



Teaching Design Thinking

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How to use this guide.

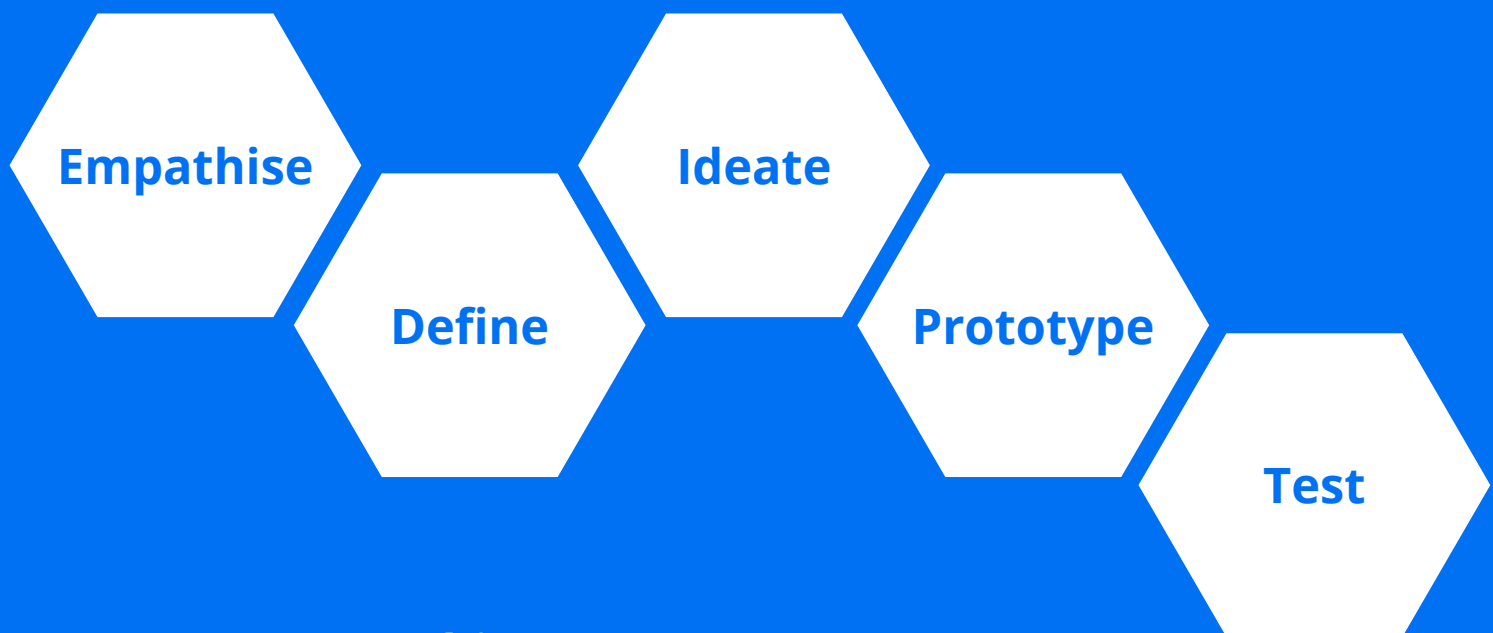
This guide has been designed for teachers who want to get started using design thinking in their classrooms. Over the following pages, we provide an overview of what design thinking is and how to follow a design thinking process. We'll also suggest some design thinking activities that work well in classrooms and will help students understand how design thinking works in practice.

You can use the activities and suggested lessons here as a method to teach students about design. However, you might also find this approach to be useful for competitions and events where students need to come up with ideas based on themes or solve problems for particular people. This approach is also a great way to teach design thinking while your class tackles the design challenges on the Bitlink website.

There is far more to learn about design thinking than we could possibly cover in this short guide, so please consider this to be a helpful starting point, rather than the whole story. If you're interested in learning more about design thinking, we have provided some additional resources for you to explore at the back of this document.

What is Design Thinking?

Design thinking is a process for coming up with solutions for problems. It is typically described as a series of 5 steps, but there is more than one way to talk about the process. Over the coming pages, we'll dig into some activities that you can complete with your class; for now, let's quickly summarise each step in the design thinking process.



Step 1: Empathise (E)

The first step in a design thinking process is to develop empathy for the people you're solving a problem for. You can do this through observation, interviews, field trips and research. The goal is to understand the problem from your customer's perspective and do everything you can to challenge your own biases.

Step 2: Define (D)

In this step, take everything you've learned from your empathy work and use it to redefine your understanding of the problem you're solving. Can you express your problem as a question that could have many answers or a problem that could have many solutions?

Step 3: Ideate (I)

In this step, we want to take everything that we have learned so far and use that to generate as many ideas as possible. In this phase, we're looking for quantity of ideas first and foremost. We should allow ourselves to come up with creative ideas that might not be obviously reasonable or achievable; we want to "go wide" so that we have a broad spectrum of ideas to take with us to the next stage.

Step 4: Prototype (P)

In this step, we want to select a small number (1-3) of the ideas from our ideate phase and build prototypes inspired by those ideas. Prototypes help us get our ideas out of our heads and into the real world where they can be more readily tested and improved. Prototypes also help us identify ways in which our ideas might not work as we expected and give us a method for gathering rich feedback from customers.

Prototypes can be as simple as a sketch or cardboard model. Even low fidelity prototypes can be powerful tools for generating useful feedback from target customers and testing key assumptions.

Step 5: Test (T)

Once we have one or more prototypes, we can then test those prototypes as a way of generating new ideas. Ideally, we want to test our prototypes with our target customers (the people who have the problem we are trying to solve). By presenting customers with a prototype, we can get a deeper and richer understanding of whether our idea would really solve their problem for them and it will help us more quickly determine where improvements might be made.

Some tips for using design thinking.

If you would like to explore using design thinking in your own classroom, here are some ideas for lessons, activities and prompts that you can use to help your students start developing their own ideas.

Building empathy.

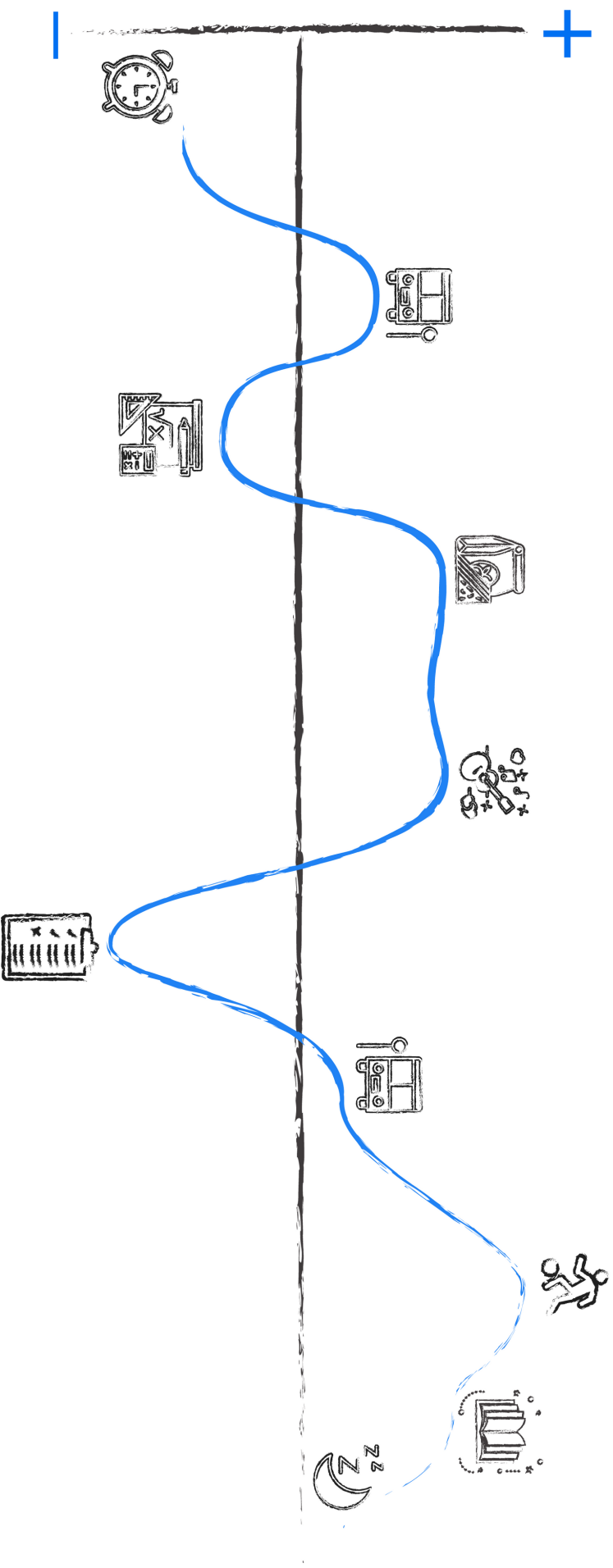
At the start of a design thinking process, we want students to take steps to understand another person's experience of the world. Ask your students to think about a day in the life of someone they might like to build a product for. How does that person experience the world? What are the things that bring them joy?

What are the things that frustrate them, or make them angry or upset?

Where possible, it's great for students to actually be able to speak to some people representing their target group. If they're thinking about elderly people, is there an elderly person in their life they could interview? If they're thinking about making schools better places for teachers, are there some teachers they can speak with to deepen their understanding of their experience of school life? Once your students have selected someone to focus on, ask them to create a journey map for their chosen customer.

Journey Maps

Interview someone and ask them to tell you a story about a typical day in their life. Create a map that shows how that person navigates emotional states throughout the day. Events that trigger positive emotions are above the central line, "pain points" or events that trigger negative emotions are below the line.



(Re)defining the problem.

Once your students have taken the time to think deeply about another person's experience of the world and the challenges that they might encounter on an ordinary day, they can take their journey map and think deeply about the lowest emotional points on that map. What are those "pain points" that cause friction in their customer's life?

Once the students have a sense of the friction points that their chosen customer experiences, challenge them to express their insight as a question that could have many answers. For example:

If a customer found attending events to be stressful because they are painfully shy...

....the question might be: "How can I help Alice feel more comfortable at events?"

If a customer was bored when riding the bus to school...

...the question might be: "How can I help Alex enjoy the time spent travelling to and from school?"

The important thing is that the question should be open and should have many potential answers.

Generating lots of ideas.

Once your students have come up with a question that they want to focus on, the next step is to generate as many ideas as possible. You should encourage your students to think creatively and not be afraid of coming up with radical ideas that might initially seem silly. The more willing students are to come up with wild ideas, the more interesting and innovative ideas they'll have available to them in the next phase.

Running an ideation session.

If you would like to run an ideation activity with your students, here's what we would recommend:

- Make sure you have plenty of post-it notes and felt pens available before you start.
- Put on some music. Search for "d.school active playlist" to find a great playlist for this purpose.
- Set a timer for 10 minutes. Tell your student teams that you want them to come up with 50 ideas.
- The ideas need to be potential answers to the question they have developed. Something they could build that would help their customer with the pain point the team has identified.

The goal is to keep the energy level high and create a sense of urgency around generating as many ideas as possible.

More ideation tips.

Coming up with lots of ideas quickly can be challenging! Here are a few tips to help you and your students get the most out of your ideation session.

- Make sure everyone is standing up. This activity works best if you let students put their post-it notes up on the wall, or on a whiteboard, rather than on a table or the floor.
- Explicitly state that there is no such thing as a silly idea in this process. All ideas must be recorded.
- Nobody is allowed to write down their own idea. Ideas should be spoken aloud, then someone else on the team says "got it" and writes it down/sticks the post-it note on the wall.
- At some point, students will start to run out of ideas and the room will get quieter. At that time, encourage students to reset using one of the following strategies:
 - Zoom in: Pick an idea, separate that post-it note from the rest and come up with 10 ideas related to that one idea as quickly as you can.
 - Creative constraints: Shout out some keywords to spark new ideas. What if you had a million dollars for your idea? What if your solution had to be fun, maybe some sort of game?
 - Reframes: What is the opposite of this idea? What is an extreme version of this idea?

Idea selection.

At the end of the ideation session, your student teams will have lots of ideas to sort through and consider.

Before moving onto the next stage, it's helpful to take some time to really get to grips with what the team has come up with in the ideation session. They should aim to select 2-3 ideas that they want to explore further in the prototyping phase.

Before students work on selecting ideas, they should take a few minutes to sort their ideas out (consolidating duplicates and rewriting any ideas that are hard to read). After this is done, students can apply one of these strategies for selecting ideas:

- Dot voting: Use coloured stickers to vote for the ideas that individuals in the team like most. Give each team member a certain number of stickers to vote with. Ideas with the most votes might be worth pursuing further.
- Categories: Divide the ideas into categories.
 - Rational: Which ideas seem most reasonable, realistic or rational?
 - Delightful: Which ideas are most likely to delight your customer?
 - Darling: Each team member's own favourite idea.
 - Long shot: Ideas that seem impossible, but could potentially change the world.

Building prototypes.

Once the students have selected 1-3 ideas to explore further, it's time to build prototypes. Prototypes can help us to test our assumptions and are an opportunity to learn whether our solution is likely to help our customers with their problem. Prototypes can also help us test whether our customers will actually use our solution and identify ways in which the solution can be improved. Prototypes also help us to start meaningful conversations with our customers, and the other members of our team. Prototyping enables us to "build to think and think to build".

Students can create prototypes through sketching, building models out of cardboard or paper, using digital tools like Microsoft PowerPoint, or building functional prototypes that require some coding. The first prototypes we build should generally be "low fidelity" prototypes that we can create quickly. As our ideas continue to evolve, we can start creating "high fidelity" prototypes (such as a working model incorporating a micro:bit and some sensors).

Of course, prototypes can also help your students identify challenges to the execution of their idea.

Encourage them to prototype things that they don't yet know how to build, so they can identify options for how to build those things in their final product.

More prototyping tips.

If you would like to support your students to build prototypes in class, here are some things to consider:

- Ask students to think about what they want their prototype to teach them. Can prototyping just part of their idea teach them what they want to learn?
- Encourage students to build low fidelity prototypes first through sketching and making models with basic craft supplies. Avoid the urge to get stuck into the technology right away.
- Encourage students to build low fidelity prototypes of a couple of ideas to compare and contrast them. What do they like about each of their prototypes?
- Prototypes don't need to be physical or digital models; they can also be sketches, storyboards or guided experiences.
- Prototypes don't need to be perfect. Encourage your students to not get too attached to their prototypes. They exist to teach you something and to inspire conversations, they aren't the final product and ultimately prototypes will always be retired and replaced.
- Start building right away. Students shouldn't spend a lot of time planning their prototypes; encourage them to get their hands dirty and start building something as soon as they can.

Testing your prototypes.

Once students have built one or more prototypes, it's time to test those prototypes by sharing them with other people and gathering feedback. In an ideal world, students would test their prototypes with people who are representative of their target customer, however, even testing a prototype with teachers and other students can lead to useful ideas and insights.

Encourage your students to share their prototypes with one another and seek feedback. If it's possible to bring parents, teachers or students from other classes into this process, that can be valuable as well. The primary aim is for the students to get an appreciation for how a stranger might engage with the solution they have built. Encourage students to ask questions when people are exploring their prototype.

When students are testing other people's prototypes, encourage them to provide constructive feedback.

Instead of just saying what they do and don't like about the prototype, encourage them to try to articulate why they feel the way they do. A helpful framing for feedback during the testing phase is "I like" and "I wish". Encourage students to share one thing they like and one thing they wish was different about the prototype that they are testing.

Example Structure

Here is a brief outline for a series of five lessons which would take student teams through the design thinking process and bring them to a point where they have completed a full design thinking cycle and developed an idea of their own.

Lesson 1: Background & Context

Run a class discussion where you explore ways in which internet of things (IoT) technology might be used to help make people's lives better. Introduce a theme (such as "smart homes", "smart farms", "smart cities" or "smart schools") and encourage students to think about how IoT might be used to solve problems related to that theme.

Lesson 2: Empathise & Define (E/D)

Ask the students to help you define empathy. What does it mean to really empathise with another person? Explain why empathy is so important for designers. Run an activity where students create a journey map for someone other than themselves. What would it be like to be that person? What would the emotional highs and lows of their day look like?

Once the students have completed a journey map, ask them to reframe one or more emotional low points as a question that might have many answers.

Lesson 3: Ideate (I)

Run an ideation session with your students. Have them work in their teams to come up with lots of ideas in a short amount of time. Use post-it notes to record ideas and then use selection strategies to decide which ideas to pursue further.

Lesson 4: Prototype (P)

Give the students a long session in which to prototype some of their ideas. Encourage them to think about what they want to learn from each prototype.

Remember that early prototypes should be lower fidelity and designed to test key assumptions and start productive conversations. Prototypes don't have to be models, they can also be sketches, storyboards or anything else that helps bring ideas into the real world.

Lesson 5: Test (T)

Give the students time to share their prototypes with another and capture feedback. Encourage students to provide feedback in the form of "I like" and "I wish". If it's possible to share prototypes with people who aren't in the class (particularly those who might be representative of the target customer), then do so.

If you have time, you can repeat steps of the design thinking process to incorporate lessons learned from the testing phase and increase the fidelity of the prototypes that students are working on.

Going further.

If you are interested in learning more about design thinking, there are a wide range of resources available online that can help you to deepen your knowledge in this area. Here are some of the resources that we love and use regularly:

The Stanford d.school's Design Library

dschool.stanford.edu/resources/get-started-with-design

In particular, the d.school Starter Kit (a guided 3-hour workshop that teaches design thinking fundamentals) and Design Thinking Bootleg (a short book outlining a variety of design tools and strategies) are both highly recommended.

Learn Design Thinking with Simon from LiveTiles

livetilesglobal.com/videos/design-thinking-will-add-years-to-your-life/

For some content with a more local flavour, check out this video introduction to design thinking from Simon Tyrrell at LiveTiles. Simon lives and works in Hobart and has run a range of design thinking activities with schools in Tasmania over the years. He's a great person to teach you the basics and help you make a connection back to how design thinking is used by companies in their product design work.

