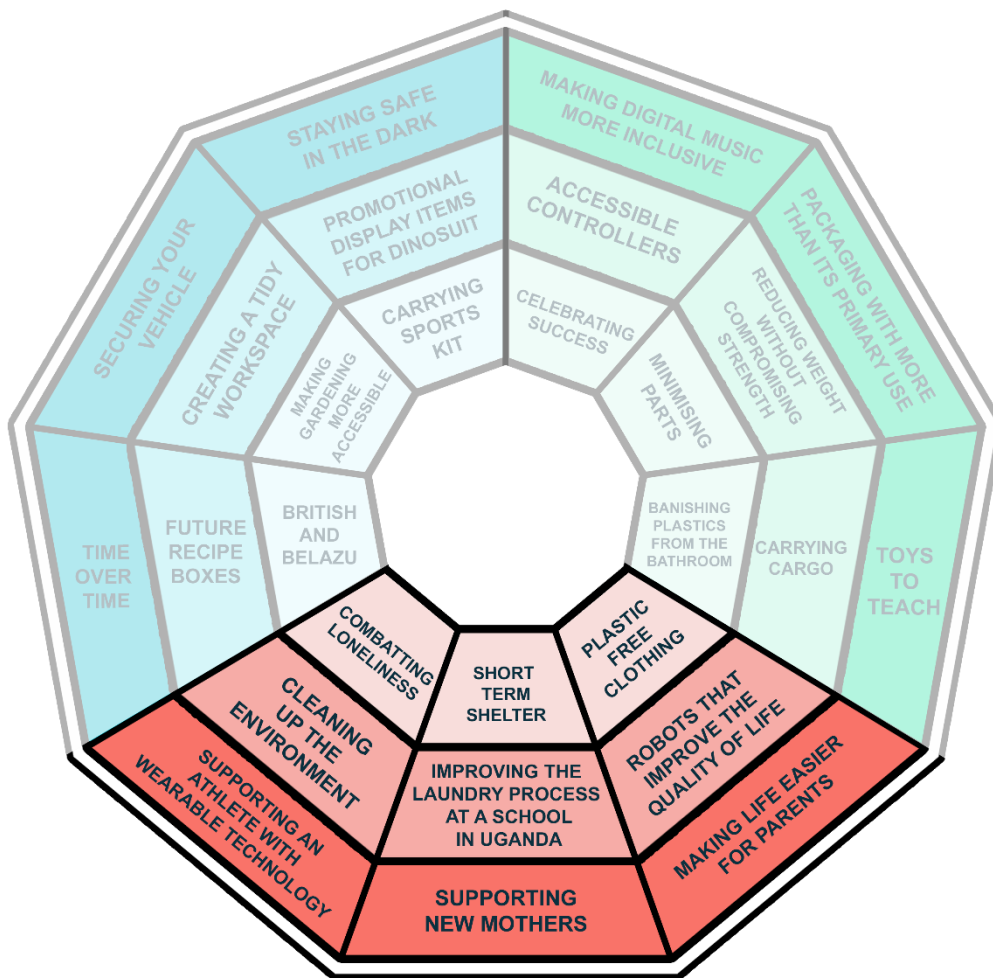


INSPIRED BY INDUSTRY

Children's portable medication storage

#InspiredbyDesignworks



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Introduction

This context has been put together to allow students to explore medical issues affecting young people, and to design and prototype a storage solution. There is an opportunity to explore a variety of associated areas, including ethics, safety and design for manufacture. The context could be left very open, or partly managed by the teacher, and provides a great opportunity to explore and practice the process students will use when faced with the NEA at GCSE.

Materials

The nature of this context opens up the possibility of exploring a range of materials. The final outcome is likely to be a prototype, and will unlikely be fully suitable to transport medication due to potential safety aspects around material safety and testing. However, it equally opens up opportunities to explore and prototype in a range of materials, including fabrics, plastics or other prototyping materials such as card and foam.

Potential outcomes

The outcomes may be conceptual and may not be fully working or fully developed. 3D printing is a likely option here to transport medication, but other outcomes will be different based on the user need/medical requirement.

It is important that students are given some freedom within this context and so outcomes should vary between students / groups. You may decide to limit your class to 2-3 outcomes or approaches however.

There is an opportunity to look at fabric-based outcomes and explore textiles here. Outcomes could be as simple as a bag to carry medicine on you/your bicycle, or could look at developing a graphical design system for medicine administration that is tailored towards teenagers and helps break down stigmas.

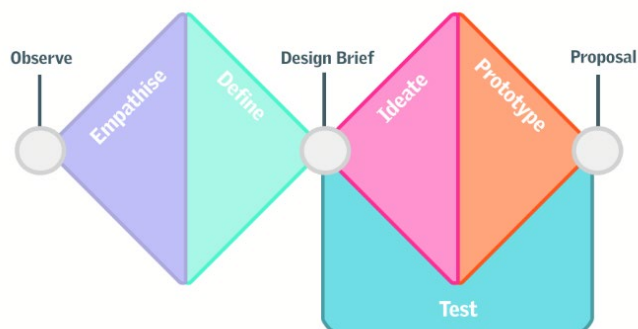
Examples may include (but not limited to):

Case for an inhaler, toiletry bag with medication storage, diabetic equipment holder for a teenage footballer, Tablet storage for use on school camp that reminds children when to take medication.

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Design cycle

The design cycle shown can be worked through in a range of orders. It's advised that the areas are revisited throughout the process depending on your time. We advise that a graphical representation of thinking convergent and then divergent may be shown to your students.



The following are some tips as to the type of activities you could do with your students.

Empathize stage

- Students should be introduced to this term if not already familiar.
- At the start of the context, students should be thinking wide with their thoughts, exploring the problem and not deciding too soon what they 'want to make', but observing what is happening.
- This observation (may be a series of photos from the process of taking the medication, a video, or demonstration in-class) should allow them to 'spot problems'.
- The Big Life Fix [HERE](#) is fantastic for showing empathetic designing. Throughout the process the designers try to immerse themselves in the problem and regularly get feedback from the clients. Observing others is really important rather than just asking people what they want as they may not know!
- Summarising different parts of the medication administration process is useful. Where do people tend to do this? What does the surface look like they do it on? Where is the person when it's administered? Does it drip? Is there waste? Do things need cleaning? Are items thrown away etc. All are opportunities for a design solution.
- Students should get information to help them later in the challenge. They may present this in any way they wish.
- Done under safe conditions, students could recreate the method associated with the medical usage. Knowing that users often subconsciously find short-cuts and 'solutions' to any issues they come across can be a barrier, and by performing the task themselves, it may bring up questions and potential issues.
- 'Problem-finding' is one of the key parts of being a successful designer. Finding pain-points as a class together can be a useful exercise. Not thinking about the solution at this stage, simply highlighting when there is an issue.
- This empathize stage is also a really good opportunity to explore true empathy and understanding and could possibly be linked to lessons in PSHCE and/or citizenship.

Define stage

- This is where students try to get the real root of the problem and decide what they are going to do.
- This is arguably the hardest stage, as students define the exact problem without coming up with a solution (yet!). It may be an improvement on something, rather than a whole new product.
- The context is big, and potentially daunting to students (and adults!). Making a small difference is still making a difference. So, if removing the amount of material used is possible, then great. It may be redesigning something for a younger user or one with varying needs (e.g. someone non-verbal or with limited cognition).
- The '5 why's' may be a good resource to run through with students. You could even pair them up to do this with each other at the define / empathy stage [VIDEO HERE](#)
- For older students, this case study from [DESIGN COUNCIL](#) is great to show how to define the problem and come up with innovative solutions.
- This is a good opportunity to introduce contextual challenges to students and get them to consider all aspects of the problem. It will undoubtedly need some support

from you as a teacher. Please get students to share their thinking as clearly as they are able.

- Get students to create a specification. Whilst templates / writing frames are fine at KS3, you will want to avoid this at KS4. Consider using columns such as 'Essential', 'Desirable' and 'Definitely not'.
- The 'Kid Safety Toolkit' is something, as a teacher, you may wish to explore. It is a free online course that is designed for product designers, working on products for children. The course and accompanying materials can be found here:
<https://kidsafetytoolkit.org>

Ideate stage

- Encourage students to think wide initially. No ideas are too silly, too big.
- Ideas can also be produced through making. Get students experimenting with materials and techniques early on.
- Having medication / medical devices in the classroom may not be appropriate, so consider what can be used in their place to represent them. Vitamins could be a substitute for tablets, possibly. Maybe a 3D printed inhaler or one made from Styrofoam?
- There are a range of videos on YouTube to help students with sketching techniques. [HERE](#)
- Product design sketching tutorials can be found [HERE](#)
- The Design Museum have some nice, short, case-study videos [HERE](#)
- Students should be encouraged to sketch on anything to hand – envelopes, packaging etc. This may be a good method to stop students potentially being daunted by blank paper.
- Get students to keep sketching. It may not be the whole item, it may be parts of it.
- You may wish to develop a handling collection of products from Amazon, pound shops or other places that have different methods of opening, locking, storage etc. These analogous solutions can help generate ideas and move from design fixation.
- Encourage zoomed-in parts of the product to focus on details and annotation.
- Annotation may be things they like, things they are not happy with and explanation of parts that are not clear from the picture.
- A range of techniques such as 2D, 3D, Exploded and cross sections are good.
- Additional research may be needed at this stage. What size may it need to be to fit in an average bathroom cabinet or washbag?
- Ideas don't have to be revolutionary and completely new. For some students, recreating something, but with a slight slant on it to make it suitable for a new age group may be appropriate. This [VIDEO](#) is a good introduction to this for older students / teachers.
- The approach may be more related to ergonomics and user experience. For example, using an inhaler – can it be redesigned to make it easier to use?
- Consider having tracing paper and/or lightboxes in the class to support with overlay sketches. You may want to create some 'starter' templates prepared for students to build on as they draw.

Prototype stage

- A nice video from BBC Bitesize is [HERE](#)
- This short video from The Design Museum looks at the journey a designer had to design and make a collapsible bottle. [HERE](#).
- There are a number of videos by Jude Pullen from Big Life Fix [HERE](#) on how to create shapes in card. However, many may not have access to materials / tools and so C.A.D. may be more suitable.
- The following are all suitable CAD programs:
 - [AUTODESK](#) free for schools/students. Mac & Windows
 - [CREO](#) free for schools/students (PC only)
 - [FREECAD](#) free for schools/students
 - [ONSHAPE](#) free for schools/students
 - [SKETCHUP](#) free for schools/students
 - [SOLIDEDGE](#) free for schools/students
 - [SOLIDWORKS](#) discounted for schools/students
- There are some good Autodesk Fusion tutorials [HERE](#) and TinkerCad [HERE](#)
- It is worth discussing with students WHY to make a model. What things could it test?
 - Size, comfort, aesthetics etc. Choosing the correct model for the correct test is important.
- Prototyping is ideally part of an iterative process, rather than a one-off make, create a variety to pick from.
- You may want to share this brief [video](#) from Reekon tools that show the variety and quantity of models that a company may produce when prototyping.

Test stage

- Encourage students to evaluate throughout and act on their feedback (and consider the feedback of others too). It is not a final thing, but a step to improve further.
- Consider AR (Augmented Reality). If you use windows, PAINT 3D allows you to open .obj files and students can then view their design in-situ to see how it may appear.
- To help students that are **reluctant to improve their idea**, consider prompts such as “What if money was no object?” “What if you could only use locally sourced materials?” “What if it had to be made in 1 day?” “What if you needed to make 100,000?” “What if it had to be made cheaper?” “What if it had to be made lighter?”.
- This could be a good opportunity to explore mathematical content by getting students to calculate amount of material used, costs etc. Some programs such as Autodesk Fusion allow you to calculate the amount of material you have used [HERE](#). This is potentially really important to see if your product/solution is a scalable solution and will make a positive impact.
- How can students get feedback from users? Could they use technology to get a wide range of feedback – e.g. a Google Form? A poll on twitter (X)?
- Get students to think about the main problem they identified earlier – does it actually do that? What proof do they have?
- Prompts for younger students e.g. ACCESS FM are suitable approaches. For older students they need to consider a wider range of aspects such as scalability, manufacturing techniques and limitations, ergonomics etc.
- Sites such as [THIS](#) may help to develop ideas further, by considering the user experience and thoughts behind different developmental stages of children.
- Similarly, [human factors](#) can also help with this product.

Implement stage

- The implement stage is when a prototype is put into production.
- This is an opportunity to reinforce that a prototype outcome is only one stage in the creation of a product.
- What processes are required to convert that prototype into a commercially available product?
- What manufacturing processes used to create the prototype would need to be re-evaluated for a larger scale of production?
- Would this involve reconsidering the materials and components used?
- This is a good opportunity to introduce industrial manufacturing processes that are not used in the classroom. It will undoubtedly need some support from you as a teacher.
- There is an opportunity to explore a business plan here looking at the sales cost including a variety of elements such as packaging, shipping, marketing and more, to give students an insight into bringing a product to market.
- Reducing material is important to minimise environmental impact and to make things easier to transport. Consider working in pairs / small groups to critique designs / prototypes and what could be done to make it lighter, smaller etc to potentially minimise environmental impact. You may want to look at a simple [Life Cycle Analysis](#) to assess the impact from material extraction to disposal.
- As a conclusion to the unit, you could get students to create an advertising campaign / promotional feature to sell their new product. Consider giving students free rein with regard to platform and media. They may surprise you with their ability to produce catchy content!

Focused Tasks

'Water-proofing'	'Cardboard prototyping'
Stopping medication leaking is often one of the key requirements when transporting opening liquid medicine. Whilst losing the medicine is bad enough, having sticky liquids all over your other items can be very frustrating. Try different methods of making fabric holders water-proof to prevent leaking.	Cardboard is used a lot to produce physical prototypes. Try different techniques to create upright, rigid outcomes. This includes making tabs, slots, flanges, gussets and more.
'Hinges'	'Marking materials'
Hinges are used a lot in products to help with fastenings as well as to make things adjustable. Choosing the hinge method can be complicated and depends on a number of factors like strength, situation it's used in. Try making working compliant and mechanical hinges using a 3D printer if you have one available.	Experiment with different methods to put text on your prototypes. This can be important to share key information to the user. This may be self-adhesive vinyl, laser engraved, painted stencil, dry transfer and more.

Investigative and Evaluative Activities

'Designing for children'	'Safety for children'	'Fastenings'
Designing for children can be challenging. Explore different ways products have been adapted to meet the needs of children. Summarise your findings in different categories.	How do designers make products safe for children? Medication is one area that requires extra caution, but other products also have features built in to make them safe for children. Find case studies and any legislation/laws that are in place to protect children from harm.	Explore and analyse a range of methods of fastening/securing. From magnets to clips, Velcro to screw-tops, there is a wide variety of fastening methods to choose from. What innovative, clever ways can you find that may be useful, and can you replicate them?

