Exten DT²

Extending Design Thinking with Emerging Digital Technologies

Teaching with Design Thinking and Digital Technologies

A professional development training offered by the European-funded project Exten(DT)2
https://extendt2.eu/

Before the session:

1. Create accounts for all teachers:
   a. Extendt2 platform
   b. nQuire for students
2. Share the accounts and URLs of the two platforms with participating teachers
3. Ask teachers to log in and have a look before the session - ask them to email you if they cannot access the platforms (solve any technical problems before the session).
4. Give links to example activity plans (one each technology) in case some teachers want to have a look beforehand
5. Before the start of the session, share **"key terminology" slide** with teachers (See next slide)

Exten DT²

Extending Design Thinking with Emerging Digital Technologies

Key terminology

Exten (DT)² Extending Design Thinking with Emerging Digital Technologies

- Exten (DT)2= "Extended Squared", the name of the research project this training relates to; it stands for "Extending Design Thinking with emerging Digital Technologies"
- design thinking= a process of problem solving that can help to develop 21st-century skills by co-creating, piloting, and improving solutions.
- 21st century skills= critical thinking, creativity, problem solving, etc
- prototype= an artefact students create or develop (physical or digital)
- empathise= understanding what others think, feel, need
- ideate= come up with different solutions for a problem
- Exten(DT)2 model= a model to help teachers use design thinking and technologies in the classroom
- Exten(DT)2 platform= an online platform that hosts tools used in design thinking, including the below:
  - Choico= a simulation game about the consequences of the choices we make
  - Sorbet= a sorting game
  - Malt2= a game for creating 2D and 3D shapes
  - nQuire for students= a tool to collect data from others
  - GearsBot= a virtual robotics tool
- Activity plan template= a template to help teachers structure and design activities for their students

Our norms for today...

- We treat each other with respect.
- We listen carefully while another person is speaking.
- We respect all others' right to speak and share their thoughts – we should not dominate the discussion.
- We should direct arguments toward opinions and ideas, not the individual stating them.
- We can ask questions at any time.
- There are no wrong questions or wrong answers! We are all here to listen and learn from each other!

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Extending Design Thinking with Emerging Digital Technologies

Contents:

Part 1 (1 hour):
- The Exten(DT)2 project
- Learning outcomes
- Design thinking
- Activity 1 (added value of technology)
- Models of design thinking

Break

Part 2 (1 hour):
- Activity 2 (use of technologies)

Break

Part 3 (1 hour):
- Activity 3 (writing my own activity plan)

Exten DT²

Extending Design Thinking with Emerging Digital Technologies

What is this project about?

Exten DT²

Extending Design Thinking with Emerging Digital Technologies

Key components of *Extended Squared* - Exten(DT)2 - project:

- **Design Thinking**
- **Technologies**
- **21st century skills**

Design thinking = a process of problem solving that can help to develop 21st-century skills by co-creating, piloting, and improving solutions.

Design thinking **rarely used in education** (mainly industry)

21st century skills e.g., critical thinking, collaboration, creativity, problem-solving

Visit the project website: https://extendt2.eu/

In this project…

….we use innovative technologies to apply design thinking at schools in an easy and effective way

…. technologies are designed at our institutions and are based on Artificial Intelligence (AI), Augmented Reality, 3D printing/scanning and virtual robotics.

….we will produce guidelines about how to use design thinking and technologies at schools across Europe (context- and country-specific).

Learning outcomes:

After attending this professional development training, you should be able to:

- Explain to your students **what design thinking (DT) is** and why it is useful (model, vocabulary, examples)
- Find out about **6 innovative digital technologies** to use in design thinking projects (you will use 2 of these in this session)
- Understand the **added value of using digital technologies** to design DT activities
- **Identify a problem** relevant to your students' needs that can be solved using DT and technologies
- **Develop an activity plan** you can implement with your students next time you go to school!

Introductions….(15 min)

Who are the facilitators?

- Organisation
- Role in the project
- An interesting fact/thought about the project

Who are the teachers?

- Years of teaching or studying to become a teacher
- Any past experiences with Design Thinking
- Any past experiences of using technology in the classroom
- Why did you join this training?
- What do you hope to get out of it?

What is design thinking?

…is a human-centred approach to **learning**, **collaboration** and **problem solving**

…a process through which you can identify a challenge, gather information, come up with possible solutions, refine, and test your solutions.

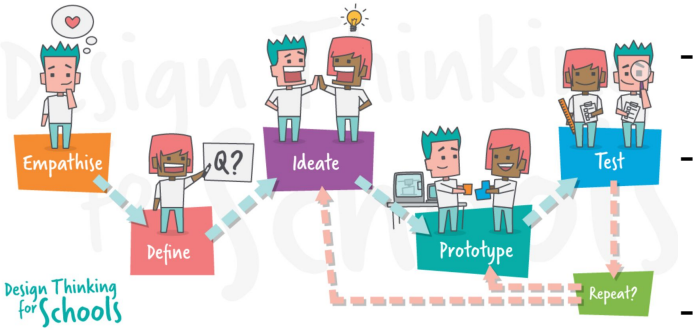
….the process is **circular** and **iterative** - you should reflect on each stage of design thinking and revise it

…is a mindset - a way of thinking and working

…is used by designers (in real life) when they try to innovate

https://tll.gse.harvard.edu/sites/projects.iq.harvard.edu/files/hgsetll/files/designthinkingeducation.pdf

Why is design thinking important?



In a changing world, future citizens need to be flexible and adaptable and ready to cope with situations they haven't seen before. Design thinking is **a great tool** to:

- To develop **confidence** to respond and adapt to challenges
- To be able to develop innovative and **creative solutions** to the problems they face
- To become active and **empathetic members** of society that can contribute to solving complex issues (e.g. pollution, climate change)
- To develop **21st century skills**

https://www.makersempire.com/what-is-design-thinking-a-handy-guide-for-classroom-teachers/

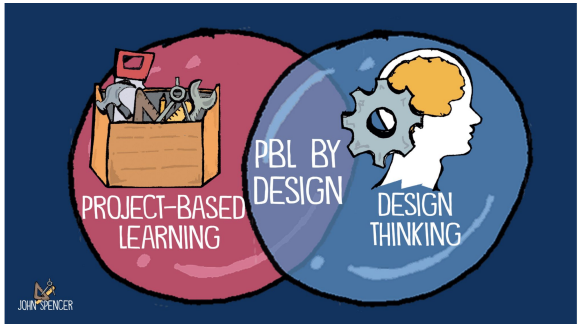
How is design thinking different to problem-based learning?

Starting point is the **understanding of end-users needs**, feelings, perspectives, and challenges ("empathise")

Student voice and choice (greater motivation) e.g. students come up with their own solutions, students co-create the driving question

A solution is **created/crafted/developed** by students rather than just found

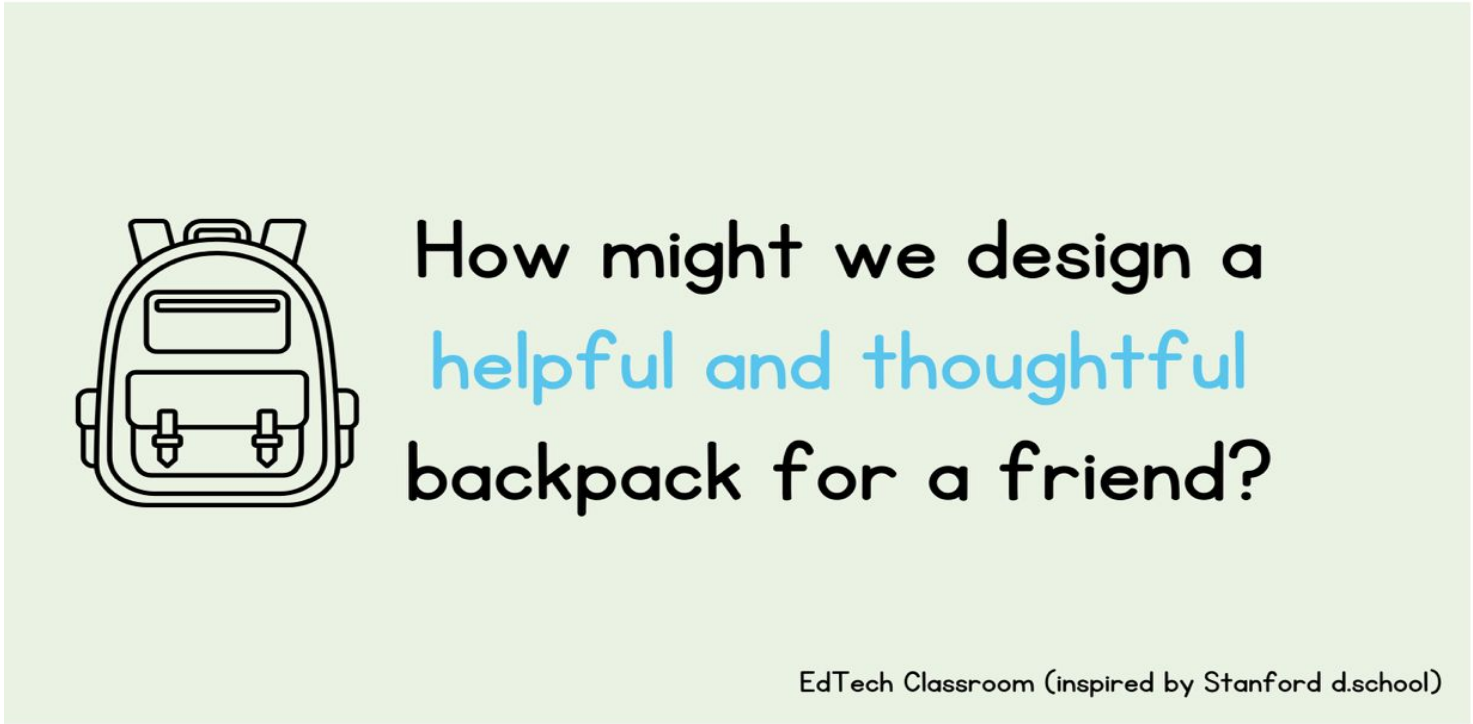
Design thinking can give **structure** to problem-based learning



Real life, complex problems, authentic learning situations

https://spencerauthor.com/pbl-by-design/#:~:text=In%20other%20words%2C%20PBL%20provides,experience%20works%20with%20design%20thinking.

An example of a design thinking project in a class



https://edtech-class.com/2021/08/26/design-thinking-project-ideas-for-elementary-classrooms-and-back-to-school/

"The first stage of Design Thinking is Empathize. What do we think the word empathy means?"

_____ needs a way to

partner's name

_____

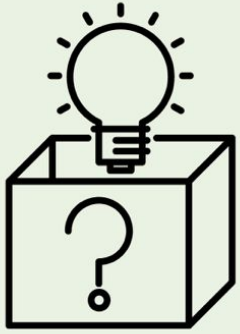
partner's need

because (or but... or surprisingly...)

_____.

insight

EdTech Classroom (inspired by Stanford d.school)

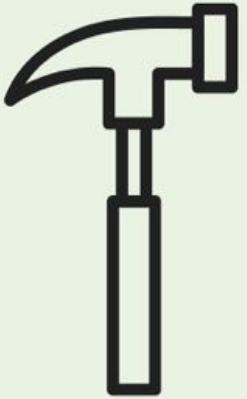


Ideate = brainstorm wildly radical ideas

EdTech Classroom (inspired

Idea #1	Idea #2	Idea #3

EdTech Classroom (inspired by Stanford d.school)



Prototype = first draft / build

EdTech Classroom (inspired by Stanford d.school)

What is helpful about this backpack? How is the design of this backpack thoughtful?

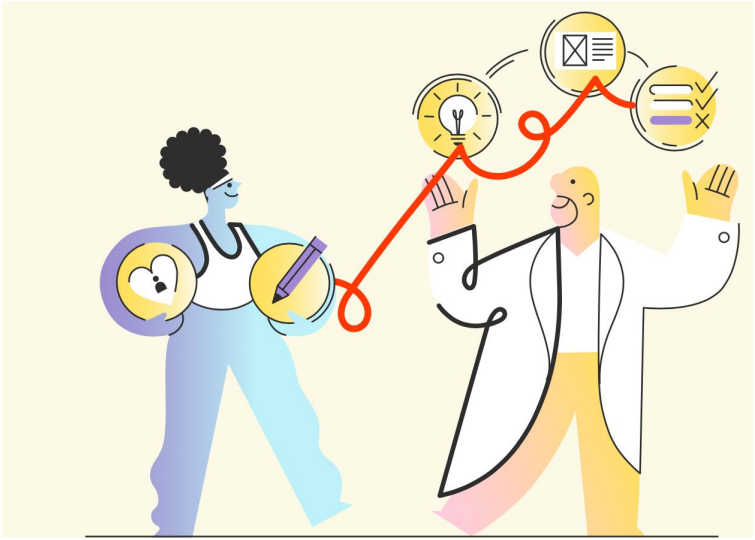
What are the outcomes of a design thinking project?

Design as making

- new products, services, designs (e.g. 3D printed artefact)

Design as thinking

- New ways of thinking (enhanced learning, changes in behaviour)
- Understanding multiple perspectives
- Iterating and revising ideas
- Being flexible and adaptable



In the classroom:

- game artifacts (digital or physical)
- presentations/pitch videos with new ideas

https://www.hotjar.com/design-thinking/

What activities can we use to teach design thinking?

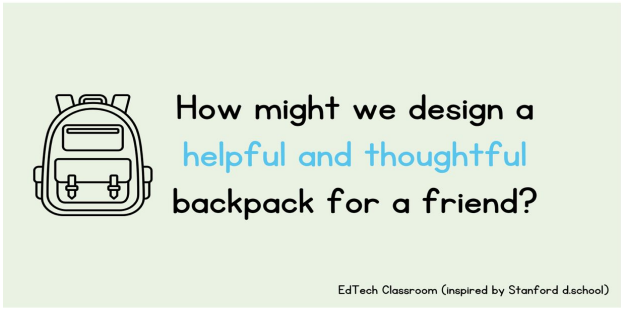
How can technology help us do this better?

Activity 1: Group work, break out rooms (15 min)

Think of the **backpack** example…

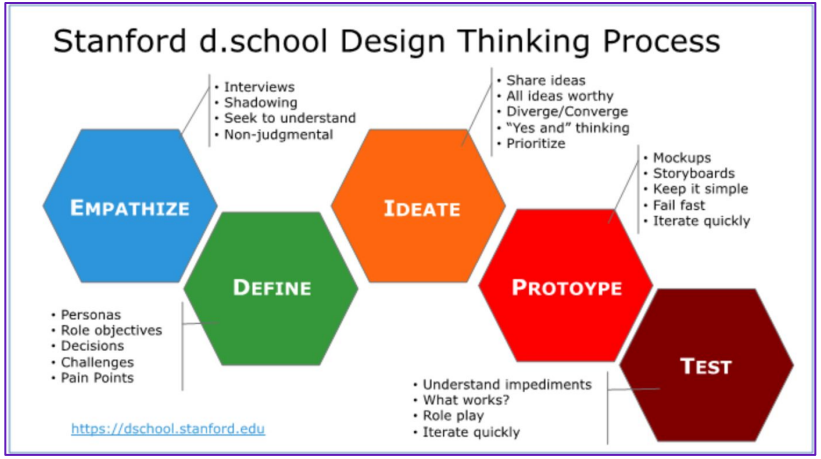
1. What activities would you normally do to teach students:
   a. how to "emphathise" (collect data from others about what they think, feel, need)
   b. how to amend and improve "prototypes" or solutions?
2. How could you teach the above with the help of technology (think of any technology tools you know)?
   a. Could technology help you to teach in an easy and more effective way?

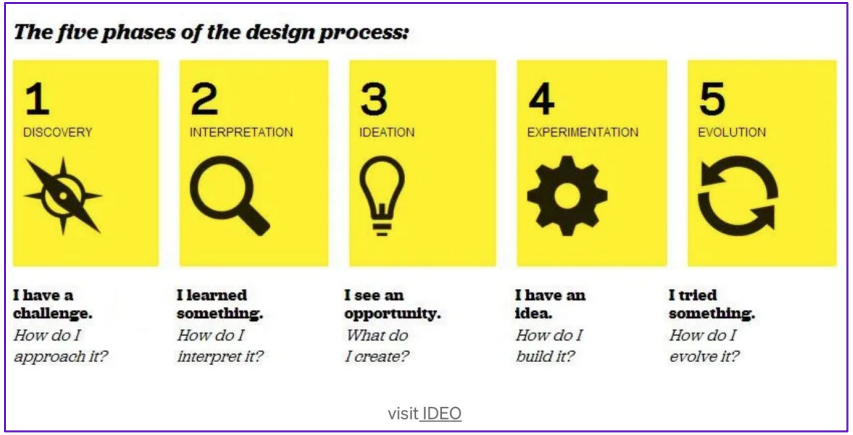
**Note down main points and share in plenary.*

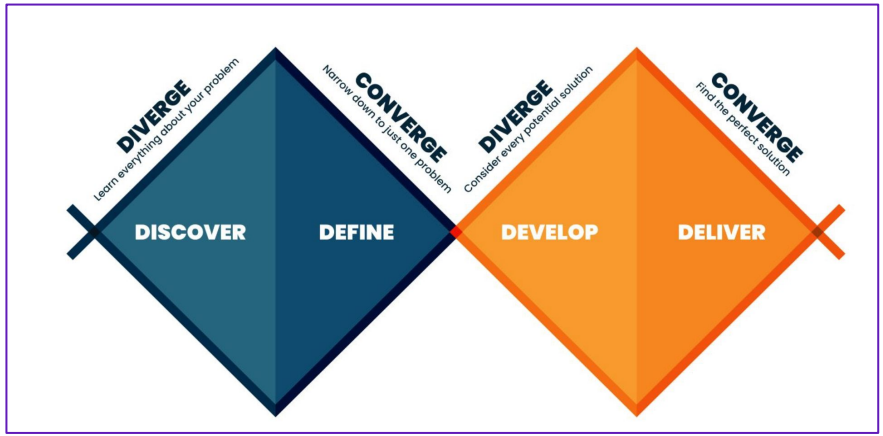


Ideas for activities:
https://docs.google.com/document/d/1TpG7dt9ci_giDeyFGn_PV_XhDN3_X3HBPPwwPxH5vIQ/edit

Models of design thinking


Stanford d.school Design Thinking Process
• Interviews
• Shadowing
• Seek to understand
• Non-judgmental
EMPATHIZE
DEFINE
• Personas
• Role objectives
• Decisions
• Challenges
• Pain Points
IDEATE
• Share ideas
• All ideas worthy
• Diverge/Converge
• "Yes and" thinking
• Prioritize
PROTOYPE
• Mockups
• Storyboards
• Keep it simple
• Fail fast
• Iterate quickly
TEST
• Understand impediments
• What works?
• Role play
• Iterate quickly
https://dschool.stanford.edu


The five phases of the design process:
1
DISCOVERY
I have a challenge.
How do I approach it?
2
INTERPRETATION
I learned something.
How do I interpret it?
3
IDEATION
I see an opportunity.
What do I create?
4
EXPERIMENTATION
I have an idea.
How do I build it?
5
EVOLUTION
I tried something.
How do I evolve it?
visit IDEO


DIVERGE
Learn everything about your problem
CONVERGE
Narrow down to just one problem
DIVERGE
Consider every potential solution
CONVERGE
Find the perfect solution
DISCOVER
DEFINE
DEVELOP
DELIVER

The Exten(DT)2 model:
A practical model for using design thinking in the classroom

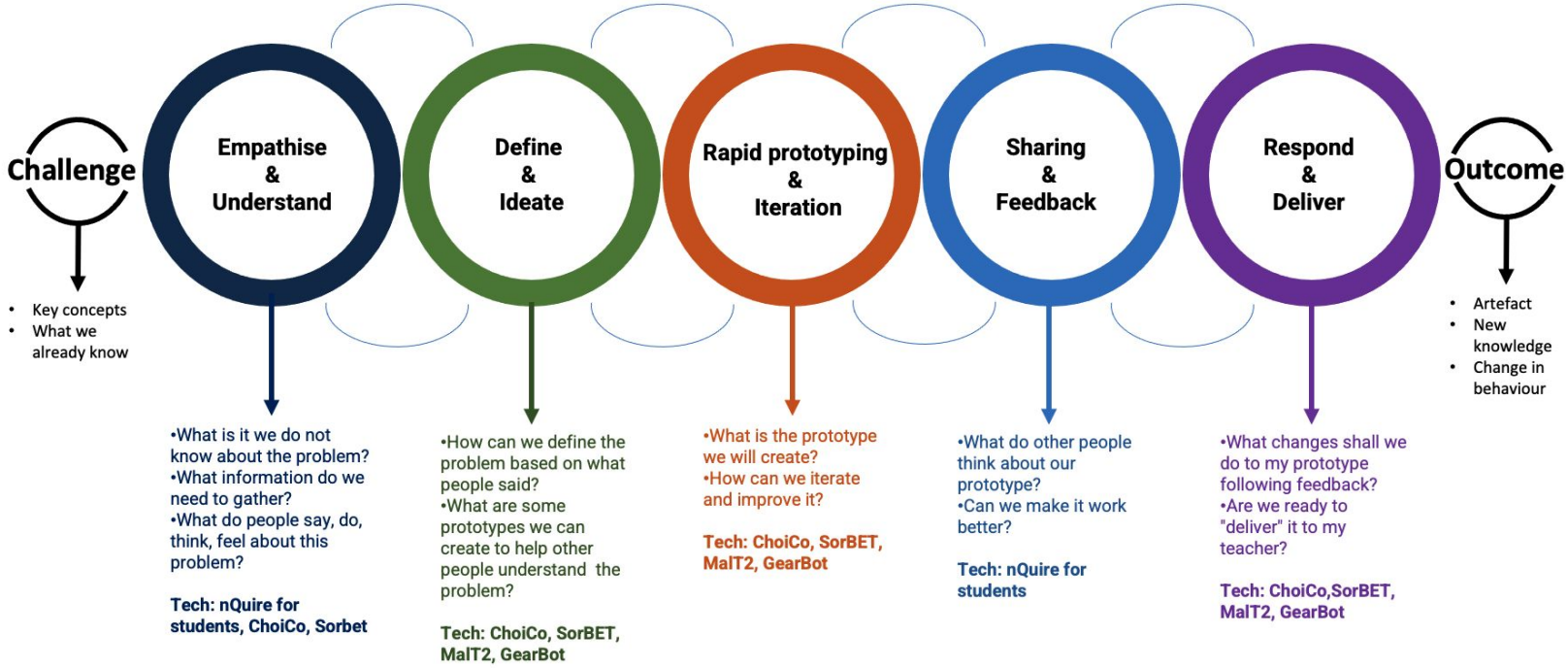
Why a new model? Reflecting on year 1 project activities with teachers and students across Europe (in which we used the Double Diamond Model), we identified the below:

- Need to showcase to students the fact that each design thinking **step is used to inform the next one**
- Need to stress the importance of "**empathise**", as a key feature of design thinking
- Need for a model that is **self-explanatory and easy** to understand (language matters)
- Need for a model that meets curricula requirements in particular, the need for **student assessment**
- A model that showcases the **added value of using technologies** to apply design thinking in the classroom

***Fully digital version*: all phases of design thinking are delivered using technologies**

***Hybrid version*: some phases of design thinking are delivered using technologies**

The Exten(DT)2 model of digital design thinking



See original version here:
https://docs.google.com/presentation/d/1N0y-ppaatWsF05JF8m10dCaKCGpf7IJR/edit?usp=sharing&ouid=117068169821130063488&rtpof=true&sd=true

Break time...5 minutes

Activity 2: Digital technologies and Design thinking

"Imagine **you are a student** and you are asked to use design thinking and a set of technologies to address the issue of:

”Energy consumption at school"

Starting point…

- What is the problem you want students to engage with?
- What do your students already know about it?
- What are some key concepts/terminology?

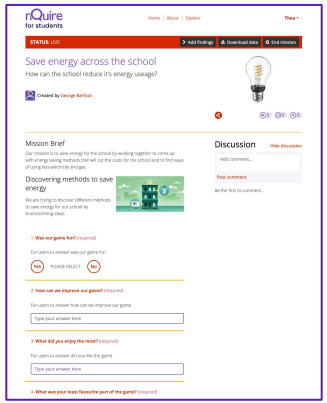
Proposed activities

- Visit **nQuire for students**: https://learn.nquire.org.uk/
- As a teacher, design a questionnaire:
  - asking your students to share problems they would like to examine related to their school, local community etc.
  - Ask students to explain why they think these are important issues to study, understand, and find a solution for.

Alternatively…

- As a teacher, identify the problem, go to www.extendt2.com, create a group, assign a group/groups that administrator has created to your group, create an activity, assign activity to the specific group, design a game using **ChoiCo** related to the problem you have chosen.
- Ask students to play the game and share their understanding about the problem and extend it further.

nQuire for students - an online tool to collect data

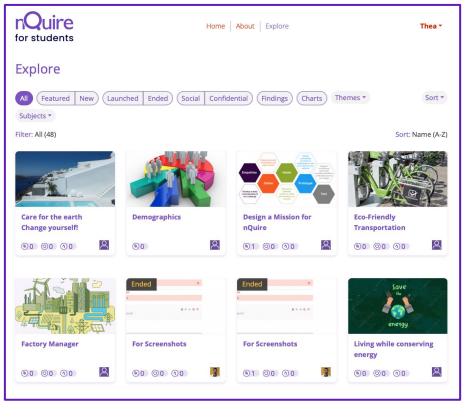


An online tool to:

- design questionnaires
- collect data about what people say, do, think, feel ("empathise" phase of design thinking)
- collect feedback about your prototypes (solutions)

What is unique with nQuire for students?

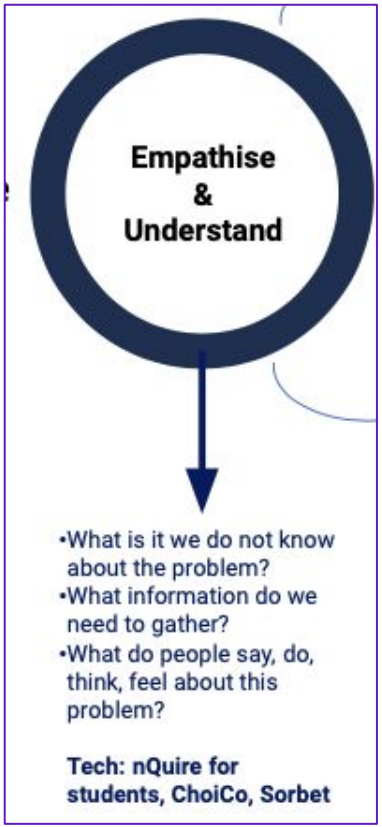
- Teaches students about the need for consent before collecting data
- Encourages students to pilot and improve their prototypes (through a dedicated URL)
- Enables the teacher to review and comment on a study before this is shared with others



Help! Here's some short videos explaining how to use nQuire for students:

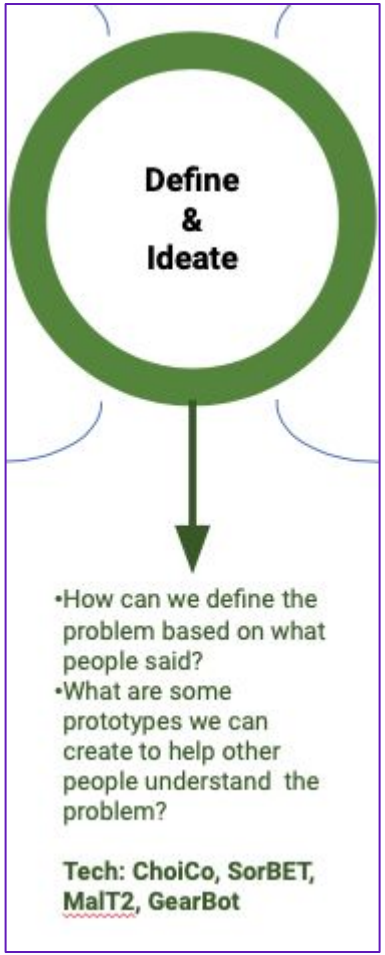
- How to log in: https://www.youtube.com/watch?v=Z6TIy2ggVKk
- How to create accounts for students: https://www.youtube.com/watch?v=bTT-NvF2p_A
- How to design a study ("mission"): https://www.youtube.com/watch?v=dEL8bEQyNPA&t=2s
- How students can pilot their studies before they make them live [to be added]

Step 1:



- As a student, log in to **nQuire for students**: https://learn.nquire.org.uk/
- To familiarise yourself with nQuire, **try a demo study**: https://learn.nquire.org.uk/mission/minimising-energy-consumption
- Now **create your own study** about the issue you examine:
  - Go to: Create a mission from the menu under your username
  - Add at least 3 questions that would help you find out what other people are thinking/feeling about the problem
  - Set the study in pilot mode and share the URL in the chat
- **Take part in a study shared in the chat** and leave your feedback by using **Discussion (see right hand side)**
- In your **feedback,** consider e.g.
  - are the questions well formulated?
  - can they be improved? In what ways?
  - are there any mistakes?

Step 2:



- Log in to www.extendt2.com and go to ‘Define and Ideate’ block. As you have decided to use the game ChoiCo, it will direct you to the '**Choico**' game: http://etl.ppp.uoa.gr/choico
- To familiarise yourself with Choico, try a game already created about Covid 19: http://etl.ppp.uoa.gr/choico/?covid19survivor_Eng
- Amend the game by pressing **Edit**
  - Delete a field
  - Add a new field
  - Add values to the new field created
  - Delete a choice
- Now **create your own game** based on what you learnt from surveying people (in step 1)
  - Define how the game will be to achieve your goal
  - Think about (ideate):
    - **Where** the game will take place? (map area)
    - **What choices** the player will have?
    - **What fields** will be affected by their choices (game fields)
    - **How** they will be affected (database values)
    - **When** the game will end (end rules)

ChoiCo - an online game with consequences

Game Fields

Game Scene (Google Maps)

The consequences of a choice made in the game

- Create choice-driven simulation games on a real map
- Make choices with consequences to the game fields
- You win if you make the larger number of choices

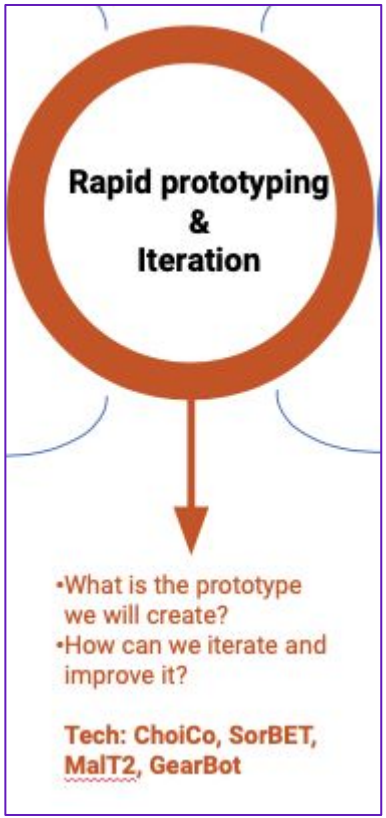
Choico: Video tutorials

Help!

Here's some short videos explaining how to use Choico

- https://drive.google.com/drive/folders/1j5zice96L4pfF9GZkLkZbjgMQO7H8B-R

Step 3:

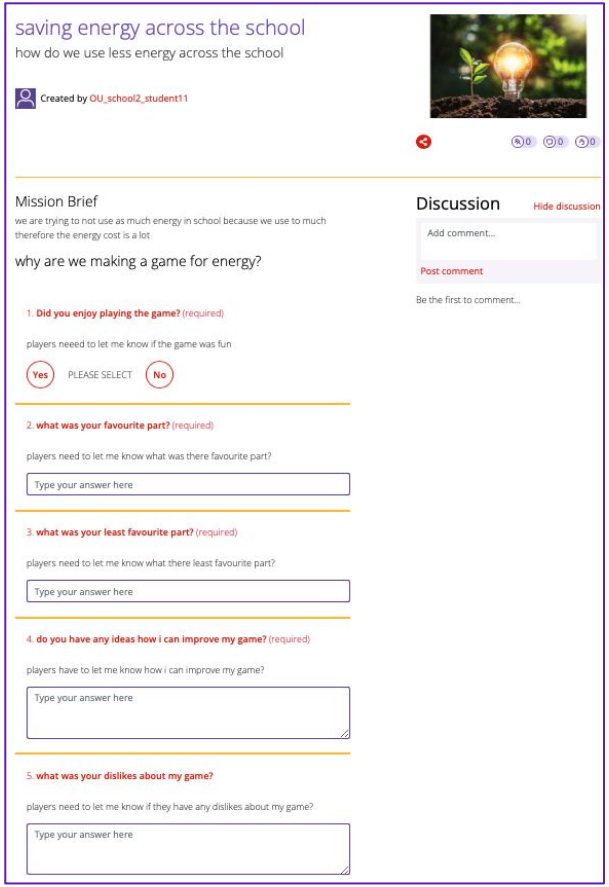


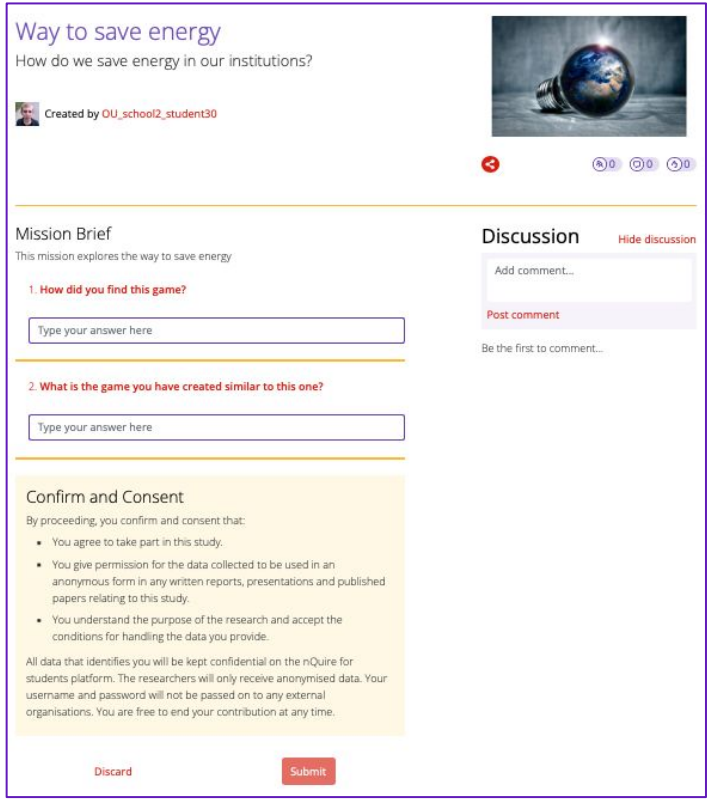
- Log in as a learner on www.extendt2.com and click on Rapid Prototyping and Iteration Block
- You will be directed to a ChoiCo game
- **Create a first demo** of your game based on the parameters you defined in previous step
  - e.g., the demo can have 3-4 choices and one ending rule
- **Test your demo**: Press the play button, use it as a player and save it.
  - While testing write down things that don't work well or new ideas
- **Improve your demo:** Press the "edit" button and edit your game
- **Test it with others**: Give your improved game to at least one other student to play it. Ask them questions and keep notes as they use it; make changes accordingly.
- **Keep testing and improving the game** until your team is satisfied by the result

Step 4:

- Log in to www.extendt2.com as a learner and click ‘Sharing & Feedback’ which will further direct you to nQuire for students: https://learn.nquire.org.uk/. Log in to the platform with your nQuire credentials.
- **Create a new study ("mission")**: the aim is to collect feedback about your prototype from as many students as possible
- **Add at least 3 questions** asking others to try your game and give feedback
- **Example questions:**
  - What do you like about my ChoiCo game?
  - Is there anything you would like to change?
  - Is there anything missing?
  - Did you learn anything new after playing my game?
  - Would you recommend my game to others students? Explain why.

Example studies created by students in Year 1

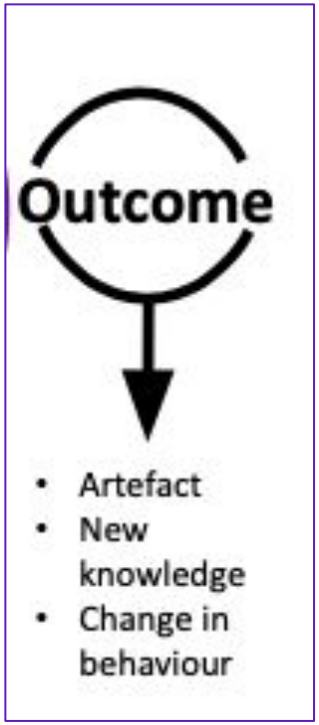




Step 5:

- Check the responses to your study on **nQuire for students** (these are public so you can read them when accessing your study)
- Read them all and note down what changes you can make to your prototype
- Go to **Choico** and **make changes** as needed
- It is fine if you cannot address all proposed changes or you have a reason to disagree with some of the suggestions.
- When you finish, "deliver" your prototype to your teacher for assessment.

Ending point…



The outcome of a design thinking project at schools can look like:

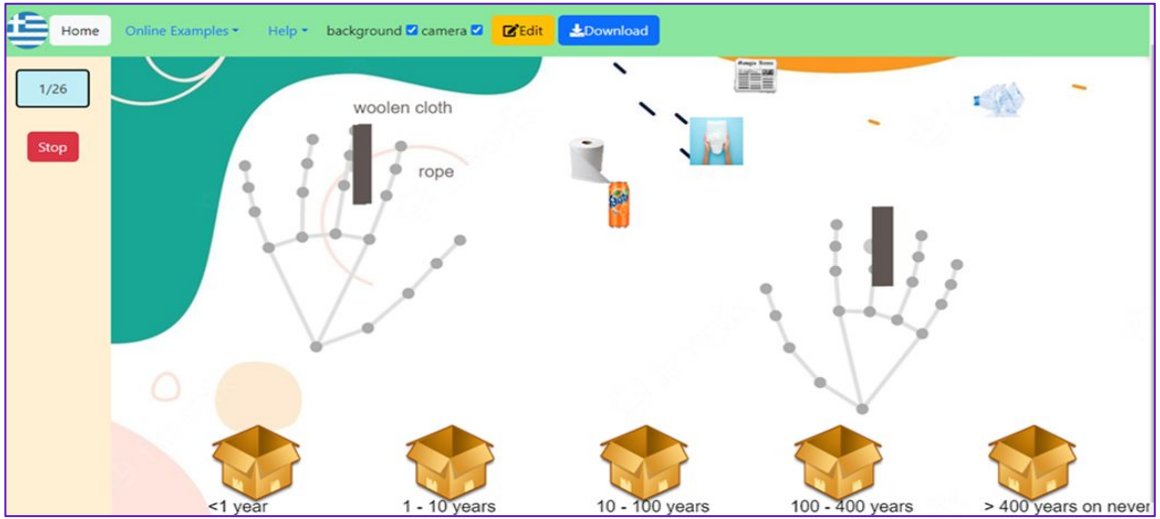
- A new digital artefact (e.g., a ChoiCo game)
- A new physical artefact (e.g., 3D printed object)
- New knowledge
- Change in behaviour/attitudes
- Development of news skills

Reflections: Plenary discussion (10 min)

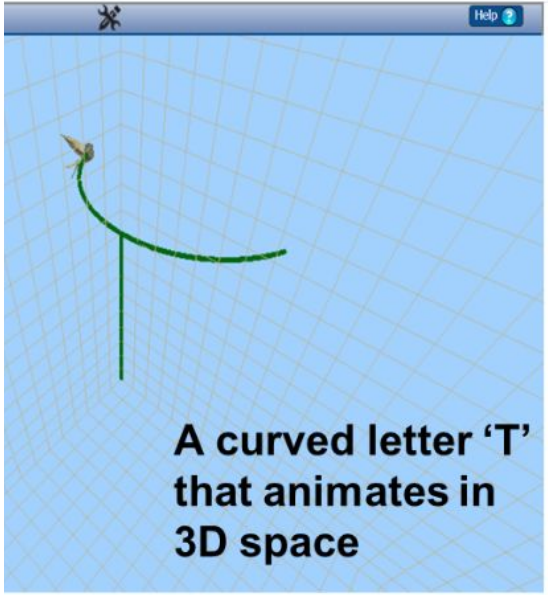
- What are your initial impressions of technologies?
  - Positive, negative, neutral
- What would you like to improve on each technology?
  - Is anything missing?
- Do you think there would be any issues/barriers using these technologies with students at your school?
  - Think of student age, technical skills, infrastructure, time, etc

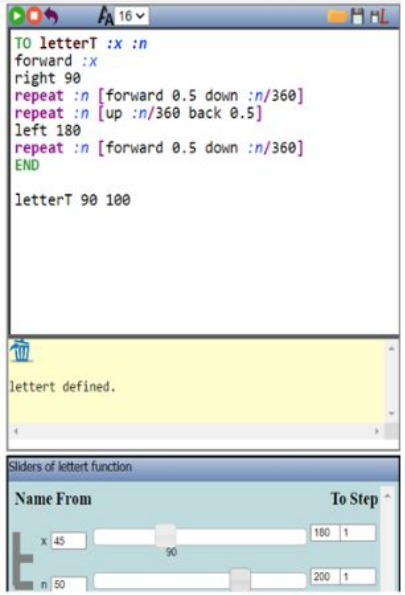
Other technologies linked to the Exten(DT)2 platform

SorBET: Design & Play Augmented Reality (AR) classification games



- Sort out items in categories (rapid decision making)
- Two players can play simultaneously using their hands (with any computer camera) (collaboration, communication, discussions)
- Figure above: an AR game that sorts material according to time needed for degradation
- Example DT project: "*design a game for the elderly to learn about the different uses of technology*"
- https://extendt2.eu/technologies/



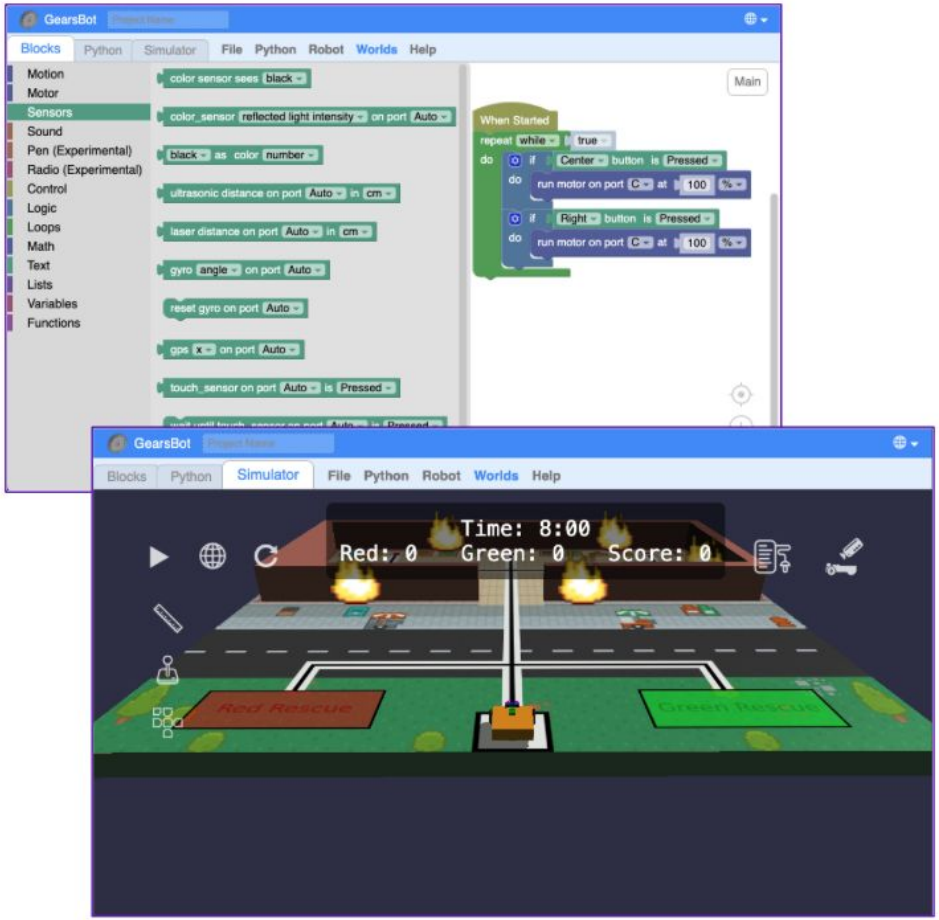


Printed to decorate a reusable cup

MalT-ext

- A tool to create **2D and 3D** animated models
- The models can be **3D printed**
- Use **text-based programming**
- Use **dynamic manipulation** to animate the model in 3D space
- An example of a design thinking project using MalT-ext: "*Design curved 3D letters that can be 3D printed and become parts of sustainable jewellery*"

https://extendt2.eu/technologies/



GearsBot

- A tool that supports a **3D robotics simulator** using either **drag-and-drop** blocks of code or **Python**
- An example of DT project is to use one of the virtual “worlds” and make it fit in an imaginary scenario of a problem you may think about, **or** to choose a more advanced “world” like the “**fire rescue**” and try to improve how the robot is constructed and controlled to complete a rescue mission
  GearsBot Mini Tutorial: https://youtu.be/Zc7tCtucLC8

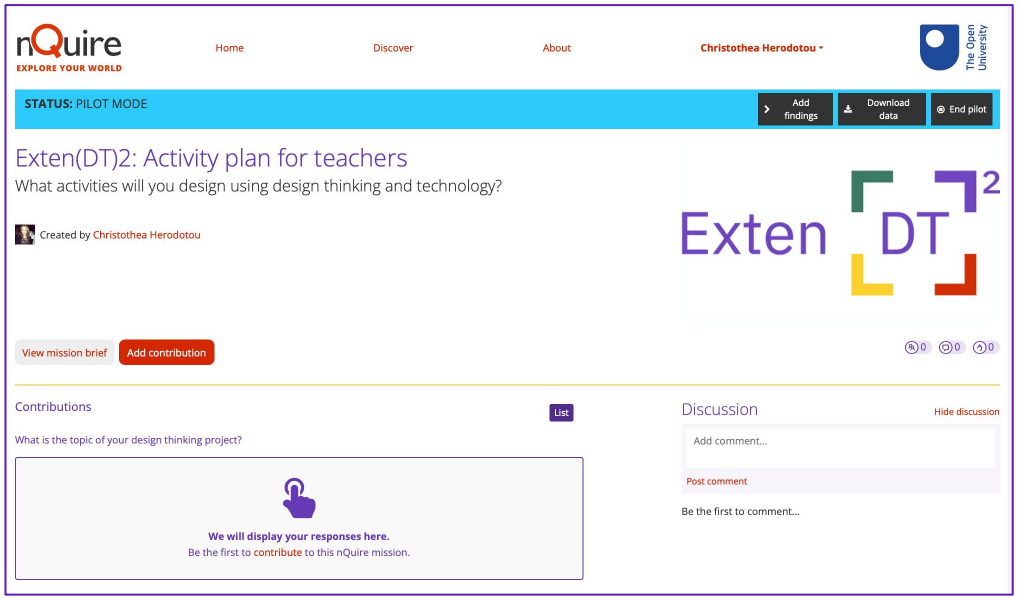
Break time…5 minutes

Exten DT²

Extending Design Thinking with Emerging Digital Technologies

Activity plan template:

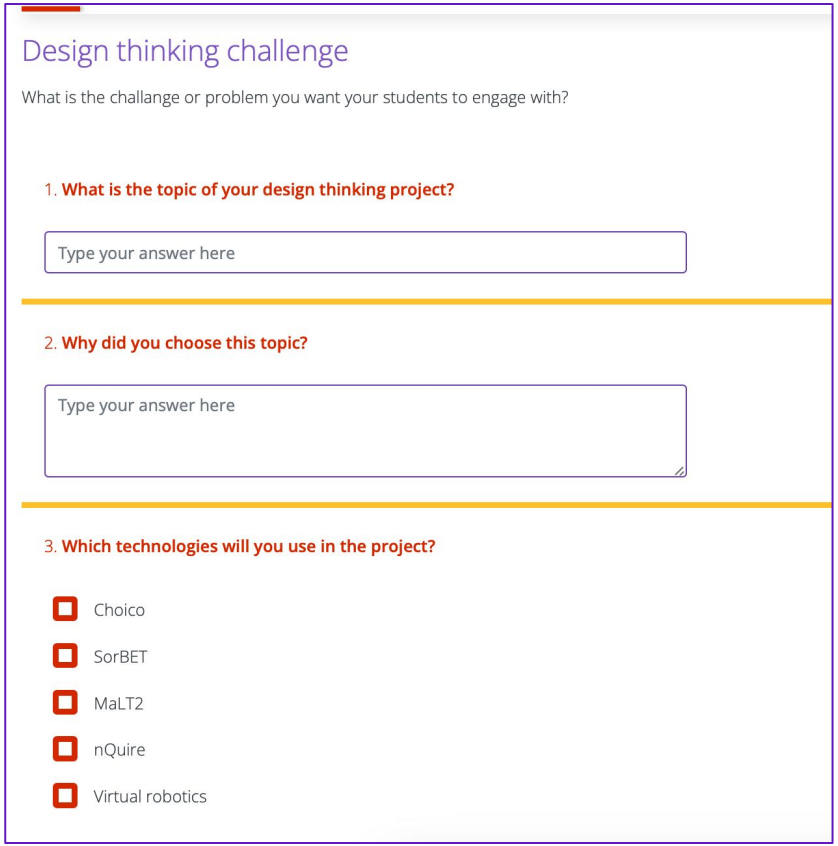
Produce your own design thinking project for your students



Activity plan template

- You can find the activity plan template here: https://nquire.org.uk/mission/extendt2-activity-plan-for-teachers/data

- Register and select: “add contribution” - add your responses to questions related to the below:
  - Design thinking challenge
  - Step 1: Empathise & Understand
  - Step 2: Define & Ideate
  - Step 3: Rapid prototyping & iteration
  - Step 4: Sharing & Feedback
  - Step 5: Respond & Deliver
  - Organisation: Space/settings (online, ftf, blended); Time/weeks; Student information (any special needs, etc)
  - Student learning outcomes



Activity 3: group work in break-out rooms (40 min)

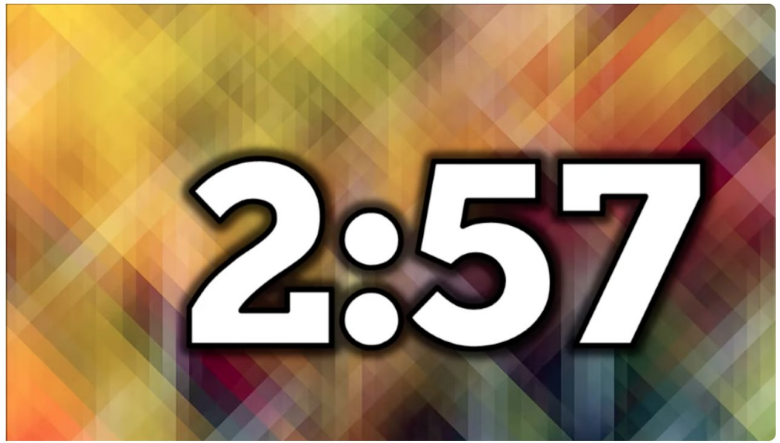
- Discuss and decide on a **topic** for your design thinking project
  - Fill in the respective fields in the activity plan template
- Decide on the **technologies and any other material** you need to teach each stage of design thinking
  - Fill in the respective fields in the activity plan template
- Decide on the **learning outcomes** of your activity
  - Fill in the respective fields in the activity plan template
- Decide on how **students will work together**, how long this will take, and any other student considerations
  - Fill in the respective fields in the activity plan template
- **Submit your completed activity plan!**
  - This will be made **live** for other teachers to read and get inspiration from!
  - You will be able to read the activity plans of others and leave your feedback!

End of training assessment (3 min)

- Before we wrap up, we want to know what you think about this training!

  https://bitly.ws/33Sd7

- 3 minute timer: https://youtu.be/iHdviZkM7S4?si=td4s5E95Vl6yUQMI



Next steps

1. Planning to implement your activity plans? **Get in touch!**
    a. A "Case study" we observe and collect data from
    b. Administer pre- and post-student questionnaires (only) and send them to us
    c. Give us an interview sharing your experiences after you implement your activity plans
    d. Receive a newsletter from the project (every 4 months)
2. Follow-up workshop dates: share with your colleagues!
3. Bespoke requests for delivering workshops at a single school
4. Contact details: **extendt2@gmail.com**

Thank you! Any questions?

Example learning objectives (with help from AI…)

1. Students will be able to identify the key factors that contribute to energy consumption.
2. Students will be able to apply the design thinking process to develop innovative solutions to reduce energy consumption.
3. Students will be able to evaluate the effectiveness of their solutions and make improvements as necessary.
4. **Empathize**: Students will be able to identify the key factors that contribute to energy consumption.
5. **Define**: Students will be able to articulate the problem statement and define the scope of the project.
6. **Ideate**: Students will be able to generate a range of innovative solutions to reduce energy consumption.
7. **Prototype**: Students will be able to create a prototype of their solution.
8. **Test**: Students will be able to evaluate the effectiveness of their solutions and make improvements as necessary.