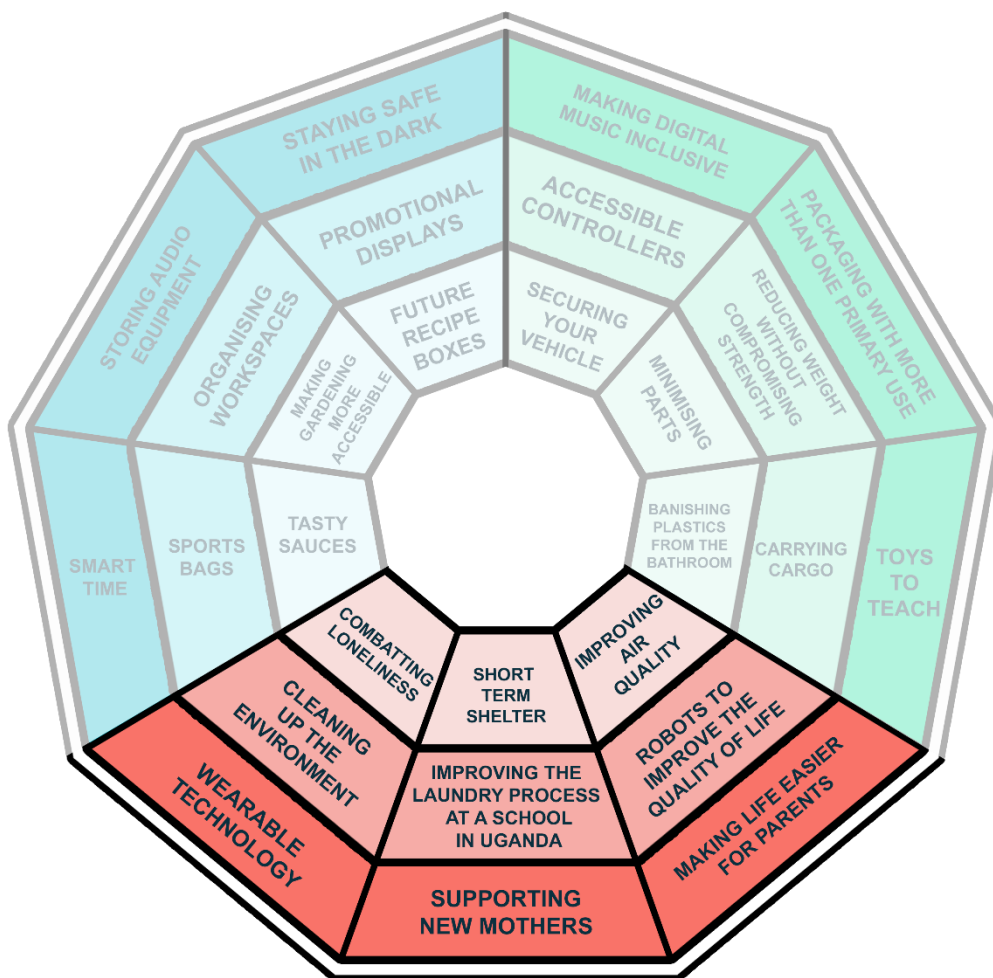


INSPIRED BY INDUSTRY

Supporting new mothers

#InspiredbyElvie



elvie

Introduction

This context has been put together to allow for a range of opportunities for students to explore the needs of new mothers and to design and develop products to support them.

Materials

This context can be explored through a range of materials. It provides good opportunities to explore fabrics through the design and manufacture of baby-changing/care accessories, covers for breast-feeding and more. There is also the opportunity of exploration of electronics and/or systems and control. This is especially relevant to this context as Elvie is such a high-tech / groundbreaking company. This may be through the use of micro:bit or Crumble where they can allow for some prototyping of products that react to external changes. For example, the micro:bit V2 can detect movement, temperature, sound and more. Prototypes could be explored for a whole range of problems that new mothers may face.

Potential outcomes

The outcomes can be varied and explored the wide range of materials that students are likely to explore at Key Stage 4. Whilst you may wish to constrain materials / processes for students, a mixture of possible fabrics and electronics may be suitable.

If using electronics elements, many outcomes are likely to be conceptual and may not be fully working or finished to the standard expected in a final product. For example, if a baby alert monitor was made, students could use the radio function on two micro:bits [like in this tutorial](#) to create a monitor that tells the parents when the baby is crying. It is unlikely to work and look exactly like the final commercial product would be, but the Proof of Principle would be there.

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 however.

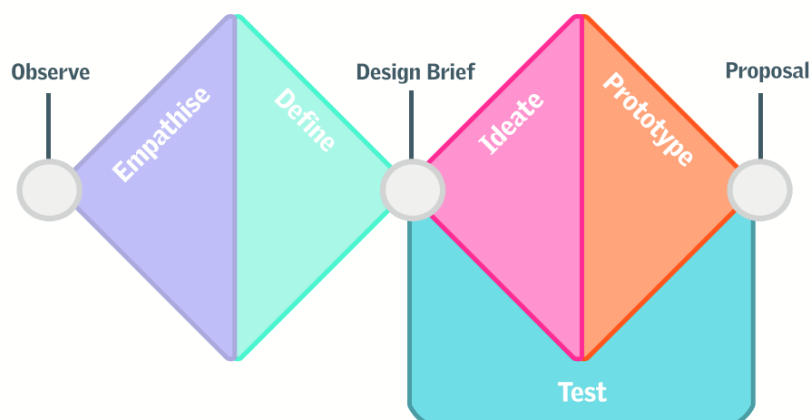
Examples may include (but not be limited to):

Baby alert monitor, changing bags, multi-function breast-feeding covers, musical changing mats.

Consider sharing work on social media using the hashtag #InspiredbyElvie

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 and identifying problems.
- This observation (may be a video, producing a journal for someone to fill in, email etc) should allow them to 'spot problems'. It can be tricky with this user group so it's likely you may need to facilitate this. Would you be able to have a few new parents bring in their baby to your D&T lesson? Many students may not have experience of being around new babies and/or empathize with new mothers, so first-hand observations would be ideal.
- Consider setting a homework task whereby you give students set areas to observe / research new mothers and the problems they may face, for example; at a supermarket, going to the park, getting in/out the car. They may be able to spot new mothers struggling with various aspects.
- If all of these cannot be done, consider sharing a few websites/forums with students such as Netmums. These may need facilitating, so sharing a few posts for them to explore may be useful.
- The following videos from Ford are good examples of empathetic design in industry [VIDEO 1](#) [VIDEO 2](#)
- 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!

Define stage

- This is where students try to get the real root of the problem and decide what they are going to do.
- There are likely to be a whole range of problems identified, so which ones are potentially possible to tackle? This is where ideas converge to something rather more specific.
- For some students, it may be an opportunity to improve something that is already available, rather than trying to explore a potentially 'unexplored' area. It's likely that students will be questioning it and stating that 'something already exists for that' – well it's likely they are correct, so like the Elvie Pump, it needs to be better than what exists or have a different feature.
- Explore the 'tenets' with students. To understand this concept you could look at / consider the tenets of other (unrelated) products or companies. There are some examples [here](#).
- 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'.
- Try to get students to resist what it will be / look like, but focus on the problem they are trying to tackle, and get to the root issue. For example, if they are talking about a feeding blanket – WHY is one needed, what's it for, ultimately? What is the ISSUE, not the SOLUTION...

Ideate stage

- Ideas for any electronics element may initially be through words. You may want to consider listing the inputs and outputs available for your system and do a matching activity. For example, motion, light, temperature etc, then LED, buzzer, tune etc. It may be that the tune plays when there is motion to encourage baby to sleep (would it?!)...
- Encourage students to think wide initially. No ideas are too silly, too big.
- Whilst some of the sketches shown from Elvie are very impressive, graphically, many are very rough, thumbnail sketches – be sure to show these to students too. They are used to get across a point.
- Alongside the ideas presented by Elvie, there are other ideas you may wish to explore. Switching between ideas and prototyping should ideally be a fluid process, so having prototyping materials to hand is useful.
- 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 – for example, there are various models and sketches looking at a clip in the Elvie materials on the Powerpoint!
- 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. Again, there are various examples shown.
- Research may be needed at this stage. Consider a handling collection of similar products. Could families donate old / unused baby equipment? Many of these may be foreign to students and may make a fun activity for students to work out how to use them.
- You could introduce modern / smart materials such as thermochromic pigments for thermometers, detecting hot baths / hot food etc.

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](#)
- 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.
- Can 'hacking' be useful if you have a variety of products to use?
- POP rigs may be done larger than life, such as the mechanism shown on the video. Maybe a student doesn't create the whole outcome, but a new aspect for an existing product?
- Throughout the process, ensure students follow procedures for health and safety and understand the process of risk assessment.

Test stage

- Although this is the final stage of the design cycle, 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 a nursery 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](#).
- 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?
- 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.
- Designing and making test fixtures could be a very useful aspect in itself.
- Whilst testing against specific H&S elements and standards is hard, these can be replicated to an extent.

Focused tasks

<u>'3D printed prototype teether'</u>	<u>'Make and programme a night light'</u>	<u>'Programme a movement detector'</u>	<u>'3D Sketching Techniques'</u>
Students look at typical shapes and designs of teething babies. Students use Tinkercad, Google Sketchup etc. to draw and 3D print a prototype shape for a teether.	Create a night light to be used in nurseries or bedrooms during night feeds by either using a pre-determined electronics kit or by using Crumble so to program it so that it comes on in the dark. Students can then design and make the outer casing for the night light.	Use micro:bit tutorials to program a <u>movement detector</u> . Discuss ways this could be used in regards to safety of newborns and creating the opposite reaction so that the alarm goes off when the baby doesn't move for a period of time.	Develop students' 3D drawing capabilities by focusing on sketching in 1 point and 2-point perspective. The use of a visualiser or pre-recorded tutorials would help to guide students through strategies as well as tutorials on <u>Youtube</u> . Websites such as <u>Sketch-a-Day</u> are a great resource to challenge your students and inspire them.

Investigative and Evaluative Activities

<u>'Shop Around'</u>	<u>'Plastics and Moulding Processes'</u>	<u>'Smart Materials'</u>	<u>'User Profiling'</u>
Explore some baby shops to see what is currently on the market and what is really popular for the newborn stage in particular. Look at the <u>Bounty</u> packs to see what is included for all expectant mothers and what some countries (such as Sweden) give free to all new mothers. There are certain publications and websites also dedicated to new mothers such as <u>Mother and Baby</u> .	Look at typical plastic processes used both in the classroom and in industry. What processes could be used in products for new mothers. Why is plastic a suitable product for these kind of products? This research can be carried out as part of practical, hands-on research in the workshop for in school processes and secondary research for industrial processes.	Explore the use of smart materials, such as thermochromic pigments and how they are a benefit to new parents. If you could 'design' a new smart material, what would be the external stimulus and what would change?	Gathering a better understanding of the client (new mothers) through observations, interviews, surveys etc and secondary research to get a thorough understanding of their priorities. Create a profile sheet detailing their likes, dislikes, core objectives, lifestyle, motivation, income, etc.

