



Class 10 | Module 6 | Design thinking

Sustainability and Design

Task book



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Whats and whys of Sustainability

The big questions ...

Can we continue the current relationship we have with our environment ?

What does sustainability mean to us?

Class activity 1 | Getting my lunch

Whoosh! You are now transported into a different time period and are a human in that particular time! We have learnt so much about people in different time periods in history class. Can you imagine how people get their breakfasts, how they eat and what they do with their leftovers?

Get into character and prepare a small skit!



Group activity

50

Minutes

Instructions for class activity 1

- Think of how people from that time get their breakfast.
 - Do they have to hunt it?
 - Can they exchange food for other items?
 - Can they pay for food? How do they cook the food?
 - How do they eat it and what do they do with the leftovers?
- You have 20 minutes to prepare, and you have to create a short 5-minute skit
- For further details about the time period, your teacher may provide you with articles, links and content to base your skit. Feel free to go through the internet, if access is available
- Observe your classmates' skits too, you will have to observe the details, of how habits in humans changed over time and talk about it in the next part of the activity.

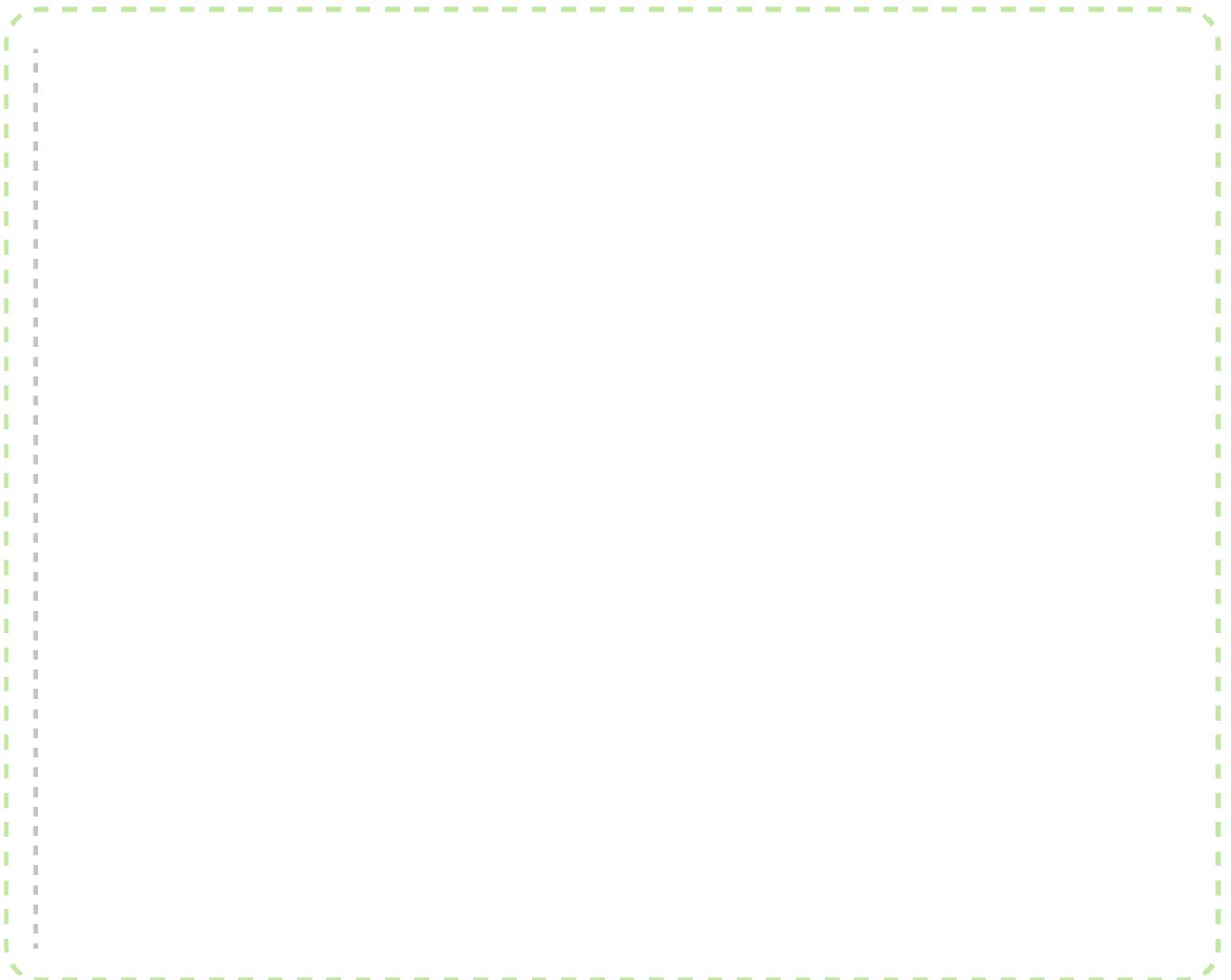


Exercises

C1.1 What is your time period? What role did you play in the skit and why was it significant?



C1.2 Once you are done with your skit, fill up the box below with the observations you made about the people from the different times. **What changed, how and why?** Try to answer the **big question** and feel free to draw pictures or write your thoughts.



If more space is necessary, use an A4 sheet, fold and stick along the grey dashed line



Introducing the long activity

What is the long activity?

You are now starting out on a mini-project that spans the 6 sessions. This will help you tie everything you learn together and apply your knowledge to come out with a thoughtfully redesigned product!

Long activity preparation

In this session, we will be deciding the groups for the long activity and their topics. Form groups of 3 and pick an object that your group thinks could have been designed more sustainably.

You will be redesigning this object with everything you learn from this module!



Group activity

10

Minutes

Instructions for long activity preparation

- First, make groups of 3 (4 if strength is not a multiple of 3). Try to work with friends you haven't done projects with in the past!
- Then, your teacher will give you a list of objects for you to pick from, pick one for the group that you think has the potential to be designed more sustainably.
- Submit your group name and object to your teacher at the end of this session.

Exercises

L0.1 Write the name of your group and it's members. Mention the chosen object and a few sentences on why you think it needs redesigning.



Home activity 1 | Before and after

We learnt in class about the various pillars of sustainability and that it is not just about the impact anything has on ecology, but also other social, cultural and economic factors. Your task is to take anything we have or use, look at its impact on the pillars of sustainability and represent your research creatively!

Brownie points for creativity!



Individual activity

01

Hours

Instructions for home activity 1

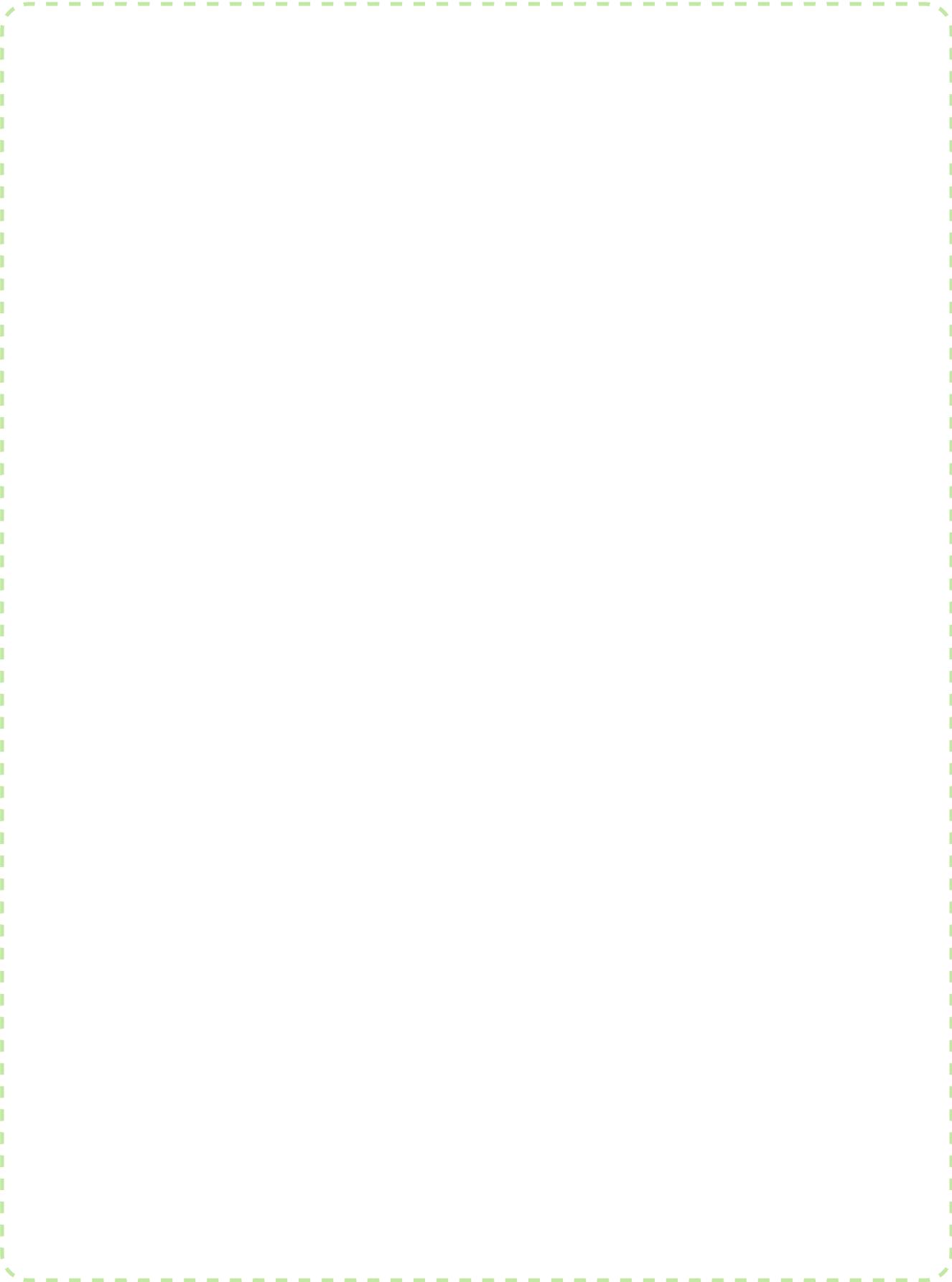
- First choose an object or select from the list that teacher gives you. Write about what the product is/does, who makes it and so on.
- Understand both positive and negative impacts it has had on each pillar of sustainability.
- Answer the questions asked in the exercise section
- Represent this information in a creative manner like an infographic, newspaper, article, poster or news report
- You are also encouraged to collect relevant articles or any form of social media to support their content and add it to your work.

Exercises

H1.1 Write a bit of introduction about the object you chose. Who makes it? Where is it used? ...



H1.2 Create your compilation here (or) do it in an A4 paper and attach your work to this page.



H1.3 Can we answer the big question of “What does “sustainability” mean to us?” based on what you learned in this session?



Look, it's a system!

The big questions ...

Are the things we use independent of everything else?
Can we view things as a part of a bigger system?

Class activity 2 | Mrs Preetha Prakash & her small business

You will now hear the story of Mrs Preetha Prakash, who is starting her entrepreneurial career right from her home. As you hear the story, visually represent her town and everything that goes into her business.

Get into the details, you will have to make detailed representations!



Individual + Group activity

40

Minutes

Instructions for class activity 2

- The story of Mrs Preetha Prakash's business will be read out to you.
- As they listen, you must draw a representation of the town in which she resides in and the various aspects of her business. There is no specific format, but you can use mind-mapping/ ecosystem mapping rules to do the same.
- Pay attention, details are important!
- Once the story is done, you must finish drawing your map, and then find a partner, with who you will collaborate and build a more complex map, with information you may have missed
- This process is repeated twice to get one map for ~8 students.
- Now, each group has to find ways to add or drop connections to create positive ecological, social, and economic impact



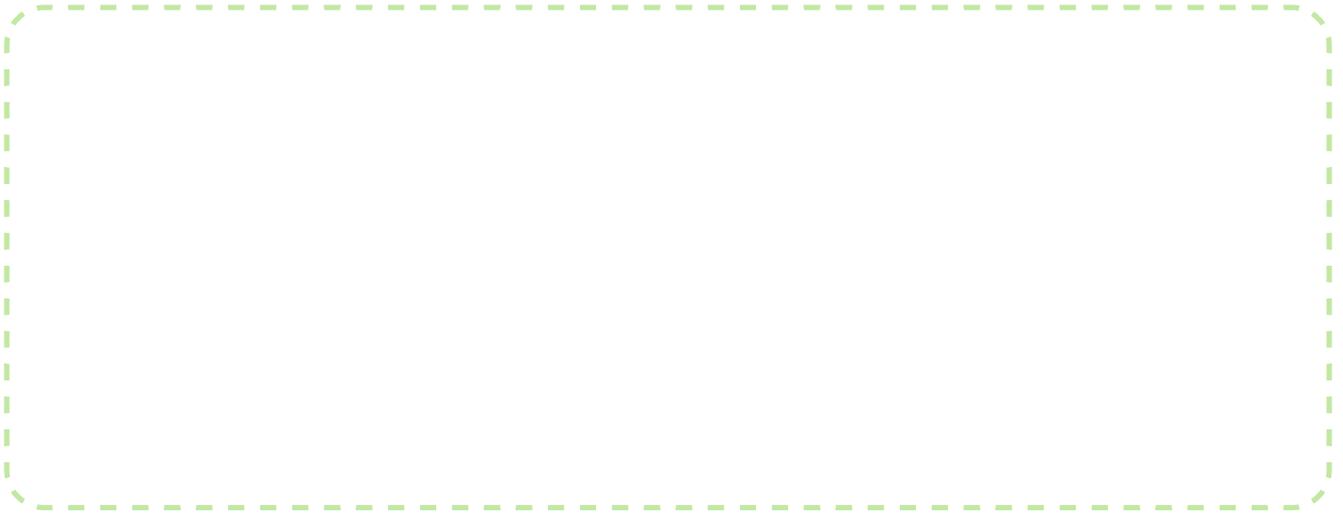
Exercises

C2.1 Represent Mrs Preetha's town & business in the form of a system attach paper to this page:

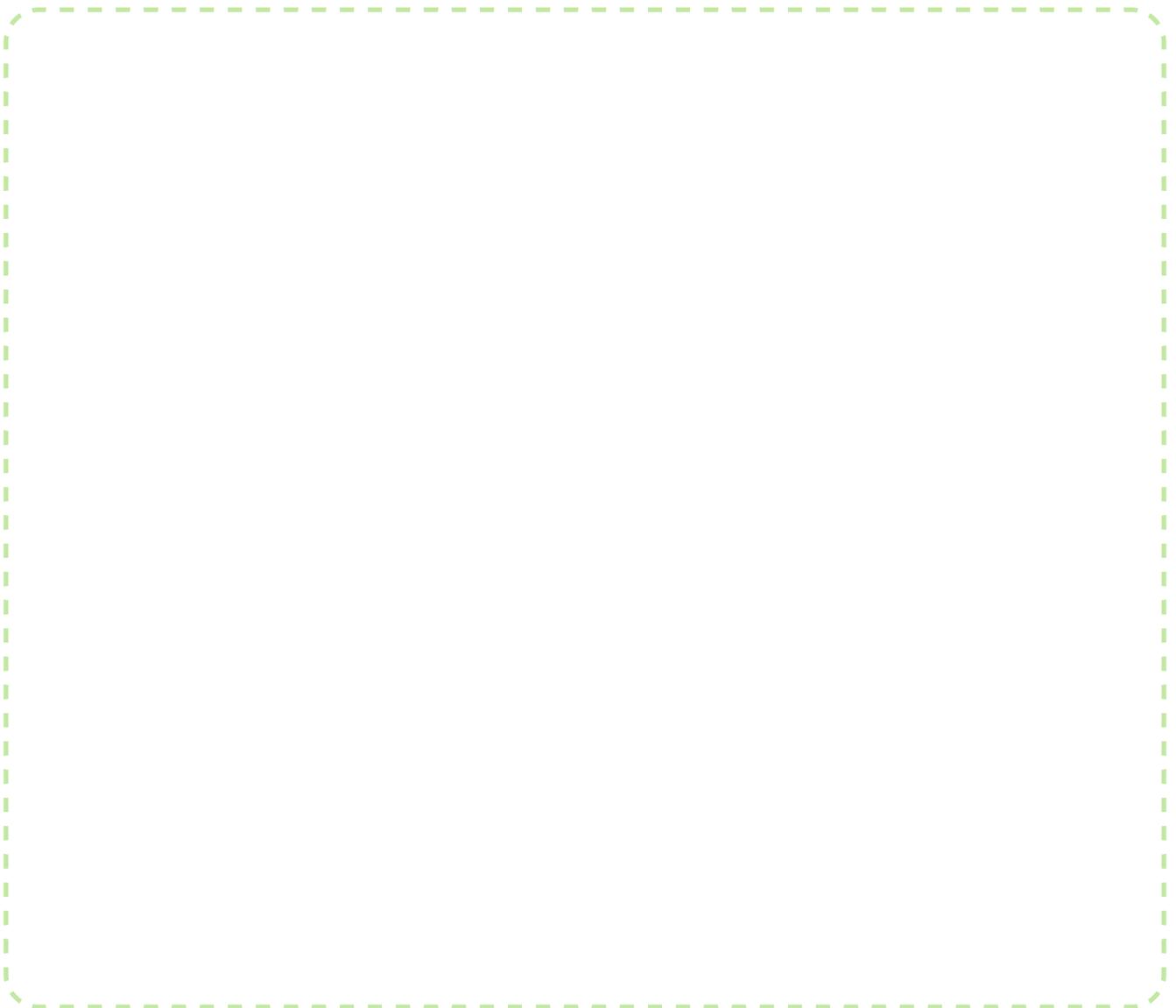
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C2.2 What are the issues you think exist in this system?



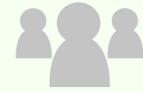
C2.3 Do you think there could be any such instances of domino effects (a seemingly small aspect causing huge impacts) in this system?



Long activity part 1/3

The first part of the long group activity involves applying what they have learnt about visualising the ecosystem within which a product belongs to.

You will be redesigning this object with everything you learn from this module!



Group activity

40 + 20

Minutes

Instructions for long activity 1/3

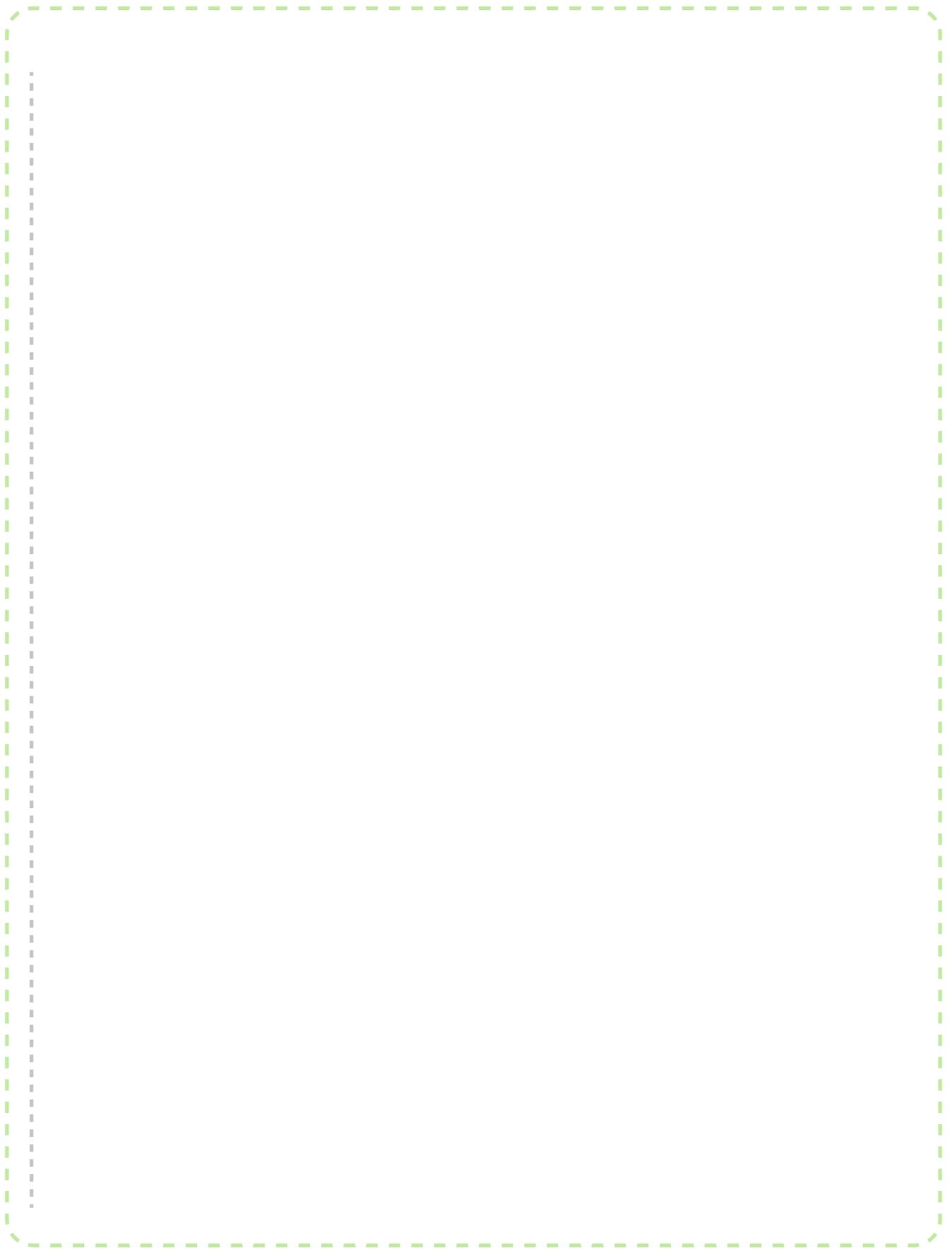
- Sit with the group you chose for the long activity. Get to understand the product and its context, users, producers based on all this information, create an system representation
- In the system, are there any:
 - connections that can be made/broken
 - presence of any loops
 - new elements/stakeholders that can be introduced
 - long term effects of the decisions taken, possible domino effects
- Document your thought process as you will be asked to compile it and submit in the end of the session. Remember to justify all your choices, in a couple of sentences!

Exercises

L1.1 What were the issues observed? Opportunities? List them here:



L1.2 First, draw your initial system. Can you modify the map to try and remedy the issues? Adding or removing elements, forging or breaking connections? Also draw your modified version



For this activity, use two A4 sheets for the two drawings, stick along the grey dashed line



L1.3 What could be some of the long term effects of your design decisions? Do you foresee any domino effects?

Home activity 2 | Vasudhaiva Kutumbakam

There are so many interconnected systems around us. Lets try to understand how they function and what may interrupt them. We will listen/read the words of Dr. Vandana Shiva, a prominent indian Environmentalist. This activity will help understand systems around us better.

Brownie points for creativity!



Individual activity

01

Hours

Instructions for home activity 2

- Students must listen to the speech by Vandana Shiva called "Vasudhaiva Kutumbakam" / read the text in the appendix
- If we look closely, we can see interconnected systems everywhere we turn. The task is to identify a natural system from the things you can see when you look outside the window. (Providing milk to homes, composting/recycling your waste)
- Map out the system, and talk about the following regarding your system.
- Write the thoughts and reflections that came about when you were doing the activity?



Exercises

H2.2 Draw your system below:



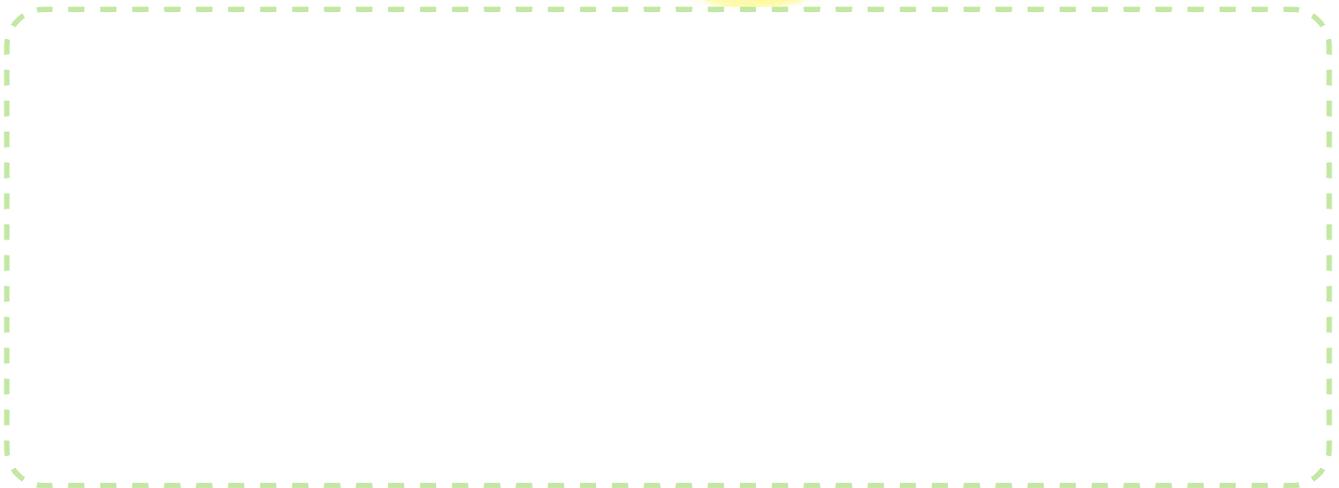
If more space is needed, use A4 sheets for the drawing, stick along the grey dashed line



H2.1 Is this a permanent or temporary system? What causes hindrances to this system? Does it require some sort of human action/interference? What does this system cause to the bigger system of life?



H3.3 What did you think about Dr. Vandana Shiva's talk? What were your thoughts when you did the activity? Do they help you answer the big question?



Resource to product to... resource?

The big questions ...

How are things made? How can we ensure what we take from Earth is utilized fully and returned?

Class activity 3 | How is Mrs Preetha's product made?

How is Mrs Preetha's product made? All the resources we use come from some part of the earth, right? Can we identify all the resources and processes used to make what Mrs Preetha is selling? How is the product used? What happens to the product after it is used?

Get into character and make a small impromptu skit!



Group activity

50

Minutes

Instructions for class activity 2

- The class will be divided into groups of 4 (or) assemble in their long activity groups.
- All the groups queue up, next to the centre of the classroom, as each group is going to create an impromptu skit.
- Each group will act out one part of the process used to make Mrs Preetha's product. If they are pickles - there would have to be a mango farmer who will grow the mangoes and harvest them, which will go to a Kirana store, from which Mrs Preetha will buy the mangoes, so on.
- You have 5 minutes to prepare and discuss amongst themselves
- One group is assigned the role of noting down the stages performed by the students.
- Each group acts for 2 minutes and moves off the stage, and the next group begins
- All students are encouraged to chime in and give suggestions as to what to act
- A small empty chalkboard/ paper is given to group 1 - it is assumed to be the starting raw material.



- When group 1 finishes, the final state of that raw material is drawn on the board and given to the next group.
- Every group must hand over their version of the same product to the next group. example: mango farmers hand over raw mangoes to Kirana store, who hands over to Mrs Preetha, and so on.

Exercises

C3.1 Visually represent the process in which Mrs Preetha's product is made, used and disposed. Can you identify any distinct stages of the process?

If more space is necessary, use an A4 sheet, fold and stick along the grey dashed line



C3.2 What are the issues you see in this lifecycle?

Long activity part 2/3

You will apply your learnings about the lifecycle of a product to your chosen product and explore what can be changed in the way it's made to reduce its impact.

You will be redesigning this object with everything you learn from this module!



Group activity

30 + 30

Minutes

Instructions for long activity 2/3

- For your chosen product, your group must create the lifecycle. You can collect information from the internet, factory, users, disposal handlers, transporters, etc.
- They must also answer questions posed in the exercise section.
- Groups are free to go home, do more research and bring it back to school in the next session, although it is not actively encouraged.
- Document your thought process as you will be asked to compile it and submit in the end of the session. Remember to justify all your choices, in a couple of sentences!



Exercises

L2.1 Draw your initial lifecycle here. What are the problem areas in each stage of the process? Can we propose any alternatives? If the lifecycle is linear, can it be made circular?

For this activity, use two A4 sheets for the two drawings, stick along the grey dashed line



Home activity 3 | Linear vs Circular

You will now further explore the lifecycle of a product further, specifically about the linear and circular lifecycles/economy. You will also be answering a few questions regarding what you learnt in class today.



Individual activity

01

Hours

Instructions for home activity 3

- First, answer the questions in exercise section with text/images.
- Then you can pick an object that has a linear lifecycle, elaborate the phases and answer the next set of questions.
- Are the resources used efficiently and returned to earth in the simplest form?
- What kind of issues do you notice in each phase?
- Now what can you suggest that could make the lifecycle more efficient, low-impact and possibly circular?

Exercises

H3.1 Do you think circular lifecycles/economy are better than linear ones? Is there any case where the contrary is true? Are there cases where a linear lifecycle can't become circular?

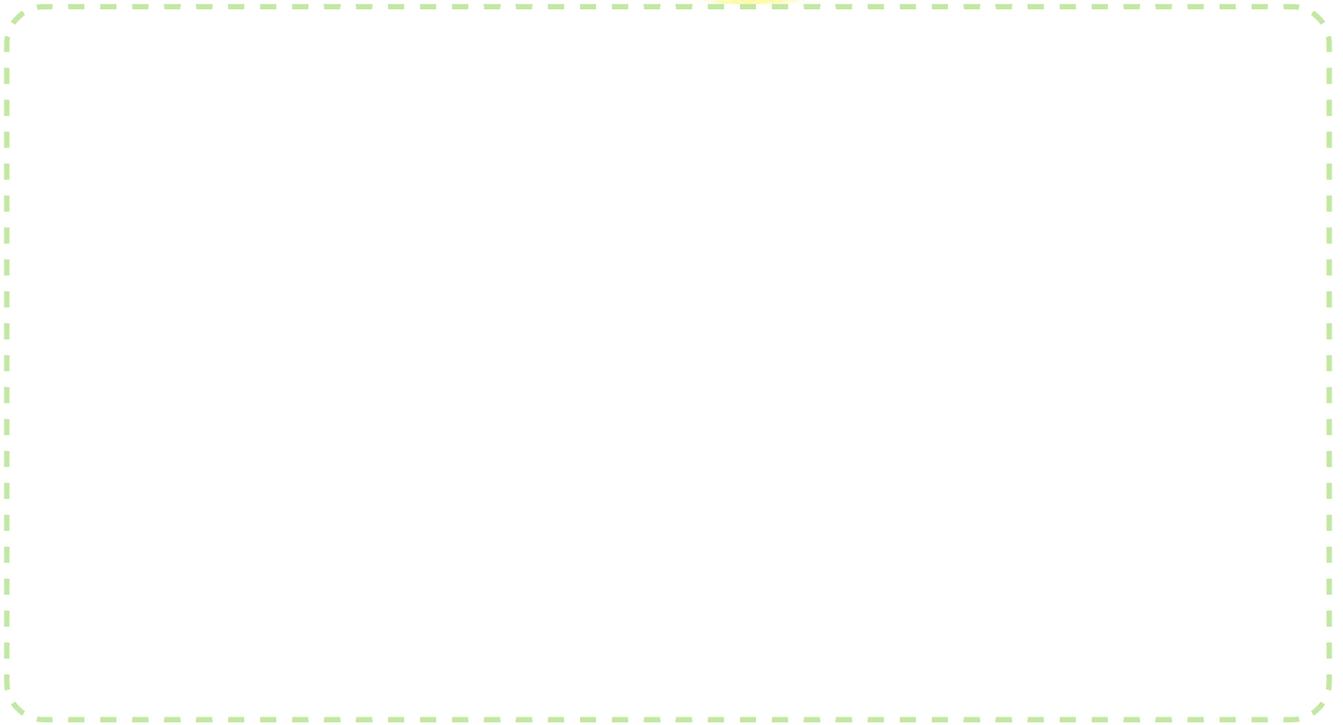


H3.2 Choose an object, put down it's lifecycle, elaborate its phases. Are the resources used efficiently and returned to earth in the simplest form? What kind of issues do you notice in each phase? What can you suggest that could make the lifecycle more efficient, low-impact and possibly circular?

For this activity, use two A4 sheets for the two drawings, stick along the grey dashed line



H3.3 Can you now answer the umbrella question? How can we ensure what we take from Earth is utilized fully and returned?



Sustainability strategies & technologies S4

The big questions ...

Are there strategies to sustainability that we can see in our daily lives? How can usage of sustainable technology help with sustainable design?

Class activity 4 | Sustainability charades

Use charades to help your teammates the different sustainability strategies, with the help of their own findings from their previous exercises as clues, and the team with most points wins.

May the team with most points win!



Group activity

30

Minutes

Instructions for class activity 4

- Class is split into two, and one actor is picked from both groups, who will do the charades
- They stand in front of the board / hold a notebook up
- Teacher first acts out one sustainability strategy to explain how to play the game.
- They are given a bowl full of chits. Both actors have to pick up a chit from a bowl of chits, containing the various sustainability strategies
- Drawings and actions can be used to convey to the rest of the team what the strategy is, and the team who finds it first is the winning team.
- Actors can also refer to problems identified in their long activity discussions, or daily life practices.
- After this, the present actors choose other actors from their teams
- There is a 3 minute time limit for each word.



C4.1 What was the list of sustainability strategies guessed? What were the examples used to act them out?

Long activity part 3/3

This is the final activity in which you apply their of sustainability strategies to redesign your chosen product. Position the redesigned product in the same system and observe how it changes, also draw out it's new lifecycle.

Elaborate on all the changes!



Group activity

30 + 120

Minutes

Instructions for long activity 3/3

- For their chosen product, first identify if any sustainability strategies have been used in their product
- Does this product need the intervention of any new materials or sustainable technology?
- Redesign the product, its lifecycle based on what they have learnt in other design modules.
- How would the ecosystem, lifecycle change after the redesign?
- If sustainable technology is needed, how could they incorporate it with the least impact?
- Groups are free to go home, do more research and bring it back to school in the next session, although it is not actively encouraged.



- Document your thought process as you will be asked to compile it and submit in the end of the session. Remember to justify all your choices, in a couple of sentences!

Exercises

L3.1 What does your new ecosystem and lifecycle look like? What strategies have been used in your redesign?

For this activity, use two A4 sheets for the two drawings, stick along the grey dashed line



L3.2 Has technology been used in your redesign? What category does it fall into?

Home activity 4 | Sustainable technologies

Technology is the future! We have come across so many problems which have been solved by sustainable technologies in our lives, lets take some example and analyze them.



Individual activity

01

Hours

Instructions for home activity 4

- Pick an instance where technology has helped solve a sustainability issue with respect to a product.
- Examples are: wooden stoves -> bio fuel stoves, street lamps -> solar lamps
- Answer the questions in the exercise section.



H4.1 Describe what instance you picked, and what was the technology used to solve the problem. Was it a substitution, prevention or efficiency technology?



H4.2 Did the use of this new tech give rise to any new problems? Was there a simpler way to solve the problem that you could identify? Justify your reasons?



Sustainability strategies & technologies S5

Instructions for session 6 presentation day

You have almost reached the end of the module, and by this time, you will be ready with the redesign and may have ideas on how to present it. Here are a few instructions you will have to follow on presentation day:

- Each group must convey their redesign concept to the class in a creative and concise manner.
- The form of the product, what and why you changed things in the original product must be communicated in their presentation.
- Their method of presenting must be creative and engaging. It is completely left up to them but some of the suggestions could be:
- Keep a short write-up of the presentation ready for submission later.
- After your presentation, pay attention to the other presentations and engage with the other teams during the rapid fire question session after they present.
- Most of all, have fun and be curious!

Home activity 5 | Grassroot Innovation

Have you heard of grassroot innovation and innovators? These are inventions of common people who are facing a problem, who use their existing knowledge about the situation to propose a simple solution.

Lets understand more about grassroot innovation through this activity!



Individual activity

01

Hours

Instructions for home activity 5

- Students must first watch this video about Mitticool, a fridge made of clay: Mansukhbhai Prajapati: Making earth look cool - YouTube / read the article in the appendix
- Mitticool is an example of a grassroot innovation. Students read a passage about what grassroot innovation is, in the task book.



- Next, visit Grassroot Innovations | India Science, Technology & Innovation (indiascienceandtechnology.gov.in)
- Pick one of the grassroot innovation and answer the questions in the exercise section.

Exercises

H5.1 Why was this product designed? what was the motivation? Who invented this product?



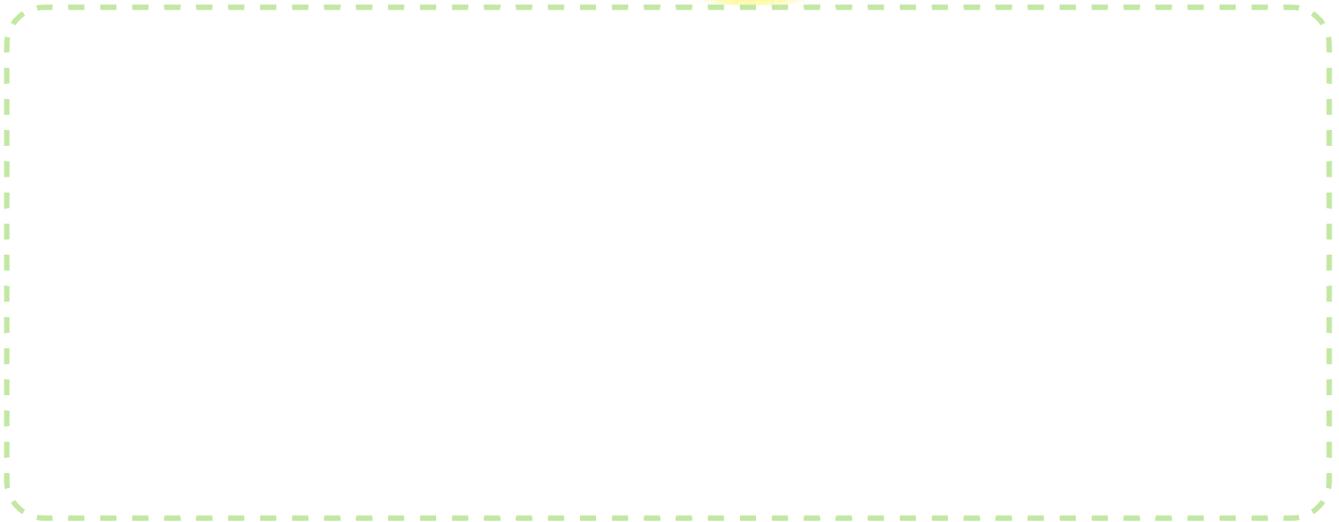
H5.2 What can you comment on the level of resource use? Where did the creator source the resources from?



H5.3 Do you think grassroot inventors tend to create sustainable solutions? Justify your answer?



H4.3 When do you think the intervention of technology is needed? How can usage of sustainable technology help with sustainable design?



Presentation day!

To-do in class

C4.1 It's presentation day! Write concisely about the redesign of your product and your way of presenting it:

If more space is necessary, use an A4 sheet, fold and stick along the grey dashed line



The module is finally over! How was your experience? Let's answer a few questions before we wrap up:

Final feedback

F1 As a future creator/designer/engineer, what is your role in shaping the future?



F2 What are the most useful things you learnt in this module? What are the things you might use in your day to day life?



F3 Do you think we should start designing sustainably now? What would you comment on the urgency with which this needs to be done?



F4 Do you think it is important to consider all aspects pertaining to a decision before making it, what will be the consequence if we do or do not do that? Does it matter if it is a simple or complicated decision?



Appendix

(A) Article by Vandana shiva

Here is a short article by Dr. Vandana Shiva, an Indian scholar and environmental activist:

In numerous traditions of indigenous thought, the sharing of food is treated as ceremony. Each ritual reflects the understanding that giving and receiving is a sacred transaction. You give and receive in appreciation of your interdependence with others—not only with your family and community but also with the farmer, the food provider and the vast non-human family that populates Earth. Every bird, every bug, every microscopic microbe—every living organism interconnects in the great web of life. As school students we learn that all life is made of the same basic elements—earth, water, air—yet as adults we tend to forget it. But the facts are the facts: We drink water that circulates throughout the whole biosphere. The oxygen exhaled by the rainforest becomes our own breath. The food produced by the seed and the soil builds up our bodies and keeps them alive. We are one with the earth. If it sounds like spirituality, it is. But it is also science and—more than ever now—politics.

<https://vandanashivamovie.com/vasudhaiva-kutumbakamwhats-that/>

(B) Mansukhbhai's "Mitticool"

When An Earthquake Hit Gujarat, He Invented "Mitticool", A Clay Fridge That Runs Without Electricity

When Mansukh bhai suffered severe loss in the Gujarat earthquake, he got an idea to make a fridge out of clay. He invented "Mitticool" which runs without electricity and also preserves the original taste of the food items. Apart from a fridge, he has invented non-stick earthen tavas, earthen thermos flasks, etc. Know all about the man who is helping millions with his amazing environment-friendly and pocket-friendly innovations.

Mansukh bhai Prajapati, a traditional clay craftsmen, has transformed traditional clay items into an innovative range of products which he calls Mitticool, 'mitti' meaning clay in Hindi. The Better India sheds lights on the entrepreneurial journey of this tenacious innovator.

Born in Nichimandal village of Morbi, Rajkot, Mansukhbhai was exposed to traditional clay making since childhood. But, due to the precarious financial situation of the family, he had to leave studies early and take up various odd jobs to support the family. In 1988, he left his job and took a loan of Rs. 30,000 to start his own earthen plate manufacturing factory. Mansukh bhai modified the roof tile making hand press and developed a hand press machine having a capacity to produce 700 earthen pans per day. He sold one pan for 0.65 paisa and within 2 days he could sell the entire 1st batch.



This continued for some time. However, he started getting negative feedback from customers regarding the durability of the tavas (pans). He then experimentally varied the proportions of clay to get a mix which was more heat resistant and durable. In 1990, he got his unit company registered. And in 1995 he got a bulk export order for water filters from Nairobi, Kenya. Finally, the Trade Mark 'Mitticool' was registered in 2001.

In the calamitous earthquake of 2001, Mansukh bhai suffered huge irreparable loss. His stock was decimated to a large extent, and whatever remained, he distributed it among the earthquake victims in Kutch. In February 2001, Sandesh Gujarat Daily carried a photo feature on the earthquake where at one place it showed a broken water filter of Mansukhbhai with the caption 'Garibi Ka Fridge Tut Gaya' (Fridge of the Poor got broken)

This caption motivated him to work hard and create a fridge that could be used by rural masses. In 2002, he started working on the refrigerator design and came in contact with GIAN (Grassroots Innovation Augmentation Network), which assisted him in various stages of product development. The principle of cooling used in this simple machine is the same as that of earthen pots. It does not require electricity or any artificial energy and therefore has no recurring costs. The refrigerator preserves the original taste of fruits and vegetables.

During testing, the shelf life of coriander was extended by 4 days as against 1.5-2 days in room temperature. Shelf life of vegetables like brinjal, chilly & okra was increased on an average by 5-6 days vis-à-vis room temperature. GIAN facilitated design improvements in the fridge through National Institute of Design (NID), Ahmedabad. Mitticool refrigerator has been featured at a conference organized by the Centre for India and Global Business, Judge Business School, University of Cambridge, UK in May 2009. Bosch and Siemens Hausgeräte (BSH), Germany, one of the world's largest home appliance companies, have also written to GIAN and showed interest in the product.

<https://www.thebetterindia.com/14711/mitticool-rural-innovation-nif-mansukhbhai/>

