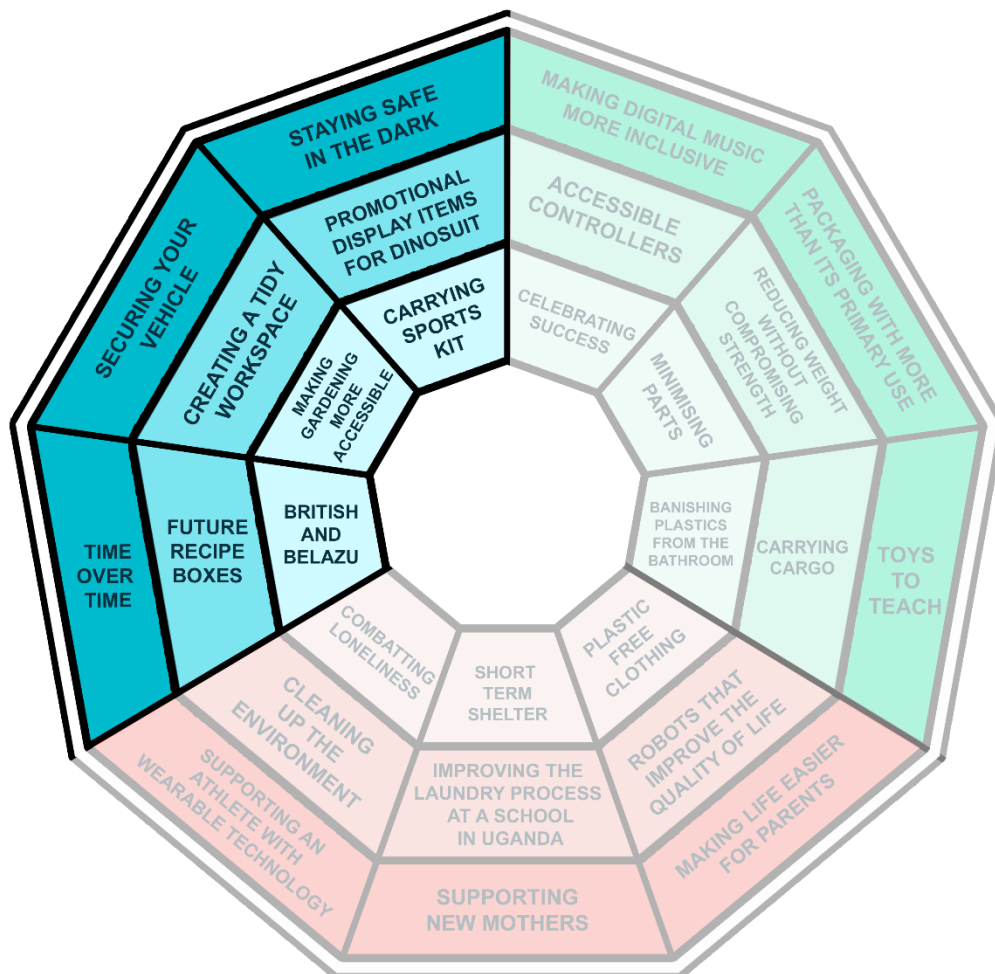


INSPIRED BY INDUSTRY

Creating a tidy workspace

#InspiredbyBangCreations



bang
creations

Introduction

This context has been put together to allow for a range of opportunities for students to simple design and make challenges. Whilst this context focuses on creating a tidy workspace using spectacles as an example, it could be made more or less focused for your students. A classic 'desk tidy' approach allows for an introduction to materials and manufacturing methods with a modern/real context. As an aside, this [VIDEO](#) may be of interest – showing the journey of a similar product from concept to launch.

Materials

There is no particular material focus for this context. The examples given are produced using plastic, but could easily be manufactured using wood, fabrics or a combination of materials chosen based on a variety of properties. It also allows for the use of modelling materials to create prototype proposals, especially those that mimic sheet materials that may be used such as manufactured boards (i.e. foamboard, corrugated card etc).

The opportunity to explore material properties (possibly through tests) is also useful, e.g. easy to wipe clean, not scratch the desk, not slide around, not be affected by scissor storage...

Potential outcomes

It is likely that students will be able to produce working outcomes that they can test. These may take the form of a simple 'pen pot' but also a dual item such as holding a phone/tablet, or a pair of headphones. There is an opportunity for teachers to identify a range of skills and knowledge to incorporate as part of their planned curriculum (e.g. lamination, wood joints etc) that they can demonstrate and allow students to explore in their designs.

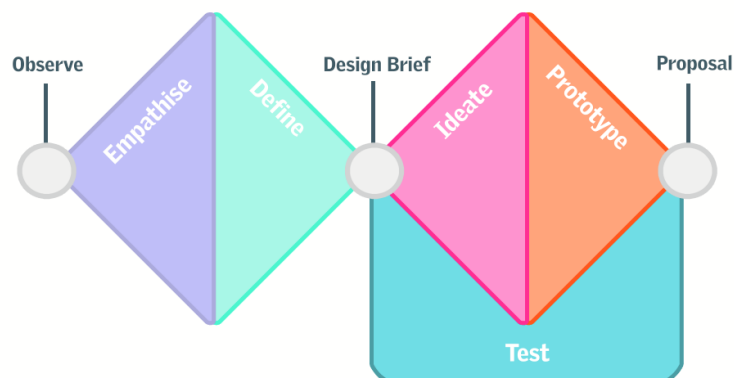
It is important that students are given some freedom within this context and so outcomes should ideally vary between students / groups. You may decide to limit your class to a range of outcomes or applications or the components they need to incorporate.

There is also an opportunity to look at CAD work here, either simplistic block modelling, or exploring assemblies and components. Outcomes / models may be laser-cut, CNC machined, 3D printed or using more traditional methods by hand.

Consider sharing work on social media using the hashtag #InspiredbyBangCreations

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 convergently and then divergently may be shown to your students, such as this example:



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.
- Ideally, students will have access to users who may be the ideal user-base for this context. Whilst it is easy to choose themselves, to fully empathize with the user, it's advised to choose someone else. This may be a teacher in the school, and an observation of their desk and interview may be a starting point.
- Although the focus is on workspaces, this can be open to interpretation, and could include creative and play spaces as well. The focus is on organisation and keeping that space tidy. Desks provide a simplistic context and means that final outcomes are also unlikely to be too large/unwieldy.
- You may decide to have the class all focus on one user/tester for ease. Ideally this will be a real person, but for worst case scenario, this could be members of the class or other students/teachers in the school who represent the target audience.
- 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. Focus on the process rather than the product.
- 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 important rather than just asking people what they want as they may not know! Consider asking a teacher to allow a filming of them during a free period when working, or setting up a camera in a classroom. No sound is required, and it can be sped-up, but may show habits and equipment that is used allowing students to observe any problems and possible solutions.
- Students should get as much information to help them later in the challenge, but also be aware the research can be done at any relevant point in the design process. They may present their findings in any way they feel appropriate or effective. This may be a table listing all equipment used, a chart to order equipment/resources by how often they are used or interacted with...

Define stage

- This is where students try to get the real root of the problem and decide what they are going to do. What aspect of storage or tidying up the workspace will be their focus?
- There may be a whole range of problems identified. Identifying the user and their needs as well as understanding different workspaces and applications will help.
- You could even pair students up to work with each other at the define / empathy stage to encourage the development of fresh ideas.
- 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 simple 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 'Things to avoid'.
- Problems highlighted may include, taking up too much space, not easy to access, too many different storage systems, gathering dirt/dust, hard to maintain, duplicate products at work and home, use of non-standard equipment, aesthetics not matching, clutter on table, security etc

Ideate stage

- You may want to consider listing the materials, tools, utensils etc. that you identified in the empathise stage, and consider innovative ways these could be stored or accessed.
- Encourage students to think wide initially. No ideas are too silly, or too big at this stage.
- Encourage the use of SCARED or SCAMPER to help develop ideas.
- Ideas can also be produced through making or modelling. Get students experimenting with quick sketch modelling early in the design development phase.
- Gather the items that need to be stored and model around them. Having a box of different modelling materials can be useful.
- The outcome can also be modelled using 3D CAD to help visualise colours and materials in a more realistic way and without the use of materials.
- 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 make notes (annotate) as they design. This helps to 'tell the story' of their design process.
- Further research may be needed at this stage. Consider a handling collection such as basic desk storage and stationery as well as more specific methods of tidying up equipment so students can explore and evaluate them.
- Ideas don't have to be revolutionary and completely new. They can be a development or addition to an existing product, but you may well see an opportunity for something totally new!
- Consider doing ideas after a focused task demonstrating a particular manufacturing process(es) you wish to explore, and get students to design to incorporate this. For example, you may wish to explore curving wood through lamination, kerfing and living hinges. This will allow students to see what's possible and what's not, and may trigger some design ideas.
- You may wish to add constraints to students, for example, limited timbers and fabrics to use, or limited production processes. This may make ideas generated, more realistic to achieve, especially if students don't yet have an in-depth knowledge of materials and processes.

Prototype stage

- This context lends itself to a range of modelling and prototyping throughout.

- Modelling may be in low-cost materials such as Corflute, corrugated card and dipryl, whereas the final prototype could be an opportunity to explore timbers, polymers and more that are more suited to product testing and realistic outcomes.
- 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
 - [TINKERCAD](#) free for schools/students (PC only)
 - [ONSHAPE](#) free for schools/students
 - [SKETCHUP](#) free for schools/students
 - [SOLIDEDGE](#) free for schools/students
 - [SOLIDWORKS](#) discounts for schools/students
- There are some good Fusion tutorials [HERE](#) and Tinkercad [HERE](#)
- Supporting and Curriculum Units are available that cover the use of various CAD packages.
- It is worth discussing with students why they create a model or prototype. What are they wanting to test or evaluate; function, comfort, aesthetics etc? Choosing the correct model or prototype for the correct test is important.
- Rapid prototyping technology such as 3D printing and laser cutting can be useful when realising prototype ideas in limited time. These files can be trialled in modelling materials before exploring different materials later on, especially useful if sheet material thickness is the same.
- You may want to share this brief [video](#) from Reekon tools that show the variety and quantity of models that a company may produce.

Test stage

- Although this is the final stage of the design cycle, encourage students to evaluate throughout the process and act on their feedback (and consider the feedback of others too). Testing is not a final thing, but a step to improve your designs further.
- 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? TikTok videos from users.
- Get students to think about the main problem they identified earlier – does it actually do that? How successful is the outcome compared to the intention?
- 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.
- Can you test materials with students to help understand properties of materials – for example simple hardness or impact tests? How easy things are to wipe clean etc. These also provide a good opportunity to explore data representation in different formats.

Focused Tasks

'3D sketching'	'Living hinges'	'Card modelling'
Bang Creations refer to the mix of model making and existing parts as 3D sketching. Effectively they are 'mocking up' their designs in 3D form. Try combining drawn sketches with card models and components made using 3D printing or laser cutting for speed.	A living hinge is a way of turning a solid material into something more flexible. It is made from the same material as the two rigid pieces it connects. It is typically thinned or cut to allow the rigid pieces to bend along the line of the hinge. This can be useful to simulate a moving or bending part.	Design a simple desk organiser and make a model using only cardboard. • What restrictions will you face using only this material for construction? • Will you be able to realise your design using sheets of card • Could you laminate layers of card to build up solid 3D shapes?
'Wooden holder'	'Fabric holder'	'Rendering materials'
Using small pieces of wood and/or manufactured boards, create a simple stationery holder using a range of skills and processes such as using a forstner bit, wood joints or lamination.	Making a simple fabric glasses case can teach students about patterns, tolerance, fabric properties and more. Maybe they can explore how to connect fabrics to timbers and other materials after it's made.	Demonstrating using markers / coloured pencils how to represent different materials is a useful skill when designing. Demonstrate how to represent wood, fabric, plastic and more.

Investigative and Evaluative Activities

'Anthropometrics'	'Scales of production'	'Material properties'
Ornaments may be admired from a distance, but products are meant to be interacted with by humans. Consider the important measurements we would need to design a product for a workspace. How high is the tabletop, can our product fit underneath, how big is a space to hold glasses, a phone or tablet?	In the classroom, we usually make one prototype outcome, but how do we make products on a larger scale? Look at one off's, batch production, mass production and continuous production. Can you find products that are good examples of each level of production?	Your choice of materials is very important for many reasons. They will affect the look of the objects as well as the performance and there may be specific processes for forming and shaping certain materials that are not accessible to you in the classroom.

