judgement) Analyse, Conflicts, Define, Identify, Problem

In this lesson, the learner will:

- understand the importance of getting to the source of a problem
- become more accustomed to SDG 14
- develop an awareness of how to localise SDG 14
- 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

- Worksheet Define - Fishing System / Ecology Define
- Pens, pencils
- Paper
- Local Newspapers / internet access

MM6: Problem to Pitch Marine Plastic Waste
L5: Defining the Problem 2

Activity Instructions

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

1. Organise learners into groups of 3 or 4 depending on class numbers.
2. In their groups ask them to select (or assign) one of the 5 sections on the worksheet - Fishing Net Industry.
3. Ask each group to summarise their findings on poster-size paper and present their findings by putting them on the wall for the next activity.

Activity 2 – Discussing the information (25 mins)

1. As a class, give the group 10 mins to look at the posters on the wall.
2. As a class, develop a discussion by addressing each of the posters or have the group consider each of the poster's aspects and discuss the findings

Questions to discussed (selection taken from the worksheet):

1. Where do most of the nets come from / where are most nets made?
    a. What other problems might this cause?
    b. How could that be addressed?
    c. What are some of the latest development in net making, e.g. lights, electronics?
2. What are nets made from?
3. What are the key problems with the industry?
4. Are there any regulations or new laws that might change these problems, e.g. single use plastic?
5. What impact might this have?
6. What impact do nets have on fishers?
    a. How does this impact their job?
    b. How are they helping?
    c. Do you think the public understand this?
7. What campaigns or activism was discovered?
8. What might you do? Any early ideas?

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

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

MM6: Problem to Pitch Marine Plastic Waste
L5: Defining the Problem 2

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, ask learners to undertake complete the Flipped Classroom Task: the local search on marine plastic waste using the internet / newspapers and watch the video: Defining the Problem at home and prepare to share their findings in the next class.

Extension: For a longer class, continue the discussion with the class:

- What surprised them?
- Do they have any ideas of a product, or service they could make or develop linked to marine plastic waste?

Learners could discuss any ideas they might have to address the problems now they have more information with peer feedback on their ideas.

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

- Video: (4:34min) Healix Recycling Fishing Nets https://www.youtube.com/watch?v=NVsf3Aw-8Ww
- Sustaining Development SDG 14 https://sustainingdevelopment.com/sdg14-indicators/
- Linked learning: Media Communication 1-4 micro-modules support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration. Use these to support learners making a video, presentation, poster or podcast / undertaking interviews.

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Learners can link into their local FLAG region to find out about local initiatives or contact BIM to ask about initiatives in their area https://bim.ie/fisheries/advisory-services/fisheries-local-action-groups-flags/

Find out where your nearest fishining net manufacturer is - could you visit? Could you set up a call for learners to interview them about their process including what do they do with their waste?

Could you talk to a Harbour master or owner of a fishing boat to find out more about the problem?

SDG 14 Module 4 and 5 Introduction to Biomimicry and Biomimicry Micro Project

MM6: L5WS FISHING SYSTEM / ECOLOGY DEFINE 2.0

14 LIFE BELOW WATER

OBSERVATION: What do we know about the problem?

- How are nets made?
- Where are they made?
- How do they get to Ireland?
- What is the issue with synthetic nets?
- What is the impact of synthetic nets?
- What policies are there around this issue?
- Who does it effect?
- How does it effect them?

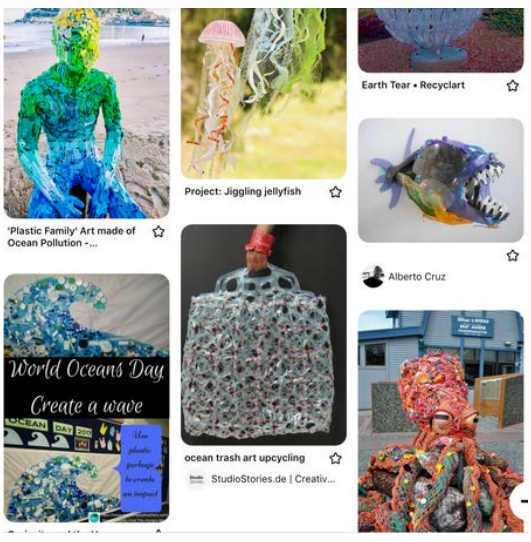
SELECT AN AREA OF THE FISHING INDUSTRY AND GATHER AS MUCH INFORMATION AS YOU CAN

- Fishers
- Net Manufacturers
- Net materials and Processing
- Marine Charities and Education Groups
- Community groups and Local groups

You can use Google and Pinterest as a research tool.

Once you have completed the task, set up a Pinterest board and save images to the board, with images from your category.

Share the boards with the whole class, so you can see the whole system you have researched quickly. www.pinterest.com



MM6: L5WS FISHING SYSTEM / ECOLOGY DEFINE 2.0

14 LIFE BELOW WATER

Work through the questions relevant to the industry aspect you are looking at - these will be shared at the end with the other groups to build up a whole picture of the industry

Net Manufacturers

1. How many net manufacturers can you find?
    a. Provide their names.
    b. Where are they based?
2. How do the nets get to Ireland?
3. Who buys them?
4. Are there Irish net manufacturers?
5. What do they do?

Net Waste

1. What are the issues with synthetic nets?
2. What are the impact of synthetic nets?
3. What policies are there around this issue?
4. Whom does it effect? List them.
5. How does it effect them?

Fishers

1. What are fishermen having to deal with regarding net waste? Does it effect them and their work?
2. What are they doing about net waste?
3. Are there other organisations within the fishing industry dealing with net waste?
4. How are they managing the issues of waste?

Some useful links:

- http://www.bim.ie/media/bim/content/funding-forms/flags/6085-BIM-FLAG-South-West-1.pdf
- http://www.bim.ie/media/bim/content/funding-forms/fl
- http:/www.fao.org/in-action/globefish/fishery-information/resource-detail/en/c/388082/
- https://www.worldoceanfest.org/new-blog/2017/6/9/the-impact-of-abandoned-ocean-fishing-nets-on-marine-life

MM6: L5WS FISHING SYSTEM / ECOLOGY DEFINE 2.0

14 LIFE BELOW WATER

Marine Activism, Conservation and Education

1. How are marine charities, conservation, and activism groups dealing with the key issues with fishing net industries?

2. Consider the key messages around marine plastic waste campaigns?

3. What types of campaigns are there? Can you categorise them: awareness-raising or practical solutions, are there any other types?

4. What is their message?

Local Communities

1. What is the impact of net waste on local communities?

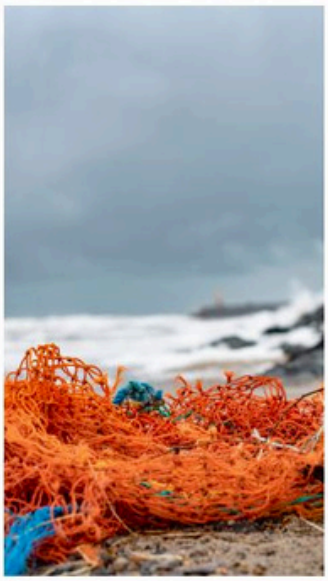
2. How are local communities managing the impact?

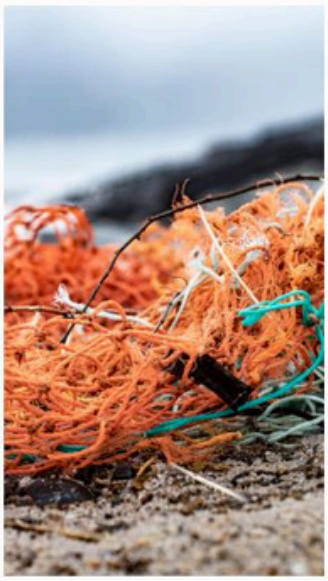
3. Do you see the impact in your community? If yes, what is it?

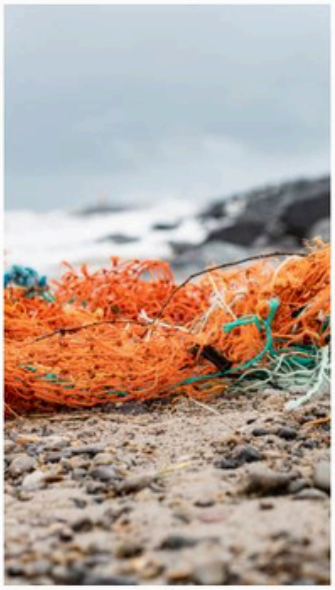
4. What organisations are working with net waste in your local community?

5. What are they doing in your local community to deal with the waste?

6. Do you know anyone else in your local community interested in fishing net waste?







SDG 14 Future of the Ocean
MM6: Problem to Pitch Marine Plastic Waste

MM6: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 6: Worst IDEA Ever

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

Lesson Title and Summary: Worst IDEA Ever

This lesson enables students to develop an understanding of how to think with agility, creativity, and resourcefulness. Learners will go through the process of transforming a bad idea into the potential starting point of a workable idea. This supports the development of ideation and the capacity to look for opportunities to iterate and improve on existing ideas.

Learners are introduced to open source concepts, such as iteration, collaboration, and ideation.

Vocabulary: Agile thinking, Collaboration, Idea Generation, Ideation, Iteration, Remix

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:

- Teachers' Guide: Worst IDEA Ever
- Pens, pencils
- Large pieces of paper
- White board

MM6: Problem to Pitch Marine Plastic Waste
L6: Worst IDEA Ever

ACTIVITY INSTRUCTIONS

Activity 1 - Worst Idea Ever (20 mins)

1. Organise the learners into groups of 2 or 3.
2. Explain the activity (see Teachers' Guide: Worst Game Ever) learners will work in their groups to come up
with 6-8 examples of the worst ideas ever. These will then be swapped amongst the groups
to be transformed in activity 2.
3. Tutor to give some real-world starting ideas – Teachers' Guide.
4. After 15 minutes ask students to share one or two of their worst ideas ever.

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 the 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 as a whole class.

- How easy/difficult was it to generate bad ideas? Why?
- How easy/difficult was it to remix the ideas into good ones? Why?
- How could this process be used in different ways (not just about products)?

2. Use the activity to introduce key ideas of open source:

- Watch the Open Source As Explained by Lego video - see Media Box.
- Give each learner one of the other open source video links (see Media Box) to watch at home.
- They can bullet point the main ideas in the video and share it in class during the following lesson.

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

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

MM6: Problem to Pitch Marine Plastic Waste
L6: Worst IDEA Ever

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, complete Activity 1 and 2 with less examples (i.e. 3-5 ideas).

Extension: For a longer class, extend discussion time around the process. Ask learners to select 1-2 of the remixed good ideas and complete a Empathy Map from lesson 2.

Option 2: Spend more time examining the concept of open source and the projects (Activity 3).

Extend the discussion and encourage learners to research the open source projects in the media box as a Flipped Classroom for a possible discussion next class – see Media Box. Allocate the open source projects equally across the learners, so there are a number of learners watching each video. In the next class, begin with small group discussion around each project / video watched. Follow up with all group feedback on each video / project and undertake a collective discussion.

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

- What is open source? Explained by Lego (4 min 40) https://www.youtube.com/watch?v=a8fHgx9mE5U
- Open-source culture (1:10min) https://www.youtube.com/watch?v=gobBQwtFeyk
- Crispr Gene Editing (4:22min) https://www.youtube.com/watch?v=1VaG3DpFXjs
- Open Source Aquaponic Greenhouse (3:45min) https://vimeo.com/141252002
- Open Source Ventilator https://opensourceventilator.ie/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Stakeholder Mapping worksheet - supports students to focus on their local place, its issues and its audience. This can be linked into their project as part of the prototyping process.
Link to SDG 4 - Supporting skills https://www.codesres.ie/sdg-4-supporting-resources
Sign up to access SDG 4 Web quest lesson plan, Interview skills.

Learners can link into their local FLAG region to find out about local initiatives or contact BIM to ask about initiatives in their area https://bim.ie/fisheries/advisory-services/fisheries-local-action-groups-flags/

MM6: L6TG WORST IDEA EVER

The session is an iteration of the 'Worst Possible Idea' a term coined by author, president and co-founder, Bryan Mattimore, The Growth Engine Company LLC.

As a facilitation tool for ideation, the 'Worst Possible Idea' (WPI) turns the process of developing ideas upside down. Rather than having the pressure of coming up with novel or innovative ideas, WPI facilitates agile creative thinking in a relaxed, fun, collaborative atmosphere. The process is used by professionals, design studios, within hackathons, or start-up weekends, and has been shown to boost confidence, challenge assumptions, and offers a more inclusive approach to ideation. No one fears stating the worst possible ideas, a process loaded with fun and laughter and maybe a few groans.

This session introduces learners' to this concept focused around the worst idea ever and a playful process of transforming how they can be formed into the foundation for possible good ideas.

To start, explain the activity using the following examples of bad to good ideas:

- a sealed metal tube for a boat / as transport - add an engine / design and pressurise it (submarine), add windows and wings (aeroplane), different wheels and slick design (bullet train).
- a chocolate teapot - why is it a bad idea? It would melt. However, the 'hot chocolate spoon' that retails for about €4-5 uses that quality as a design feature to create a gift / treat product.
- windows you can't see out of / opaque windows - this how 'bathroom' or privacy glass started.

To facilitate the worst idea ever, have groups:

1. Come up with as many bad ideas as they can. 8 -10 is a good number to aim for.
2. Ask them to list why they are bad ideas, listing all the properties of what makes them bad as this is what forms the foundation of the transformation.
3. List what makes the WORST of these ideas SO terrible.

Here, you can decide whether to do a class activity or just swap the groups work, it is important no group works on their own bad ideas. Then either as a class (you can still swap the groups' work and ask each group to offer up ideas to work on collaboratively a class) or within their groups.

1. Begin with searching for the OPPOSITE of the WORST attribute of each idea.
2. Then substitute something else in for the worst attribute.
3. Mix and match various awful ideas to see what happens - all the time considering how to make them good ideas or how they might become good attributes for a product, e.g. addresses a need or is sustainable.

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Micro Module 6: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 7: Generating and Remixing Ideas

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

Lesson Title and Summary: Generating and Remixing Ideas

This lesson builds on lesson 6 and enables learners to develop an understanding of the process of generating ideas starting with their personal experience to help them build skills for personal project ideas. Learners 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: 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:

- Worksheet: Ideate Remix
- Worksheet: Remix SWOT extension task
- Pens, pencils
- Paper

MM6: Problem to Pitch Marine Plastic Waste
L7: Generating and Remixing Ideas

Activity Instructions

Activity 1 - Remixing ideas – Rapid Response (20 mins)

1. Organise students into groups of 3.
2. 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.
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, which build on lesson 4 outcomes, current product, service or activity, the problem, and the change required.

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

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

MM6: Problem to Pitch Marine Plastic Waste
L7: Generating and Remixing Ideas

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, undertake activities 1 only and use activity 2 in a follow up class focused on marine plastic waste / litter.

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. Learners can begin to develop an empathy map for a user of the ideas, products or service that have come out of activity 1.

Learners 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)

- Video: Ideate (4:04 mins) - https://www.youtube.com/watch?v=zbLxs6te5to
- Sustaining Development SDG 14 https://sustainingdevelopment.com/sdg14-indicators/
- SDG 14 Life Below Water - What you can do https://www.youtube.com/watch?v=AJZFBhJwct8&t=0s
- The Global Ocean SDG14 - An Ocean Opportunity (9:34mins) https://www.youtube.com/watch?v=rfwymvYHyWk 2015 but still has useful information

Local Trip / Expertise / Additional Work and Assessments

Learners can begin to research the local organisations and stakeholders involved in the problem of Marine Plastic waste and make connections with them. They may be able to collaborate when they come to develop their service or product in response to the local problem of Marine Plastic Waste.

Learners can link into their local FLAG region to find out about local initiatives or contact BIM to ask about initiatives in their area https://bim.ie/fisheries/advisory-services/fisheries-local-action-groups-flags/

MM6 L7WS Idea Remix 1

Team Name _____

Date _____

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 undrtaking your hobby

What would make it easier to do your hobby

Hobby	Likes	Obstacles	Change

Hobby	Likes	Obstacles	Change

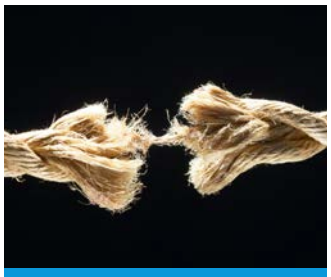
MM6: L7WS Remix 2
SWOT Analysis

Name _____

Date _____

14 LIFE BELOW WATER

This worksheet will help you play with ideas using a SWOT analysis. Fill in the boxes for three different ideas for your teams' project.



Purpose	Strengths	Weaknesses	Users

Purpose	Strengths	Weaknesses	Users

Purpose	Strengths	Weaknesses	Users

SDG 14 Future of the Ocean
MM6: Problem to Pitch Marine Plastic Waste

Micro Module 4: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 8: Design Thinking - Ideate 3 Biomimicry

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

Lesson Title and Summary: Biomimicry and Design

In this lesson, learners are introduced to Biomimicry and its potential and importance for design. Learners will learn more about the concept and explore how nature manages aspects of the physical world.

Learners will also research and consider a number of animal 'superpowers' from nature and explore how this can be used to inspires us and can contribute to developing solutions to serious problems.

Vocabulary: Biomimicry, Nature-inspired design, Nature-led Innovation

In this lesson, the learner will:

- become aware of the concept of Biomimicry
- understand the potential of nature to inspire design
- develop creative research skills
- explore biomimicry for design and innovation
- learn how to apply creative research in new contexts
- develop creative problem solving skills

Materials:

- Worksheet: How Does Nature - Part 1 and 2
- Pens, pencils

MM4: Problem to Pitch Marine Plastic Waste
L8: Design Thinking - Ideate 3 Biomimicry

Activity Instructions

Activity 1 - Introduction to Biomimicry - How does Nature (30 mins)

1. Watch the Video - Bio-mimicry, Definitions and examples (4:19mins).

2. Discuss the video with the learners and how this might lead to design innovations.

3. Organise learners into groups of 2 or three depending on the class size.

4. In their groups, ask them to undertake the How does Nature 1 activity on the worksheet.

5. Ask each group to summarise their findings on poster paper and present their findings by putting them on the wall and everyone to look at them.

6. Ask teams to photograph their answers and upload to Microsoft teams. It is important everyone can all see the answers and thinks about them.

7. Keep their poster papers for reflection during prototyping and developing their ideas.

Activity 2 – Exploring Biomimetic Design - (20 mins) Species and their Superpowers

1. In their teams, ask learners to find out the answers to on the How Does Nature part 2.

2. Ask the learners if they know of any design innovations.

4. Ask each group to summarise their findings on poster paper and present their findings by putting them on the wall and everyone to look at them.

5. Again, ask each group to summarise their findings on paper and present their findings by putting them on the wall or using Microsoft teams. It is important everyone can all see the answers.

6. Keep their poster papers for reflection during prototyping and developing their ideas.

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

- 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

MM4: Problem to Pitch Marine Plastic Waste
L8: Design Thinking - Ideate 3 Biomimicry

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, undertake activity 1 only with a short discussion.

Extension: For a longer class, watch Science Copies Nature video and discuss.

Option B: Watch - 5 Amazing biomimicry examples (6:48mins) in the media box and ask learners to consider how they might integrate an animal superpower into a solution for marine plastic waste. Learners can watch the other in the media box in their own time for inspiration.

For an additional class, see Local Trip Box.

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

- Bio-mimicry, Definitions and examples (4:19mins) https://www.youtube.com/watch?v=UHb_XNgIHFY
- Science Copies Nature's Secrets - Bio-mimicry (9:22 mins) https://www.youtube.com/watch?v=2d1VrCvdzbY
- 16 x 9 Bio-mimicry (5:51mins) https://www.youtube.com/watch?v=QdFfGvLwAhg

Animal Superpowers

- 5 Amazing biomimicry examples (6:48mins) https://www.youtube.com/watch?v=5FZ9Ryx5zAk
- Shrimp swimming https://www.youtube.com/watch?v=tOh33BmiT0I
- Starfish tube feet https://www.youtube.com/watch?v=tvTH3Q4OLdQ
- Feather stars https://www.youtube.com/watch?v=OyketlthVWg

Local Trip / Expertise / Additional Work and Assessments

For a local trip / additional class - use SDG 14 Ocean Literacy - Biomimicry Lesson 8.

1) Go to local area in nature, e.g. garden, shoreline, woodland, AND/OR bring in some items from nature that students can observe in class.

2) In pairs, mindfully observe one of the animal examples (see media box); study its form, features and how it moves, what can we learn from it (5-10mins - at least 1 min silent observation to begin with).

3) Write down these features after observing, drawing or listing super powers.

4) In small groups, learners can share their observations of each creature.

5) Discuss as a whole class and list any similarities between observations on the board.

MM6: L8WS HOW DOES NATURE?

How does biomimicry help inventors solve human problems through nature-based solutions?

How Does Nature? Part 1

The following exercise is to get you thinking about how nature does things - looking at this and then thinking about how we can use this in our designs is a very useful start when thinking about design solutions to problems.

Try to find out 3 examples (any species) of how nature does the following things:

1. How does nature produce energy?
2. How does nature gather and store energy or heat?
3. How does nature heat and cool things?
4. How does nature waterproof things?
5. How does nature propel things?
6. How does nature produce colour and light?
7. How does nature provide shelter?

Learners can watch these other videos in your own time:

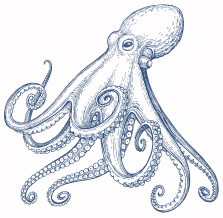
- 16x9 – Biomimicry - Sharklet 5:51mins
  https://www.youtube.com/watch?v=QdFfGvLwAhg
- Biomimicry is more than just good design 6:58mins
  https://www.youtube.com/watch?v=r1CpzEGhs3c

MM6: L8WS HOW DOES NATURE?

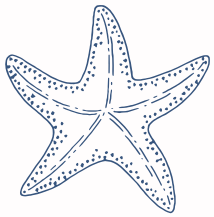
14 LIFE BELOW WATER

SPECIES AND THEIR SUPERPOWERS

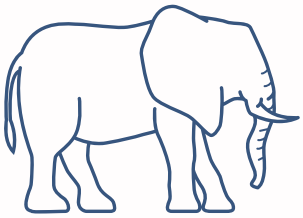
- How much power is in dolphin's thrust and how does it work?



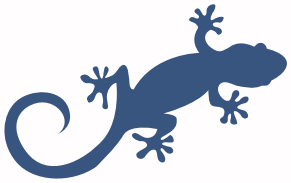
- Find out how an Octopus changes colour?



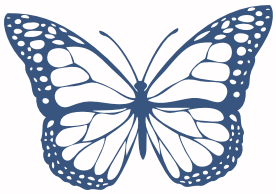
- How does a starfish regrow a limb?



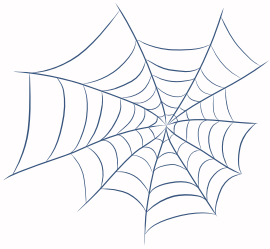
- How does an Elephant's trunk work?



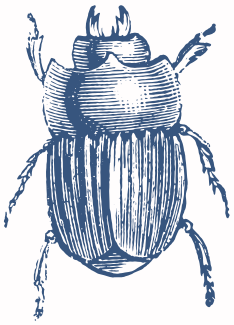
- How can Gecko walk on walls and ceilings?



- How does butterfly wings gleam?



- How strong is a spiders web?



- How does the Namib Desert beetle get water to survive in the desert?

- How does a peregrine go into a dive?

SDG 14 Future of the Ocean
MM6: Problem to Pitch Marine Plastic Waste

Micro Module 6: Problem to Pitch Marine Plastic Waste

Implementation

Lesson 9: Prototyping 1 - Circular Design and Life Cycle Analysis

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

Lesson Title and Summary: Prototyping 1 - Circular Design and the Life Cycle Analysis

In this lesson, learners are asked to consider a product case study for its sustainability and learn how to break down the 'system' in which the design / product is part of.

Learners will then apply this skill to thinking about their own possible ideas by undertaking a life cycle analysis by considering the inputs, processes, and outputs involved.

Vocabulary: Inputs, Life Cycle Analysis, Outputs, Processes, Systems Thinking.

In this lesson, the learner will:

- Learn more about the circular economy and circular design
- become aware of the concept of design systems and systems thinking
- understand the potential of design interventions for sustainability
- develop system thinking and system analysis skills
- begin to consider their design interventions from a systemic perspective

Materials:

- Worksheet: Product Case Study
- Worksheet: Life Cycle Analysis Zoning map
- Pens
- Pencils

MM6: Problem to Pitch Marine Plastic Waste
L9: Prototyping 1 - Circular Design and Life Cycle Analysis

Activity Instructions

Activity 1 Introduction to Circular Economy and the Life Cycle Analysis (20 mins)

1. Watch the Video: 'The circular economy: A new way to design, make, and use things [3:50 mins].

2. Discuss the video with the learners and how this might lead to design innovations.

3. Organise learners into groups of two or three depending on the class size.

4. In their groups, ask them to undertake the Product Design Case Study Life cycle analysis.

5. Ask each group to summarise their findings on poster paper and present their findings by putting them on the wall and everyone to look at them.

6. Ask teams to photograph their answers and upload to Microsoft teams. It is important everyone can all see the answers and think about them.

7. Keep their poster papers for reflection during prototyping and developing their ideas.

Activity 2 Life Cycle Analysis of Fishing Nets - (25 mins)

1. Organise learners into groups of 2 or 3.

2. Using the information from lesson 2 on Net Manufacturing, ask groups to select (or assign) one of the following: Inputs, Processes and Outputs.

3. Learners will then use the relevant Zone mapping Life Cycle Analysis sheet and map relationally the various research findings.

4. Ask teams to photograph their sheets and upload to Microsoft teams so everyone can all see the answers and think about them.

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

- 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

MM6: Problem to Pitch Marine Plastic Waste
L9: Prototyping 1 - Circular Design and Life Cycle Analysis

EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, undertake activity 1 only with an extended discussion about the case study.

Extension: For a longer class, watch: 'The Vision for a Circular Economy' for Plastic as activity 3 and ask learners to think about their ideas and where they need to be more circular.

Flipped Classroom Option: Watch - Explaining Circular Economy: Best Real-Life Examples | The Circular Economy Show Episode 11 https://www.youtube.com/watch?v=Yvsps9DHVcw

Ask learners to consider and be ready to share which was their favourite example and why and what their 'take away' was for their ideas.

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

- The circular economy: A new way to design, make, and use things [3:50 mins] https://www.youtube.com/watch?v=ZIAYu-N98tI
- The vision for a circular economy for plastic [8:50 mins] https://www.youtube.com/watch?v=xmTQA-RNygQ
- Fishy Filaments www.fishyfilaments.com
- Fishing Net Recycling https://www.keepbritaintidy.org/uk-fishing-net-recycling
- Circular Business Models 1 - Types of Product Service System [3:31 mins] https://www.youtube.com/watch?v=QAWJLu0d6_I

Examples of Circular Design and Business Models

- Gerrard St Headphones https://www.youtube.com/watch?v=S94o9hZ2os0
- Terracycle (1:68min) https://www.youtube.com/watch?v=zEND9KG67PM

Local Trip / Expertise / Additional Work and Assessments

Learners could contact Ireland's Net Makers CarryMacarry Nets, KT Nets and Swan Net Gundry all in Donegal and ask them:

- about their design processes and how they are managing their waste
- have they introduced circular design into their processes
- how have they engaged with the single use plastic directive

Contact the local County Council's environment / utilities officer and ask about their recycling policies. Invite them to discuss the local authorities work on SDG 14.

MM6: L9WS PRODUCT CASE STUDY LCA

Consider the complete lifecycle of two nylon jackets and plot their life cycle on the Life cycle analysis chart.

Jacket A Tesco jacket
Cost €69.99

This jacket is made from a number of different materials including virgin nylon, virgin polyester and PET polyester thinsulate filling.

Nylon/Polyester: Lining is virgin polyester shell is raw virgin nylon. Filling is PET polyester thinsulate.

Fibre made in China. Jacket made in Bangladesh.

Transported by land and sea to a warehouse in Manchester, UK.

Purchased in Manchester at a Tesco store.

Machine Washed at home at 30 degrees.

Discarded after 1 year of wear because seams are unravelling. Jacket is sent to landfill.

Jacket B. Infinity Jacket Napapiji
Cost €250

The material in this jacket is a mono-material: its filling and trims are made from Nylon 6, while its fabric is made from ECONYL® Regenerated Nylon, a high-performance nylon 6 yarn recycled from discarded fishing nets and other waste materials.

Fibre Made in Slovenia. Jacket made in Slovenia.

Transported by land and sea to a warehouse in Italy. Purchased online.

Spot Washed at home.

Jacket is worn for 2 years and returned to manufacturer. Through a digital take-back programme the jacket can be returned and recycled into a new garment. ECONYL® Regenerated Nylon can be recycled again and again.

L9: MM4 PRODUCT CASE STUDY LCA

14 LIFE BELOW WATER

Each phase of the lifecycle should be carefully considered when scoring the jackets on the chart on p3.

•Concept design: Overall need for the product.

•Materials: How important are the processes and considerations of the materials used?

•Reducing waste: What will happen at the end of life? And how can this consideration be anticipated at the beginning of the lifecycle?

•Manufacturing: New technologies for increasing productivity, increasing sustainable impact, and improving factory conditions. Where is this garment made?

•Transport: How far does this garment travel? Where is the fabric produced? Where is the garment manufactured, etc.?

•Use phase: Laundry: What levels of Behavioural change might prolong the life of this garment?

Customisation and personalization: Does this garment have scope for personalization? Adding or taking away elements that might give it added value?

•Durability/ Longevity: How long will this garment last? How can you prolong its life? End of Life/ Start of new life, what about new tech for recycling garments and sorting garments? What is the best case scenario and what is the worst case scenario?

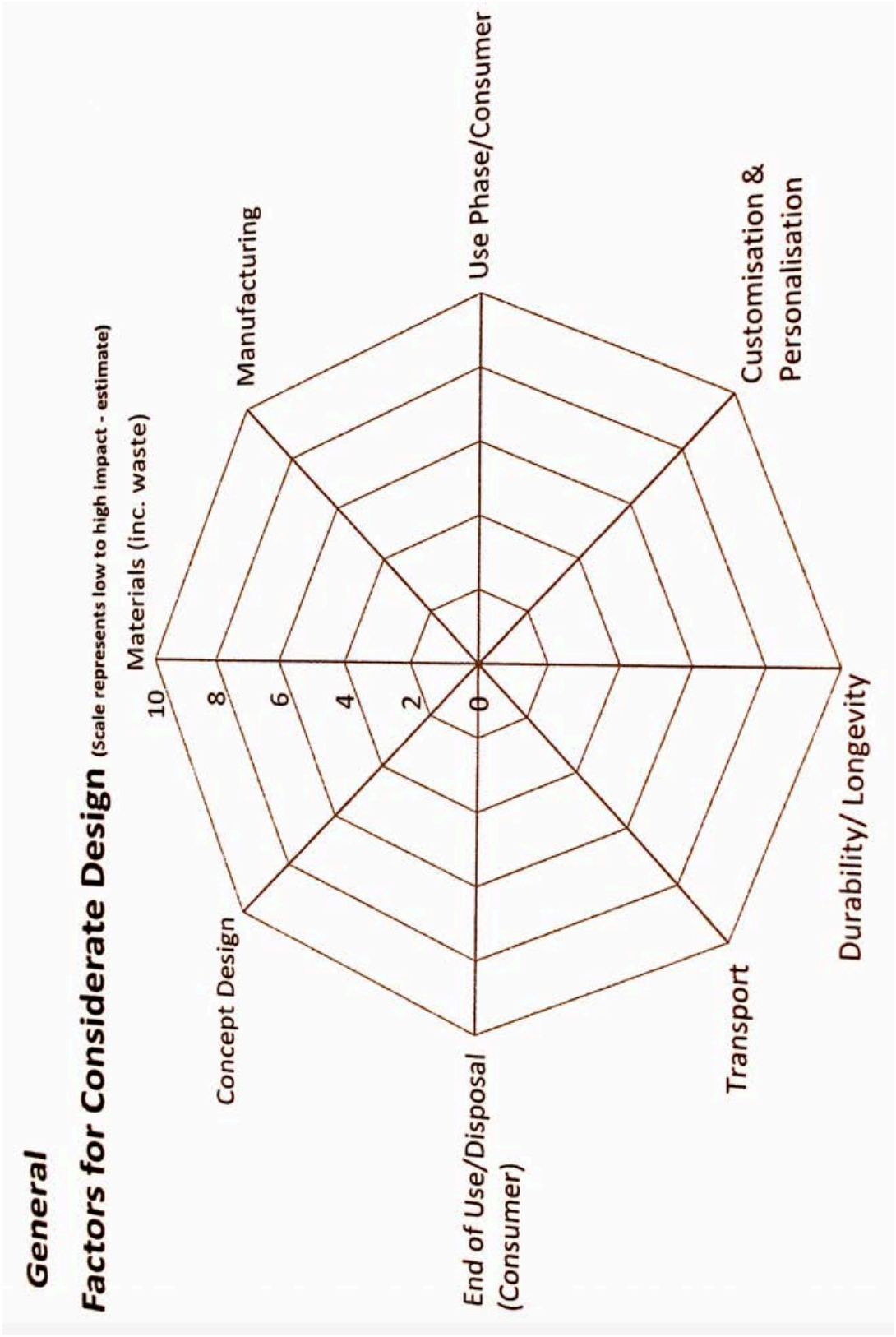
•End of Use/ Disposal: Reducing waste: Build this into the design. What will happen at the end of life? And how can this consideration be anticipated at the beginning of the lifecycle?

L9: MM4 PRODUCT CASE STUDY LCA

14 LIFE BELOW WATER

Each phase of the lifecycle should be carefully considered:

Please score out of 10 for each category with high marks being the worst- case scenario and low marks being the best- case scenario. Add up your scores. Use a different colour pen for each jacket.



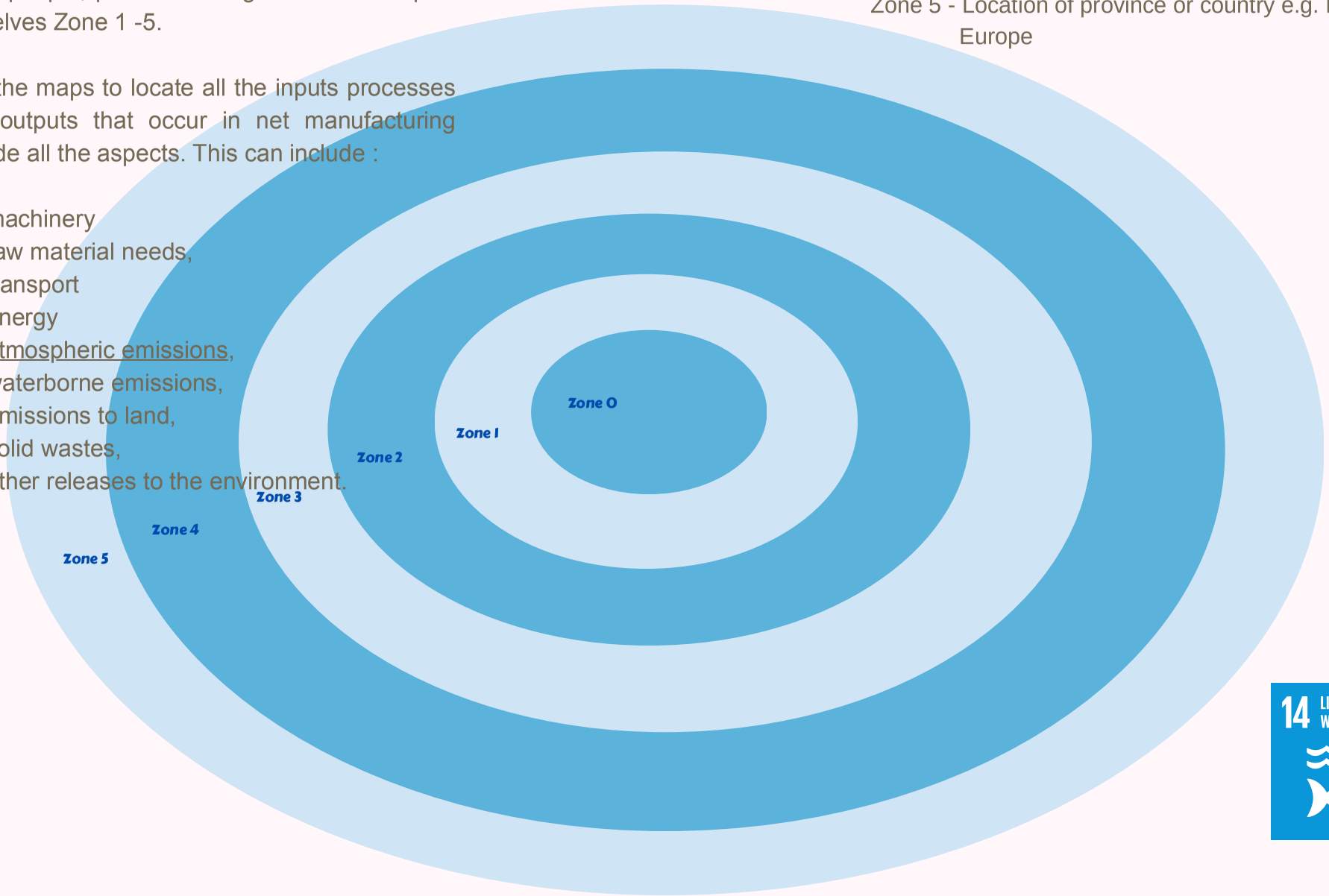
MM6 L9 INPUTS ZONE MAP EXERCISE

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

Use the maps to locate all the inputs processes and outputs that occur in net manufacturing include all the aspects. This can include :

- machinery
- raw material needs,
- transport
- energy
- atmospheric emissions,
- waterborne emissions,
- emissions to land,
- solid wastes,
- other releases to the environment.

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

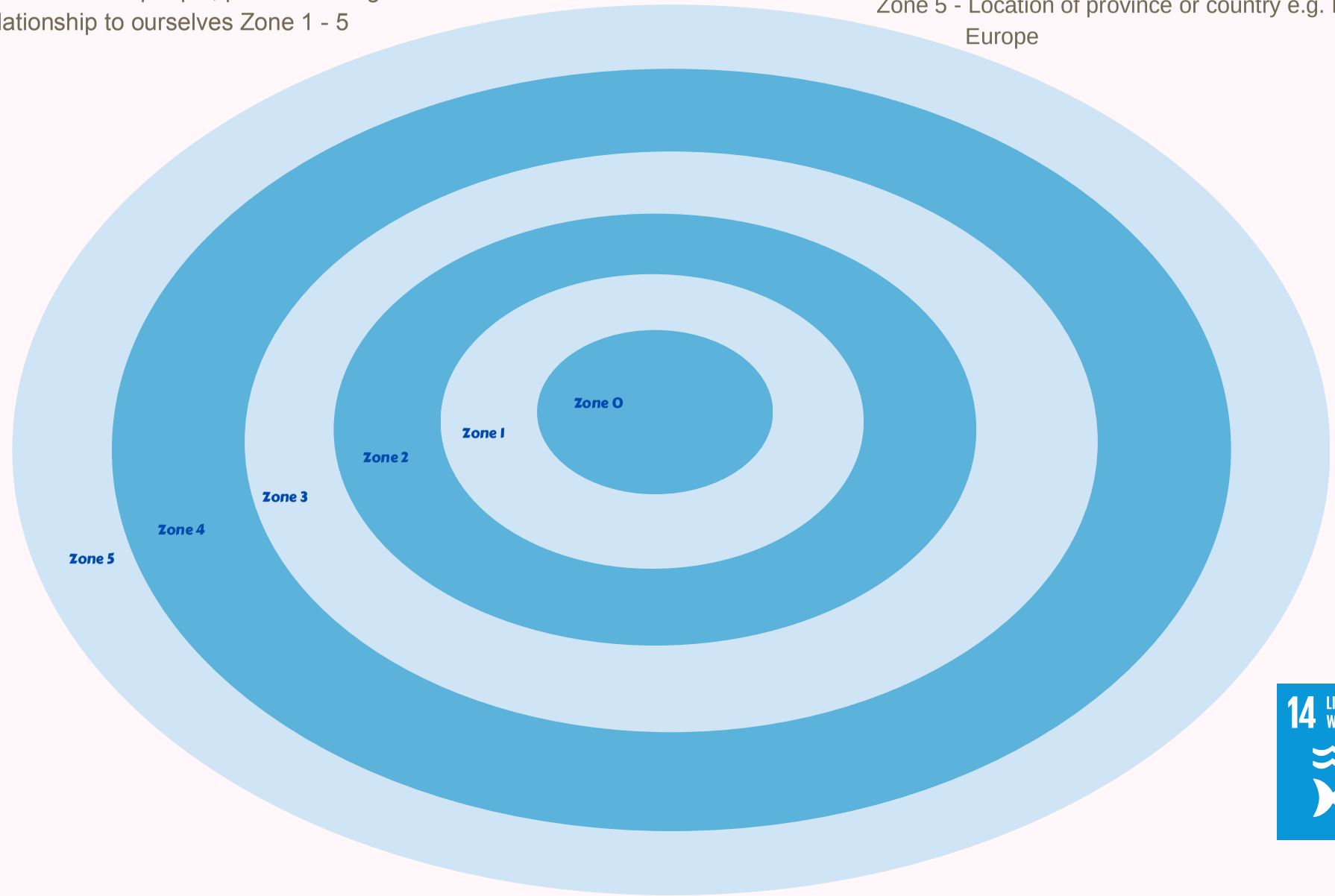


14 LIFE BELOW WATER

MM6 L9 INPUTS 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



14 LIFE BELOW WATER

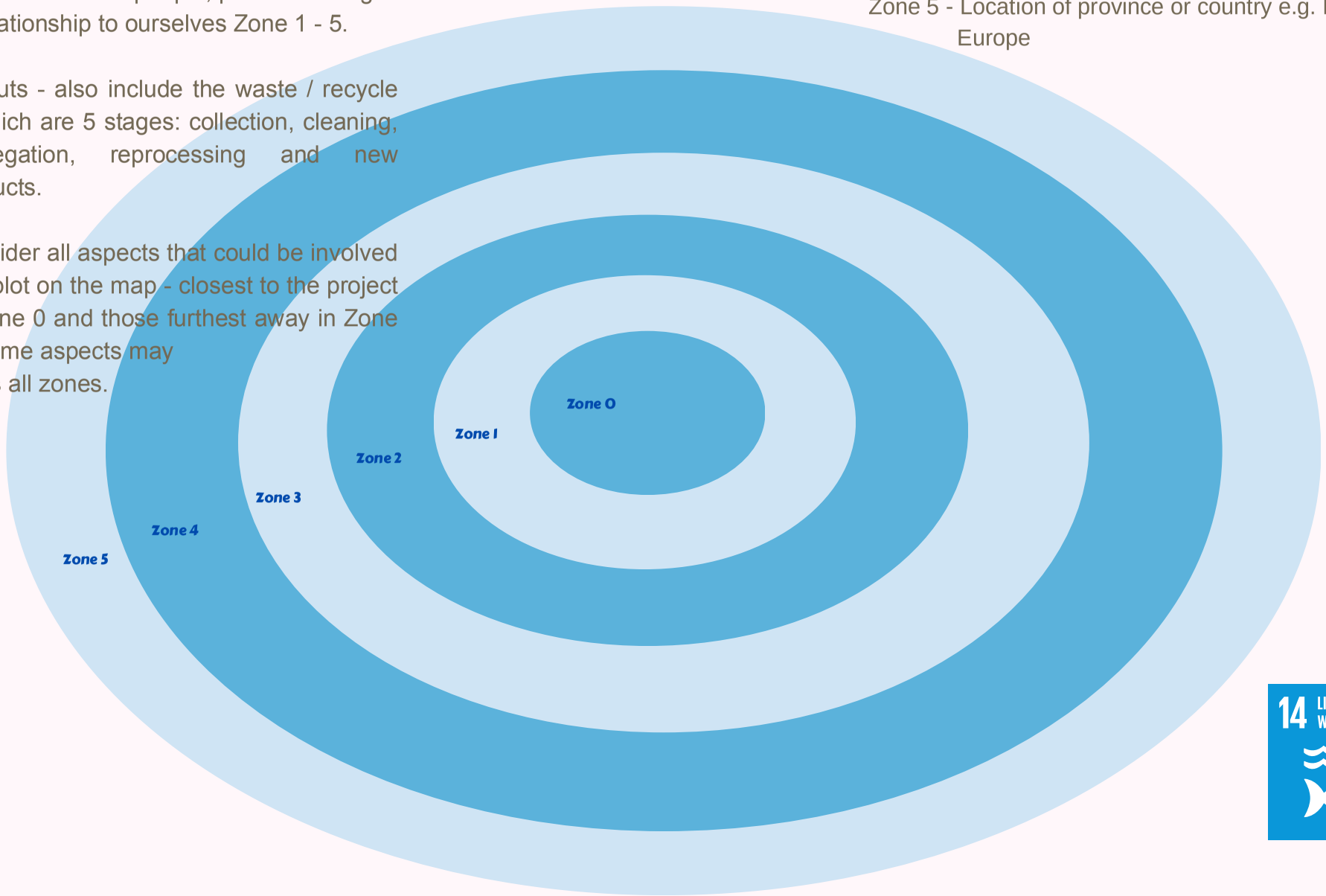
MM6 L9 INPUTS ZONE MAP EXERCISE

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.

Outputs - also include the waste / recycle in which are 5 stages: collection, cleaning, segregation, reprocessing and new products.

Consider all aspects that could be involved and plot on the map - closest to the project in Zone 0 and those furthest away in Zone 5. Some aspects may cross all zones.

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



14 LIFE BELOW WATER

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

MM6: Problem to Pitch Marine Plastic Waste
L10 - 11: Design Thinking- Prototyping 2.0

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

MM6: Problem to Pitch Marine Plastic Waste
L10 - 11: Design Thinking- Prototyping 2.0

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=4XenqN5Ib9o

'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=jIXSuZg2awA&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

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

MM6: L10WS RAPID RESPONSE PROTOTYPING

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.

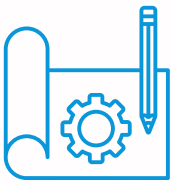
_____

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.



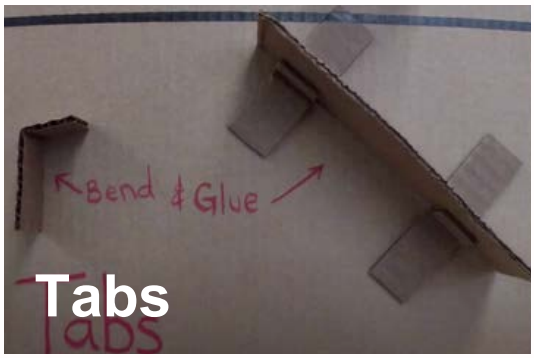
MM6: L10WS RAPID RESPONSE PROTOTYPING

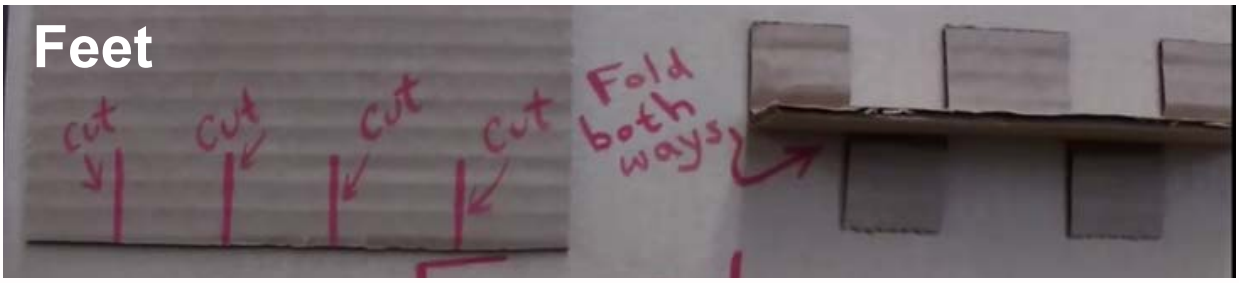
READY, STEADY, BUILD: KNOWLEDGE GATHERING

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.



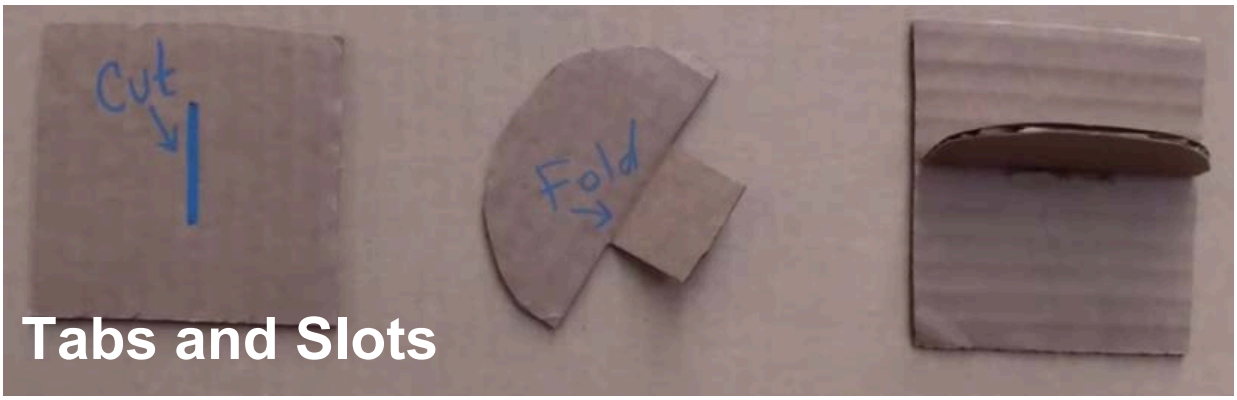


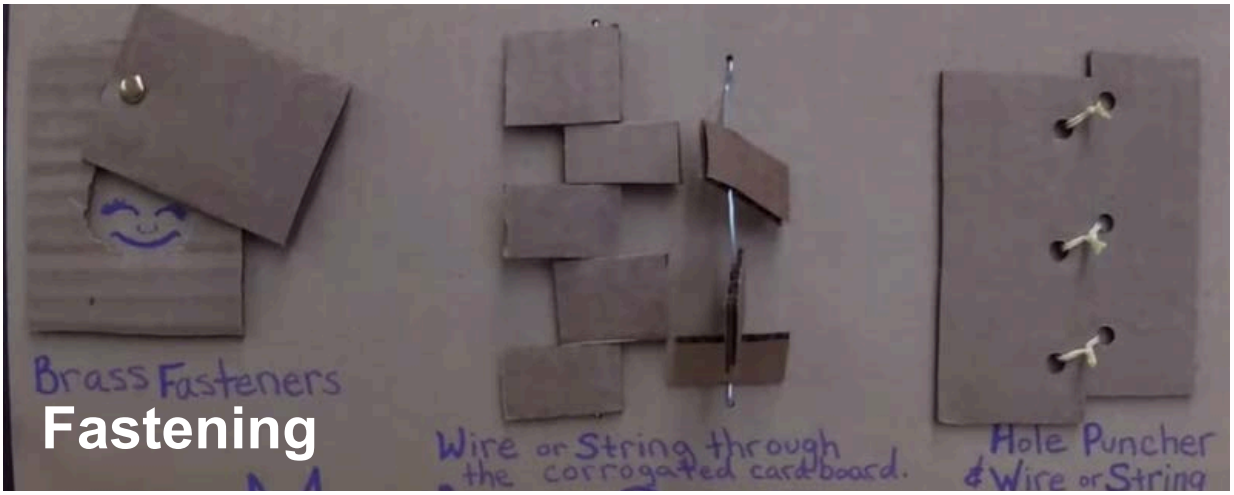
Watch the short video from Megan Peterson on structural techniques - all these processes can be scaled up to make bigger models and forms.

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

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

2. Fastening / joining and attaching - this can be done using structural approaches such at 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

MM6: L10Ws Rapid Response Prototyping

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.

MM6: L10Ws Rapid Response Prototyping

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:
    - Structure
    - Fastener / Joiner
    - 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:

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

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Implementation

Lesson 12: Design Thinking - Test 1

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

Lesson Title and Summary: Creating and Using Vision Boards

This lesson prepares learners to present their work in a structured way and prepares them for organising documentation (images, details) of their idea development and process.

This lesson will begin to help them test their ideas by developing their vision boards using the Vision Board support worksheets and prepare them for their final pitch - their Pecha Kucha presentation.

Vocabulary: Documentation, Test, Vision Board, Visualisation

In this lesson, the learner will:

- further define key elements of their game
- structure their thinking
- understand the purpose of a Vision Board
- present their thinking visually

Materials

- Worksheet: Vision Board Support
- Support Resource: Creating a Vision Board
- Internet Access
- Pens, pencils
- Large pieces of paper
- Whiteboard

MM6: Problem to Pitch Marine Plastic Waste
L12: Design Thinking - Test 1

Activity Instructions

Activity 1 - Testing and Defining your elements of your game (20 mins)

1. Watch the video 'Design Thinking TEST'.
2. As a class, discuss each of the boxes on the Vision Board Support worksheet, so that learners understand the task and its purpose.
3. Using their work from the prototttyping process, ask learners to fill in the Worksheet: Vision Board Support, which will help them to define the key elements of their project idea.
4. Once they have completed this activity they will be ready to develop their Vision Boards.

Activity 2 - Using and Creating your Vision Boards (30 mins) and either additional lessons or complete in their own time or other supportive classes e.g. English, CSPE.

1. Explain the activity, going over the key elements of the Worksheet: Vision Board.
2. Watch the video 'Create a Digital Vision Board'.
3. Ask leaners to google 'vision boards' and select 3 styles that they like and take a screen grab as inspiration for their own vision boards.
4. Ask learners to decide if they want to create a digital vision board or use physical materials.
5. Once decided, learners can either make a list of the materials they will need to create their vision board, or set up a Canva account for a digital vision board.
6. Learners will begin to think about the materials and images required to help them present the key elements of their project ideas and their paper designs and paper prototypes.
7. Learners will begin to work through the worksheet: Vision board required to create and complete their vision board.
8. Learners can begin to gather images including any they may have from the prototyping sessions and start their preparation work for their vision board.

Evaluating an idea is a key aspect of Design Thinking. Learners will see that this is not the end of the process and that it may reveal something that means they might need to return to an earlier stage, e.g. Define or Ideate. They will begin to create their vision board in preparation for creating their design and pitch.

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

MM6: Problem to Pitch Marine Plastic Waste
L12: Design Thinking - Test 1

EXTENSION / REDUCTION ACTIVITIES

Depending on class duration and number of teams, it is suggested that two lessons are used to allow learners to create their vision boards, which will form the initial steps in helping them develop their Pecha Kucha's in lessons 13 - 15.

Learners will be able to gather images and use their vision boards and the vision board support worksheet as prompts to think about some of the ideas within their project.

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

Video: 'Design Thinking TEST' (3:19min) https://youtu.be/UVEQCNM6X-A

'Create a Digital Vision Board' https://www.canva.com/create/vision-boards/

'How to make a pitch using a mood board' (4:00min) https://www.youtube.com/watch?v=8dG--KvDIX8

'Paper Prototyping' (2:36min) https://www.youtube.com/watch?v=85muhAaySps

Local Trip / Expertise / Additional Work and Assessments

Invite the Local Enterprise Officer to the learners' final pitch presentations - share their vision boards in advance.

Present their vision boards to a Local Development Company or Community and Business Alliance /or Chamber of Commerce

Organise a visit from the Local Enterprise Office to discuss Enterprise.

Create a local enterprise event / exhibition to share their vision boards and present their Pecha Kucha, e.g. in school at the end of school year, in the local library or online - align to National Enterprise Month.

Develop a Rocket Pitch event - 3 mins 3 slides – create an event to share the learners ideas.

Look at enterprise competitions encouraging this as part of the students learning process e.g. Eco-Unesco, Cool Projects

MM6: L12WS VISION BOARD SUPPORT

Use the boxes below to start making some notes about your idea or project. These will help you with your Vision board and your Pecha Kucha presentation. You can also make notes about image ideas.

Are you working in a team? What is its name? What is your idea for a Marine Plastic Waste Solution?

Tell us more about your idea - what is the story behind your idea, its purpose?

Who are your users / clients? Tell us what you know about them?

How will your idea contribute to reducing Marine Plastic Waste?

What makes your idea / project different? What is your Unique Selling Point - USP?

MM6: L12WS CREATE YOUR IDEA / PROJECT VISION BOARD

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

Keep it colourful and visual Our brains love images.

STEP 1: THE 'WHAT' OF YOUR SOLUTION

Develop an image that represents the reason for your product - the 'problem' you want to fix. Use pictures, texts or quotes that help you tell what your business is.

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

STEP 3: THE 'WHO 'OF YOUR SOLUTION

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

Vision board examples on Pinterest.

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

STEP 2: THE 'WHY 'OF YOUR SOLUTION

Use pictures, texts and quotes that help you show how your idea address the challenge and raise awareness of climate change and adaptation for your users.

STEP 4: THE 'HOW' OF YOUR MARKETING FOR YOUR SOLUTION

How will you reach your users? Use pictures, texts and quotes, that help you tell the reason for your solution.

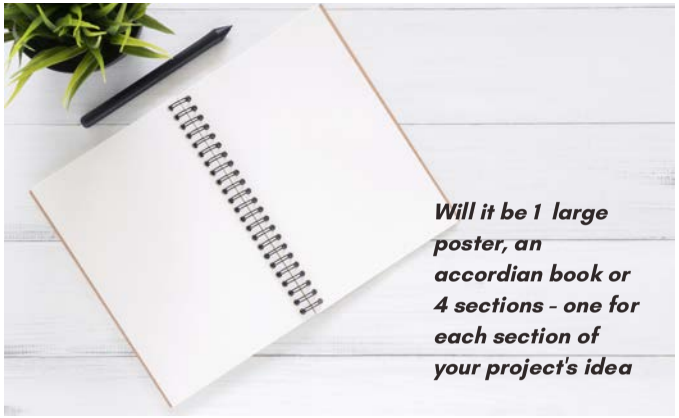
MM6: L12WS CREATE YOUR IDEA / PROJECT VISION BOARD

STEP 5 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 6 DECIDE ON WHO WILL DO WHAT

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

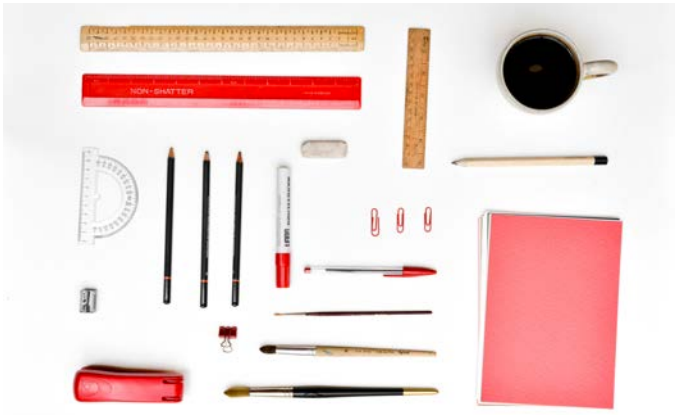


STEP 7 PLANNING YOUR BOARD

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 8 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 9 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?

MM6: L12WS CREATE YOUR IDEA / PROJECT VISION BOARD

CREATIING 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

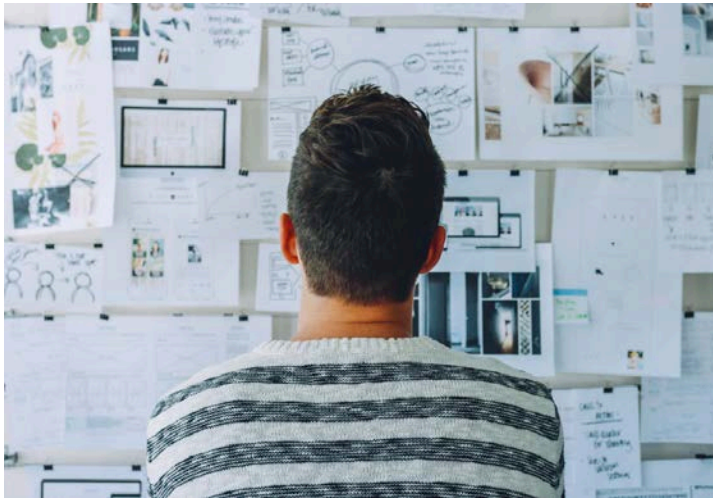
https://www.canva.com/

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/

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Implementation

Lesson 13: Peer Assessment and Developing Pitch Criteria

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

Lesson Title and Summary: Peer Assessment and Developing Pitch Criteria

In this lesson, learners will define their peer assessment criteria. Peer assessment enables those directly involved in the task or project to appraise their own learning. Learners are encouraged to consider what is most important, valuable and successful from what has been learned and the process of learning it.

By engaging in the development of peer assessment criteria and the assessment itself, learners take responsibility, learn to evaluate, are more motivated, and get practice at giving and receiving feedback.

Vocabulary: Consensus, Criteria, Evaluation, Feedback, Peer Assessment

In this lesson, the learner will:

- break down the different parts of a pitch
- decide what criteria can be assessed
- come up with a peer assessment to use for
- pitching game design ideas
- share ideas and perspectives
- come to a consensus

Materials

- Board
- Markers

MM6: Problem to Pitch Marine Plastic Waste
L13: Peer Assessment and Developing Pitch Criteria

Activity Instructions

Activity 1 - Paired discussion (10 mins)

Before the lesson, divide the board into 3 columns:

- *What makes a great pitch?*
- *The driving question - How do we increase awareness of marine plastic waste and ocean health?*
- *Peer assessment criteria for pitching*

1. Elicit from learners what a pitch is. Can they think of examples of where a pitch might be made? (i.e. a new business idea)
2. Give learners time to discuss their answers to the question; 'What makes a great pitch?'
3. Share ideas as a whole class and write keywords on the board (1st column).

Activity 2 - Developing pitch assessment criteria (40 mins)

1. Refer to the driving question in the 2nd column on the board and give pairs time to discuss what could be important to include in the pitch that will answer this question. Ideas might include: project impact, aspects of marine waste discussed, etc..
2. Share ideas as a whole class and write keywords on the board (2nd column).
3. Refer to the 3rd column and begin to elicit what criteria the learners would like to include in the pitch assessment.
4. Once there is a list of ideas, ask learners to take time to narrow them down and finalise their criteria. They could do this by having a short discussion in pairs and then a sharing circle as a whole group, with one learner leading the discussion and making edits to the information in the 3rd column. At the end of this activity, learners will have a peer-led list of criteria that their pitches will be assessed on.

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

MM6: Problem to Pitch Marine Plastic Waste
L13: Peer Assessment and Developing Pitch Criteria

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, reduce the amount of time in Activity 2.

Extension: For a longer lesson, allow more time in Activity 1 and allow learners to create the peer assessment worksheet for the pitch (after completing Activity 2).

Watch some of the feedback / peer assessment short videos (see Media Box) with learners and discuss through pair and share. This can also be used as a flipped classroom to watch at home and discuss at the beginning of this lesson.

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

'Self and Peer Assessment' (3:46min) https://www.youtube.com/watch?v=1wwo09Lb9hw

'Peer Assessment' (7:14min) https://www.youtube.com/watch?v=2hRu5i-gfXo

'Feedback' (5:43min) https://www.youtube.com/watch?v=cRJmdk3s4mk

'How-to: Peer Feedback 1' (1:25min) https://www.youtube.com/watch?v=3y7jgpe-k5I

'Introduction for Assessment for Learning (2:20min) https://www.youtube.com/watch?v=63PdFKIFzNU'

'Assessment for Learning Practices' (4:49min) https://www.youtube.com/watch?v=cNPFwCbA_mE

'Teenage Brains Wired for learning' (3:00min) https://www.youtube.com/watch?v=1GSvzgrBKaM

Local Trip / Expertise / Additional Work and Assessments

Work with other teachers to consider different forms of assessment that they might use and that the students might have experienced

Review with learners the classroom-based assessment processes they experienced in their Junior Certificate process as an example of assessment

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Implementation

Lesson 14: Preparing to Pitch - Pecha Kucha 1

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

Lesson Title and Summary: Preparing to Pitch- Pecha Kucha 1

A Pecha Kucha ('chit chat' in Japanese) is a presentation format that encourages presenters to be concise and use the relationship between image and text. The Pecha Kucha format is 20 slides with a 20 second limit – 400 seconds.

In this lesson, students will be introduced to the Pecha Kucha format and begin to analyse what makes a good presentation so they can prepare to create their own Pecha Kucha presentation.

Vocabulary: Outline, Pecha Kucha, Pitch

In this lesson, the learner will:

- learn about the Pecha Kucha format
- develop research and analysis skills
- share ideas and opinions
- develop an understanding of what makes a good presentation
- develop an awareness of presentation skills

Materials

- Video: A Pecha Kucha About Pecha Kucha
- Video: Bad Presentation 1
- Video: Bad vs Good Presentation
- Worksheet: Pecha Kucha Analysis
- Internet
- Paper
- Pens, pencils or markers

MM6: Problem to Pitch Marine Plastic Waste
L14: Preparing to Pitch - Pecha Kucha 1

Activity Instructions

Activity 1 - What is a Pecha Kucha? (25 mins)

1. Watch Video: 'A Pecha Kucha About Pecha Kucha' and ask learners to answer the following: What is different between a Pecha Kucha and a traditional presentation?

2. Visit www.pechakucha.com in pairs and select 1-2 Pecha Kucha presentations to watch and complete Worksheet: Pecha Kucha Analysis.

3. As a whole class, discuss responses in the Pecha Kucha Analysis worksheet.

    - *Does this feel easier or harder as a format for a presentation?*
    - *Did you notice anything interesting about the presentations?*
    - *What did you like about the format?*
    - *Was there anything you didn't like?*

Activity 2 - What makes a good presentation? (25 mins)

1. Watch Video: Bad Presentation 1 - review in pairs.
2. Share your thoughts with your partner, then share your comments with the whole class.
3. Repeat Steps 1 & 2 with Video: Bad vs Good Presentation and watch up to up to 1:24 min.
4. Compare the two bad presentations. What was similar between the two?
5. After the comparison and discussion begin the video from 1:24 min and watch the good presentation example.
6. Compare the good presentation with the bad ones.
    - What made it good?
    - Ask learners to thing about anything else that is important for a good presentation.

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

MM6: Problem to Pitch Marine Plastic Waste
L14: Preparing to Pitch - Pecha Kucha 1

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, complete Activity 1 only and follow up with Activity 2 in the next lesson, or set it as an at-home task.

Extension: For a longer lesson, encourage learners to explore the Pecha Kucha presentations and find an example they'd like to present to small groups. Extend discussion time in Activity 1 & 2.

Learners could look at other videos for tips on presentations- see Media Box.

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

'A Pecha Kucha about Pecha Kucha' - https://www.youtube.com/watch?v=jJ2yeplaAtE

'Pecha Kucha' https://www.pechakucha.com

'Bad Presentation 1' https://youtu.be/KgObza4ek1U

'Bad Presentation vs Good Presentation' https://www.youtube.com/watch?v=S5c1susCPAE

'Pecha Kucha Presentation' tips (6:58min) https://www.youtube.com/watch?v=zAZ_8UJUpno

'Using PowerPoint for your presentation' (4:26min)
https://www.youtube.com/watch?v=q0XWIPbXmVY

'How to give a great presentation' (7:04min) https://www.youtube.com/watch?v=MnIPpUiTcRc

'7 Presentation structures used by the best Ted' Talks (11:22min)
https://www.youtube.com/watch?v=hMk5s1y486I

Local Trip / Expertise / Additional Work and Assessments

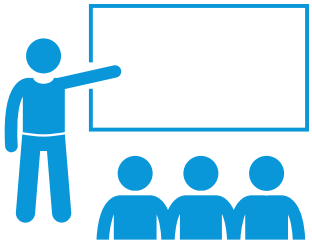
Stakeholder mapping worksheet supports students to focus on their local audience - see Lesson 2.

Develop the project across subject areas through multiple outcomes such as video, poster, Pecha Kucha, Interviews or Podcasts.

- SDG 8 Media Communication - supports the development of the 4Cs skills - Creativity, Communication, Critical Thinking and Collaboration, sign in using your school email https://www.codesres.ie/_files/ugd/92a067_a8f108ce0a6448e9851a5b03dd2e8d40.pdf
- SDG 4Supporting Skills https://www.codesres.ie/sdg-4-supporting-resources sign in using your school email.

MM6: L14 PECHA KUCHA ANALYSIS

Pecha Kucha (pe cha ku cha) means 'chit chat' in Japanese and was devised as a presentation format to get presenters straight to the point.



Team: _____

Date: _____

1 Watch the following presentation and answer the questions below
https://www.youtube.com/watch?v=jJ2yepIaAtE

- What did you like about the format?
- Was there anything you didn't like or thought was boring?
- What stood out most for you about the presentation?
- Does this feel easier or harder, as a format, for a presentation?

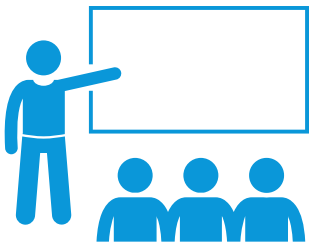
2 Visit www.pechakucha.com and select 2 contrasting presentations. Use the questions in box 2 and 3 to make notes about the presentations.

Pecha Kucha #1 Title: _____

- What was the presentation about?
- What stood out to you about their images?
- Did the image and words work well together?
- What did you learn from the presentation?

MM6: L14 PECHA KUCHA ANALYSIS

Pecha Kucha (pe cha ku cha) means 'chit chat' in Japanese and was devised as a presentation format to get presenters straight to the point.



Team: _____

Date: _____

3

Pecha Kucha #2 Title: _____

- What was the presentation about?
- What stood out to you about their images?
- Did the image and words work well together?
- What did you learn from the presentation?

4

Think about your answers above - use them to start thinking about your presentation.

- Who is your audience? - think about their age and interests or what might interest them about your topic.
- What style will you use? - drawings, photos, collage
- What information do you want them to know?

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Implementation

Lesson 15-16: Creating a Pecha Kucha

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

Lesson Title and Summary: Creating a Pecha Kucha

In this lesson, students will continue to plan, create and present a Pecha Kucha on their marine plastic waste project.

The lesson and its resources support students to create their outline and begin to develop their presentation step-by-step. Using the lean canvas and the 5 Ws of business planning they will gather the information to present their project

Vocabulary: Outline, Prompt, Pecha Kucha

In this lesson, the learner will:

- summarise work done (to date)
- create an outline for their presentation
- begin to gather their images and set up their presentation template
- develop team skills
- develop presentation skills
- create a Pecha Kucha presentation
- deliver a Pecha Kucha

Materials

- Worksheet: Pecha Kucha Planning Guide
- Worksheet: Pecha Kucha Outline
- Worksheet: Pecha Kucha Checklist
- Worksheet: 5 Ws Business Planning
- Worksheet: Lean Canvas
- Internet
- Computer or tablet access
- Paper
- Pens, pencils or markers

MM6: Problem to Pitch Marine Plastic Waste
L15-16: Creating a Pecha Kucha

Activity Instructions

Before the lesson, give each team a copy of the Pecha Kucha Planning Guide and ask them to read through it before the lesson. They can underline words or phrases they aren't sure of.

Learners will work through the creation of their Pecha Kucha as a team and will divide the work between them.

Activity 1 Planning an outline (20 minutes)

1. Give learners 5-10 minutes in their teams to review the Pecha Kucha Planning Guide. As they should have read through it before the lesson, they can use this time to summarise the key points and check understanding of unknown vocabulary. Monitor and support.
2. Ask learners to complete worksheet: Pecha Kucha Outline using their vision boards and worksheet: vision board support from lessons 21 - 22 to help define key elements of their idea.

Activity 2 Develop the Pecha Kucha template (30 mins)

1. Using worksheet: Pecha Kucha Template, allow learners to work through developing their ideas and plans for their Pecha Kucha. They can also use this time to begin gathering images and sourcing information.
2. Monitor and check each team's template and encourage learners to refer to the Planning Guide and their Outline for support.
3. Encourage learners to keep asking themselves about the image / script relationship and to ensure minimal text on their slides.

There are two structured sessions to support the learners' development of their Pecha Kucha, with an additional session proposed for finalising the activity, allowing approx 3x 1hr classes. However, teachers may elect to offer more time depending on class length and learners' needs.

To help learners' ensure they have all the information required for their pitch, they can also use the lean canvas and 5 Ws of Business Planning to help them gather the information.

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

MM6: Problem to Pitch Marine Plastic Waste
L15-16: Creating a Pecha Kucha

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class, complete Activity 1 only and extend discussion time. Complete Activity 2 in a follow-up lesson.

Extension: For a longer lesson, allow learners to continue to work on developing their ideas and planning. Also, spend more time discussing the additional worksheets - Lean Canvas and 5Ws

Flipped Classroom: Learners are encouraged to look at other presentations for their styles and delivery. Ask learners to visit https://www.pechakucha.com for inspiration.

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

How To Improve Communication Skills? (10 min 28s)
https://www.youtube.com/watch?v=v3DiMAPolIs

Tips on giving oral presentations (2:06min) https://www.youtube.com/watch?v=QKOO99UjsSE

Dos and Don'ts of making presentations effective (2:55min)
https://www.youtube.com/watch?v=X50StnWVh9I

Be a confident public speaker:
- Video (4:49min) https://www.youtube.com/watch?v=tShavGuo0_E
- Public speaking worksheet https://static.tumblr.com/nw2r6wp/2LAmj0c61/publicspeaking.pdf

Nine habits that are destroying your confidence (6:50min)
https://www.youtube.com/watch?v=_RtUt0RsGMc

Local Trip / Expertise / Additional Work and Assessments

Stakeholder Mapping worksheet supports students to focus on their local audience - see Lesson 3.

Develop the project across subject areas through multiple outcomes such as video, poster, Pecha Kucha, interviews or podcasts.

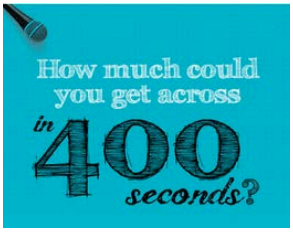
- SDG 15 MM7: Media Communication - supports support the development of the 4Cs skills – Creativity, Communication, Critical Thinking and Collaboration - sign up using your school email

- SDG 4 Supporting Skills - https://www.codesres.ie/sdg-4-supporting-resources - sign up using your school email.

MM6: L15 AND L16 PECHA KUCHA PLANNING

Your task: Create a basic Pecha Kucha on your idea and its development

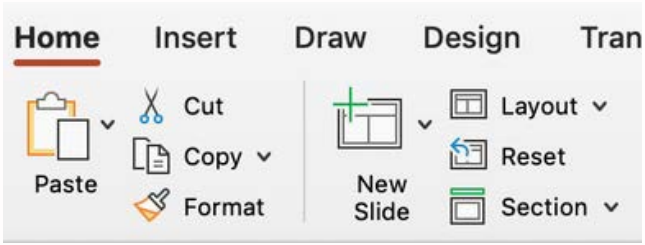
20 SLIDES X 20 SECONDS =
6 MINUTES & 40 SECONDS!



You can access PowerPoint through Office 365

- **How to make a Pecha Kucha**
  https://www.youtube.com/watch?v=32WEzM3LFhw

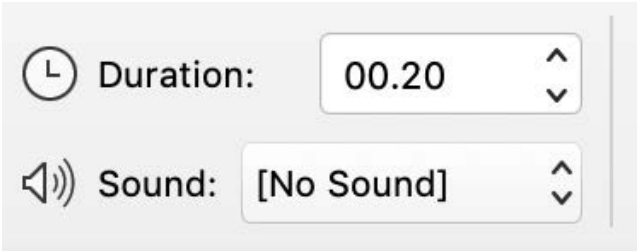
- **Using PowerPoint for a Pecha Kucha**
  https://www.youtube.com/watch?v=q0XWIPbXmVY



1. Open PowerPoint. In slide view, right-click on the first slide on the left and select 'Layout' then 'Blank' on the dropdown menu. This creates a blank canvas.
2. Right-click again on the slide and select 'Duplicate'. This creates another slide just like it.

3. Since the duplicate command is already in PowerPoint's memory, use the shortcut Ctrl-Y to repeat the duplicate (or just right-click duplicate again) 18 more times, for a total of 20 blank slides.

4. Use Ctrl-A to select all slides in the left, and then go to 'Transition', advance slide and set it to 20 seconds. If you didn't select all slides then apply timing to all slides.



5. You can also select transition styles and speed here. The simplest is the best. Maybe nothing more than a simple fade, particularly as you only have 20 seconds per slide.

Tips on creating a Pecha Kucha

- Most important, keep it simple as you have less than 7 minutes. Focus on the most important points.
- Remember your slides should be images only with your text spoken / read out.
- Your images - You can resize your images to your liking. Best is to fill the whole slide with your image unless you have a reason for using space, e.g. emphasising something.

MM6: L15 AND L16 PECHA KUCHA PLANNING

- Also, limit the text on your images and superimpose your text over the image. Use colour to make your text standout.

Free presentation software

**20 SLIDES X 20 SECONDS =
6 MINUTES & 40 SECONDS!**

- https://prezi.com/
- https://www.canva.com/
- https://www.libreoffice.org/
- https://pc.wps.com/
- Google Slides - https://www.youtube.com/watch?v=dYOLZuw-b00

Getting Free images

In public domains such as Wikimages or Pixabay, often you just have to credit the photographer or they are free for non-commercial or educational use. Remember to check and credit!

- https://pixabay.com/
- https://www.flickr.com
- https://en.wikipedia.org/wiki/Wikipedia:Public_domain_image_resources
- https://blog.hubspot.com/marketing/free-stock-photos
- https://blog.snappa.com/free-stock-photos/
- https://blog.bufferapp.com/free-image-sources-list

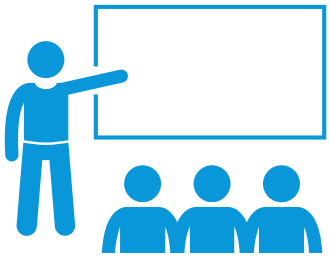
Examples of Pecha Kuchas

- https://www.pechakucha.com/presentations/daily-acts-of-creativity
- https://www.pechakucha.com/presentations/random-acts-of-courage
- https://www.pechakucha.org/cities/dublin/presentations/fenced-in
- https://www.pechakucha.com/presentations/changing-the-rules-of-our-reality-with-technology
- https://www.youtube.com/watch?v=FHuB4my_UT4
- http://www.pechakucha.org/presentations/time-based-art

Remember to share with your peers anything that helped you and your group.

- What tips would you add?
- How would you explain to someone what a Pecha Kucha is?
- How would you explain how to design a Pecha Kucha?

MM6: L15- L16WSB PECHA KUCHA OUTLINE



Pecha Kucha (pe cha ku cha) means 'chit chat' in Japanese and was devised as a presentation format to get presenters straight to the point.

Team: _____

Date: _____

Planning Your Slides

What are the most important things you want people to learn from your presentation? Use the boxes to help you plan your outline.

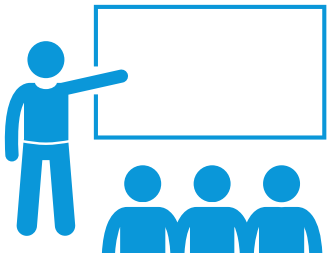
1 Slide 1: Greeting and introduction location

2 Slide 2: Introduce the problem or your topic

3 Slide 3 - 18: The Core of your presentation

MM6: L15- L16WSB PECHA KUCHA OUTLINE

Pecha Kucha (pe cha ku cha) means 'chit chat' in Japanese and was devised as a presentation format to get presenters straight to the point.



Team: _____

Date: _____

4 Slide 3 - 18 continued : The Core of your presentation

19 Slide 19: Conclusion - Start to talk about the main message you want to leave with your audience. End with a strong image and thank your audience for listening.

20 Slide 20: References - It is important to reference all the sources you used for the Pecha Kucha. This includes all images, and websites that you used to get your information from.

MM6: L15 AND L16 PECHA KUCHA CHECKLIST

1. Start With an Outline - All presentations should start with an outline.

What is an outline – this is the structure of the story you are going to tell. Stick to one idea per slide then have 1 or 2 sentences about that idea / slide – Remember you have only 20 seconds per slide.

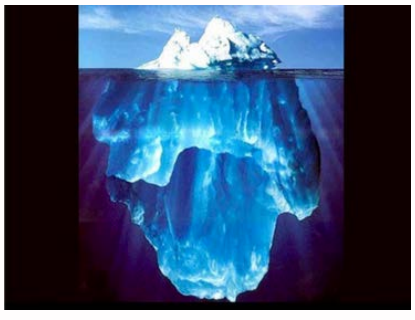
- Use the points below to help you order your outline.
- Think about how many people are in your group.
- Think about how many slides that is each per person.
- Divide your content between your group.
- You should always have an introduction slide.
- You should always have an summary slide at the end.
- You can can use paper, post-its, the outline function in Powerpoint, or a digital notebook or Microsoft Word to plan your presentation.

2. Tweak Your Outline.

- Play around with the order of your information and slides to tell your story. Remove details or slides if they don't help you say what you want to say.
- You might separate some of your sentences / ideas or combine them depending on what you want to say - you only have 20 slides x 20 secs each slide.
- Think about your audience. Try to make it interesting for them. Keep playing with the order of your ideas and your story / message.

3. Make your template and add your pictures - Once you have your 'story' then find strong visual images for your 20 slides that help tell your story. Work together – think about your image choices and how they fit with your text.

Let your images be the tip of the iceberg – as presenters you will explain what's 'behind' your image.



- You will have to import images into your Pecha Kucha template - instructions are in the Pecha Kucha planning guide.
- You should limit the text on your slides – try to keep them as only images / graphics or images / graphics with titles.
- The most successful Pecha Kuchas don't use much, if any, text. No more than 5 words per slide is a good reference.

MM6: L15 AND L16 PECHA KUCHA CHECKLIST

4. Practice - Practice as much as you can. And practice again.

- Speak your text out loud with your slide show running more than once and time it – you will see that even with your 1 or 2 sentences per slide you might have too much.
- Keep practicing your slides with the text you want to speak – do they tell your story well? Keep re-doing them until you are happy.

'The 7Cs of Effective Communication': https://www.youtube.com/watch?v=xXz1oZONUIM

- You can also have a number of slides for each idea or sentence to help slow things down or improvise. Be careful when improvising – it is easy to run over time.
- Tips on giving oral presentations https://www.youtube.com/watch?v=QKOO99UjsSE

5. To Animate or not?

- Animations and transitions can be distracting and also mess up your timings. General advice is not to animate, as the slides are only 20 secs long.

6. Practice your masterpiece again

- Yes, time to practice again. With less than 7 minutes to present, you can afford to practice more often. The slideshow runs automatically so you will run out of slides or have images that do not connect to your ideas / spoken text if you're timing isn't right.
- Remember add your own personal flair, humour and interest.
- Oh, did I mention practice?

7. Finally, don't forget your audience! Make eye contact, be warm, be human.

MM6: L16WS LEAN CANVAS

Problem

List your customer's top 3 problems

-worry that pet will get lost
-worry that pet is up to no good when home alone
-miss pet and want a way to connect while at work

Existing Alternatives

List how these problems are solved today

There are various collars on the market that track your pet's location. Some track steps and various other stats. There is a separate camera device that can be worn by your pet, but nothing exists that works as a GPS, camera and communication device in one.

Solution

Outline a possible Solution for each problem

worry that pet will get lost-you will be able to track your pet at all times.
worry that pet is up to no good when home alone-you will be able to see what your pet is doing at all times.
miss pet and want a way to connect while at work-you will be able to connect using your voice while you're away

Key Metrics

List the key numbers, that tell you how your business is doing

Number of units sold.

Unique Value Proposition

Single, clear compelling message, that turns an unaware visitor into an interested prospect

Love Paws makes it possible to be with your pet even when you're away.

High Level Concept

List your x for y analogy (e.g. youtube = flicker for videos

Love Paws is the Nest of pet tracking devices.

Unfair Advantage

Somthing, that can't be easily copied or bought

I am Cesar Milan, world famous dog trainer and I have my own TV show and numerous celebrity clients.

Channels

List your path to customers

Give away for free to celebrity pet owners and celebrity TV personalities on Animal Planet, then do a billboard, print and web and social media campaign.

Customer Segments

List your customer segments and users

Ideal customers are middle to high income, tech-savvy pet owners who spend a significant time away from their pets.

Early Adopters

List the characteristic of your ideal customer

Early adapters are pet owners who love to keep up and own the latest tech innovations as soon as they come out.

Cost Structure

List your fixed and your variable costs

Product design, sourcing of materials, production costs, engineering, marketing, PR.

PRODUCT

Revenue Streams

List your sources of revenue

We will initially sell online with the goal to being on the shelves of major pet stores by end of year.

MARKET

14 LIFE BELOW WATER

Lean Canvas is adapted from the Business Model Canvas (http://www.businessmodelgeneration.com) and is licensed under Creative Commons Attribution-Share Alike 3.0 Un-ported Licence

MM6: L16WS LEAN CANVAS

PROBLEM

List your top 1-3 problems.

EXISTING ALTERNATIVES

List how these problems are solved today.

SOLUTION

Outline a possible solution for each problem.

KEY METRICS

List the key numbers that tell you how your business is doing.

UNIQUE VALUE PROPOSITION

Single, clear, compelling message that states why you are different and worth paying attention.

HIGH-LEVEL CONCEPT

List your X for Y analogy e.g. YouTube = Flickr for videos.

UNFAIR ADVANTAGE

Something that cannot easily be bought or copied.

CHANNELS

List your path to customers (inbound or outbound).

CUSTOMER SEGMENTS

List your target customers and users.

EARLY ADOPTERS

List the characteristics of your ideal customers.

COST STRUCTURE

List your fixed and variable costs.

REVENUE STREAMS

List your sources of revenue.

MM6: L16WS: THE 5W'S OF BUSINESS PLANNING

14 LIFE BELOW WATER

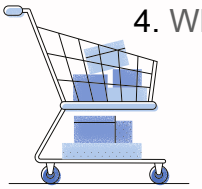
WHAT? WHY? WHO? WHEN? WHERE?

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?

MM6: L16WS THE 5W'S OF BUSINESS PLANNING

14 LIFE BELOW WATER

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?