SDG 9 Future of Space

Micro Module 7: Problem to Pitch Space Design

MM7: Problem to Pitch - Space Design

Phase 3 Implementation

Lesson 2 Design Thinking Stage 1 Empathy

Subjects: Art and Design, Climate Action and Sustainable Development, Technology

Lesson Title and Summary: Design Thinking Stage 1 Empathy

Stanford Design School's five chairs exercise encourages students to learn how to develop design principles for a user profile. In this adaptation of this activity, focused on the individual's technology needs in space, Learners will consider the 5 users needs (this sets the design principles) and develop ideas on paper and create 3D prototypes of their technological designs.

This activity encourages students to consider users needs, iterate their designs and practice using different materials.

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

In this lesson, the learner will:

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

Materials:

- Worksheet: Designing for User's Needs
- Worksheet: Empathy Map
- Teacher's Guide: Designing for User's Needs
- Pens, pencils
- Paper
- Scissors
- Corrugated Cardboard
- Fabric scraps
- Pipe Cleaners
- Modelling Clay
- Tape
- Match sticks or toothpicks
- Magazines

MM7: Problem to Pitch - Space Design
L2: Design Thinking Stage 1 Empathy

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 worksheet: Designing for User's Needs, one per group
4. Explain the task to the students and the groups, which is to read each of the user profiles on the worksheet and underline the key points / needs of the users. Explain these are the design principles
5. Learners will develop these design principles (rules / needs) for the users' needs based on the needs of the user, in this instance a technological need while living in space

Activity 2 – Developing paper designs – (15 mins)

1. Have learners select two users they wish to work on and identify two needs (design principles) they see in the description of their selected user
2. Learners will develop design ideas on paper for two of the users, integrating the users' needs (design principles).
3. Learners could also use cut-outs from magazines and notes to show their ideas.
4. As you circulate, ask questions or use the empathy map to expand the learners' understanding e.g.
    - 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. Learners will select one of their 2 paper designs and build a 3D prototype using the materials provided.
2. Learners will build two design principles (needs) into their prototype
3. Learners 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

MM7: Problem to Pitch - Space Design
L2: Design Thinking Stage 1 Empathy

EXTENSION / REDUCTION ACTIVITIES

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

Extension: For a longer class, start the class with one of the videos on empathy and include a discussion on both activities. Learners could also explore their users more using the empathy map and create a vision board - see also lesson 6 and 7 .

If learners have space project themes in mind they could also begin to develop user profiles based on their stakeholder mapping from lesson 1 and the worksheet: empathy map to build up greater understanding of their user's / stakeholder's needs.

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

- Design Thinking - Empathise [4:18 mins] https://www.youtube.com/watch?v=q654-kmF3Pc
- The importance of Empathy [3:03. mins] https://www.youtube.com/watch?v=UzPMMSKfKZQ
- Empathy Mapping [5:36 mins] https://www.youtube.com/watch?v=QwF9a56WFWA
- Empathy not Sympathy [2:33 mins] https://www.youtube.com/watch?v=HznVuCVQd10

Using worksheet: Empathy maps to develop for users profiles - activity 2

Activity 3 Design discussion questions:

- What was it like to create your designs 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 ilke the least? Why?
- Which material best expresses the essence of the design you developed?

Local Trip / Expertise / Additional Work and Assessments

Learners can use one of the scenarios from lesson 1, stakeholder mapping activity and develop an empathy map for potential users. This can be expanded in later lessons using the mood boards / vision board and linked to activities in other modules e.g. MM2 and MM4, designing for inclusion.

Linked learning: Media Communication Skills micro-modules e.g. Future of Innovation MM7: 1 - 4 support the development for the 4Cs skills - Creativity, Communication, Critical Thinking and Collaboration and activities can be linked to the various micro-modules e.g. create a space video or a research poster or presentation on as aspects of the commercialisation of Space - see MM4 Space Innovation and Enterprise

MM7 L2 TG: DESIGNING FOR USER'S NEEDS

adapted from Standford Design's 5 chairs Design Thinking exercise https://dschool.stanford.edu/resources/the-5-chair-challenge

Key needs that are linked to information in the profiles that could engage / support learners

1. Marge Simpson, 36, Space Habitat Manager

Marge is responsible for overseeing the general upkeep of the space habitat, ensuring all systems are functioning smoothly. She needs reliable tools and technology to monitor and maintain life support systems, energy use, and other critical habitat operations. Marge also focuses on ensuring the safety and well-being of the habitat's residents.

Key Needs:

- Centralised monitoring system: A user-friendly interface to track air quality, water filtration, energy consumption, and waste management across the habitat.
- Automated maintenance alerts: A system that identifies issues in real-time and sends alerts about necessary repairs or maintenance tasks.
- Resource management tools: Efficient tools for managing the use and recycling of limited resources, ensuring sustainability in the habitat.

2. Homer Simpson, 39, Spacecraft Maintenance Technician

Homer is responsible for the maintenance and repair of spacecraft docked at the habitat. He needs advanced tools to manage regular system check-ups, diagnose problems, and perform repairs, all while adhering to safety protocols. Given the demanding nature of his job, Homer also values technology that helps simplify complex tasks.

Key Needs:

- Automated diagnostic tools: Portable devices that quickly identify mechanical or technical issues in spacecraft systems.
- Multi-functional repair tools: A versatile toolkit that adapts to various spacecraft materials and systems, reducing the need to carry multiple devices.
- Hands-free augmented reality (AR) guidance: AR-enabled glasses that provide step-by-step repair instructions while keeping his hands free to work.

3. Bart Simpson, 10, Aspiring Space Explorer

Bart loves tinkering with the technology in the space habitat, often taking things apart to understand how they work. He needs access to educational and maintenance tools that allow him to safely explore his curiosity without causing harm to critical systems. He also enjoys contributing to minor maintenance tasks under supervision.

Key Needs:

- Interactive repair training module: A kid-friendly system that teaches basic space habitat maintenance, with gamified tasks and virtual rewards for completion.
- Safety-locked maintenance tools: Tools with safety features that prevent accidental misuse or damage while allowing him to experiment with real systems.
- Supervised repair tasks: A guided interface where Bart can safely assist with small, approved maintenance tasks under adult supervision.

4. Lisa Simpson, 8, Space Student and Technology Advocate

Lisa is passionate about technology and sustainability, especially in space. She i participate in maintaining the habitat's systems and learning about sustainable space technology. She needs tools that allow her to monitor and analyse the habitat's systems, focusing on energy efficiency and resource conservation.

Key Needs:

- Energy monitoring dashboard: A tool that allows her to track the habitat's energy usage and see how adjustments can increase efficiency.
- Sustainability analysis tools: Sensors and systems that measure resource consumption and waste production, allowing her to suggest improvements for sustainability.
- Collaborative tech development: A platform where she can collaborate with engineers to test and implement new, eco-friendly technologies within the habitat.

5. Abe "Grampa" Simpson, 83, Retired Space Pioneer

Abe has been through many space missions in his younger years, and now he enjoys tinkering with small repairs around the habitat in his spare time. However, due to his age, he requires maintenance tools that are simple, easy to use, and safe for elderly hands. He values classic technology but is open to newer, more efficient tools that help him stay involved.

Key Needs:

- Simplified repair tools: Ergonomic, easy-to-handle tools with large, clearly labeled controls for ease of use.
- Voice-activated assistance: A system that uses voice commands to activate maintenance devices or provide instructions, helping him avoid complex manual tasks.
- Memory-aid technology: A system that records his maintenance activities and reminds him of what still needs to be done, preventing repeat or missed tasks.

6. Maggie Simpson, 1, Curious Space Baby

Though too young to actively participate in habitat maintenance, Maggie's safety depends on the proper functioning of technology around her. Her parents need tools and systems that keep her safe from hazards while maintaining the habitat. Additionally, technology should help them manage her needs efficiently in a space environment.

Key Needs:

- Childproofing safety technology: A system that detects when Maggie approaches potentially dangerous areas (e.g., airlocks, machinery) and triggers alarms or locks.
- Automated care systems: Tools that help with day-to-day baby care in space, such as a robot-assisted feeding or changing system, allowing her parents to multitask.
- Environmental sensors: Monitors that ensure the temperature, humidity, and oxygen levels in her sleeping and play areas are optimal and safe.

MM7 L2 WS: DESIGNING FOR USER'S NEEDS

adapted from Standford Design's 5 chairs Design Thinking exercise https://dschool.stanford.edu/resources/the-5-chair-challenge

This exercise highlights 5 users each with different needs, you will identify the users' needs to develop the design principles, which are then used to create a paper design and if time allows a 3D 'prototype'.

What do you notice about their needs?
Read each of the user profiles and underline the important points of each of the user's needs - the clues are in the descriptions. Think about designs ideas for tools and technology to meet their needs.

Marge Simpson, 36, Space Habitat Manager
Marge is responsible for overseeing the general upkeep of the space habitat, ensuring all systems are functioning smoothly. She needs reliable tools and technology to monitor and maintain life support systems, energy use, and other critical habitat operations. Marge also focuses on ensuring the safety and well-being of the habitat's residents.

Think about monitoring systems, alert systems and resource mangement

Image: Download Clipart Marge Simpson Png

Homer Simpson, 39, Spacecraft Maintenance Technician
Homer is responsible for the maintenance and repair of spacecraft docked at the habitat. He needs advanced tools to manage regular system check-ups, diagnose problems, and perform repairs, all while adhering to safety protocols. Given the demanding nature of his job, Homer also values technology that helps simplify complex tasks.

Think about diagnostic tools, hands free tools / technology, repair tools

Image: https://clipground.com/images/homer-simpson-clipart-free-4.png

Bart Simpson, 10, Aspiring Space Explorer
Bart is a playful, mischievous kid who spends his time skateboarding, avoiding homework and loves tinkering with the technology in the space habitat, often taking things apart to understand how they work. He needs access to educational and maintenance tools that allow him to safely explore his curiosity without causing harm to critical systems. Marge tries to involve him in minor maintenance tasks but he needs constant supervision.

Think about gamified interactive educational tools that teach about maintenance and repair , safety locked tools

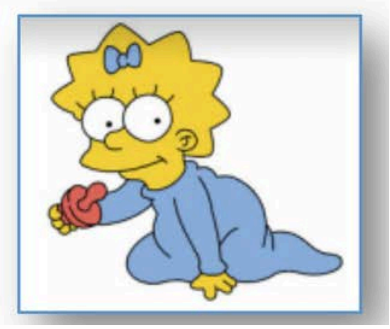
Image: https://clipart-library.com/image_gallery2/Bart-Simpson-Transparent.png

MM1 L2 WS: DESIGNING FOR USER'S NEEDS

Lisa Simpson, 8, Space Student and Technology Advocate
Lisa is passionate about technology and sustainability, especially in space. She is eager to participate in maintaining the habitat's systems and learning about sustainable space technology. She needs tools that allow her to monitor and analyse the habitat's systems, focusing on energy efficiency and resource conservation.

Think about energy and water monitoring, collaboration with engineers for testing or analysis of sustainability

Image: Stanford D School 5 Chairs activity



Maggie Simpson, 1, Curious Space Baby
Maggie 1, is an active and curious baby who spends most of her time crawling, exploring, and playing. Though too young to actively participate in habitat maintenance, Maggie's safety depends on the proper functioning of technology around her. Her parents need tools and systems that keep her safe from hazards while maintaining the habitat. Additionally, technology should help them manage her needs efficiently in a space environment.

Think about safety and gravity as well as technology checking and perhaps robotic care

Image: Stanford D School 5 Chairs activity

Abe "Grampa" Simpson, 83, Retired Space Pioneer
Abe, 83 is retired and enjoys a slower pace of life. He has been through many space missions in his younger years, and now he enjoys tinkering with small repairs around the habitat in his spare time. However, due to his age, he requires maintenance tools that are simple, easy to use, and safe for elderly hands. He values classic technology but is open to newer, more efficient tools that help him stay involved.

Think about easy to handle or voice activated tools or memory support

Image: Stanford D School 5 Chairs activity

Empathy in Design

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

MM7 2WSB USER EMPATHY MAP - EMPATHY MAP

Walking in someone else's shoes

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

HEAR

SEE

What does your user see?

- What sort of views might your user see?
- Where might they shop for food / clothes?
- What might ideas or trends might they notice?

WHAT DO THEY SAY AND DO

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

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE