



D&T IsoTech 2020 Challenge - Teacher Guide

This document is to help support teachers with the D&T IsoTech 2020 Challenge.

The challenge has been put together by a number of D&T teachers to provide a basis for ongoing work in D&T in secondary schools during a school shutdown. The challenge sets out the basis of the work but requires teachers to give input to his/her school according to students' prior knowledge and experience, therefore tailoring it to individual needs.

A PDF of the challenge to share with students can be found [HERE](#)

COLLABORATION

It was felt that having students working from home should be seen as an opportunity to take some risks with different methods of working, and that underpins this challenge. We are looking for students to work in a collaborative format and to embrace the opportunity to work (and learn from) others. This may be industry professionals, students of different ages / geographical locations and more. We felt it was important for students to understand this method of working which is being embraced more and more by the design industry, but often not in schools.

JCB and Dyson have recently started working together to pool expertise and create a ventilator. A great example to show students. [VIDEO HERE](#).

We are asking schools to register their interest using Microsoft Forms [HERE](#). You need to choose the theme (from those written) for your students (sadly logistics means we cannot give you all 3). Your students will be able to choose to tackle either context within that theme though. You will receive a link to give to your students (and you) for our sharing platform – Sketchdrive.

We will then pair you up with another school via email who have chosen the same theme. You will see your pairing on Sketchdrive.com and will be allocated a number too. We would appreciate you encouraging pair-ups / groups of students working together where possible. A big part of this is to see how remote learning can replicate remote design & manufacture in the design workplace.

Please do encourage your students to **share work on social media**. The hashtag is **#isotech2020**

We will be having **industry experts**, for example, [Ross Atkin](#) giving feedback and advice throughout the process to help students. They will also be producing videos to help with the challenge too.

PLATFORM

We are using '[Sketchdrive](#)' to host/share students' work. We were conscious of introducing another tool/platform but felt that this allowed us to tackle the problem in a managed way and having all work in one place would be a rich learning experience for all.

CONTEXTS

The decision was made early on to have the students working on a context rather than a chosen brief. This would allow students to empathise more and get them prepared for future contextual challenges in D&T.

Students are to choose 1 context (within the theme you have selected) in which to work. You may, as a teacher choose to guide all your students to one context or allow them to choose.

CRITERIA

This is not a competition and no points / grades are awarded. Teachers may wish to put their own grading schemes in for internal use. The [D&T Progression Framework](#) can help you to create your own assessment rubric should you wish, or you can base it on GCSE assessment criteria.

EVIDENCE

We have put limits on the amount of evidence students present in the final submission (5 pages) but are also welcoming alternative methods of presenting / communicating. Awarding Organisations are still finding many traditional approaches (printed A3 paper) to the GCSE contextual challenges, and again, this should be seen as an opportunity to experiment with a variety of approaches and methods for students to communicate / present their work. Indeed, choosing the most appropriate methods of communicating should be encouraged.

Sketchdrive allows the uploading of images and video (videos must be uploaded to YouTube or Vimeo first) but the final outcomes should be shared with you as a teacher. We will use social media to promote good outcomes and process work and it would be great if you did too. Good promotion for your school / department and D&T in general! **Remember the hashtag #isotech2020**

DESIGN CYCLE

Whilst there are a number of 'iterative design approaches', the suggested one can be adapted by teachers and students should be given teacher input into the stages and offered examples of how they may tackle it. Further information on this is shown below.

AGE GROUPS

The decision has been taken not to have any specific age groups for this to try and encourage collaboration in a vertical way. Again, this is an experimentation and an opportunity to try new things!

COMPLETION DATE

Deadline – June 12th

UNDERSTANDING THE PLATFORM

- Sketchdrive is an online platform for creatives. It allows all users to see each others' work at any time. It also allows others to comment on work. This can be done using written comments or users can draw over the top of the work to highlight / suggest points.
- You do not need to download any software.
- Students should use their school email address to create an account.
- There is some advice on Sketchdrive how to use it within each course.
- **Students upload work to one course only**, depending on the theme and context they are tackling. Please encourage your students to leave feedback for others. You may wish to do this as a group exercise to demonstrate what may be useful to others. They can however look at and comment on other work if they wish.
- Students must put a 'tag' on their work saying what area of the design cycle it relates to. This will help filtering searches.
- We are encouraging collaboration at this time and looking for students to group up where possible. Could you please encourage your students to look to work with others on a shared goal. This is not essential however.
- We would recommend you doing a screencast to your students about how to use Sketchdrive once you have explored it although advice is there on the site.
- Students will need to photograph / screenshot work to share it. Please run through how to take quality, clear photos.
- There is an iPhone app for Sketchdrive which works in a very similar way to the web version.
- Could you please ask students to direct support / help through you as a teacher first instead of the helpdesk?
- If you / students view the feed as a 'grid' it is easier to see all work.

FINAL PRESENTATION

- We would really like a collaborative effort to share work. Students can also play a part by sharing on a range of platforms using the hashtag #isotech2020. We will also be posting on social media.
- **All work on the platform is able to be viewed by others and may be shared on social media.**

PROJECT FEEDS

- Students are to upload their work in the different 'project feeds'. We are encouraging an iterative design approach. Whilst you may use different terms in school, the principle holds true.
- We are looking for students to revisit their work at regular points and upload work to show their progression.
- We would also encourage annotation on their work throughout to show their understanding and learning.
- Feedback and learning can (should) also take place away from Sketchdrive. Students will need guidance and input from you depending on their previous experience in D&T.

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

EMPATHISE

- Students should be introduced to this term if not already familiar.
- At the start of the challenge, 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 (video, producing a journal for someone to fill in, a phone call interview, email etc) should allow them to 'spot problems'.
- 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!
- You could suggest (or brainstorm as a group) ways to simulate what others are feeling during this time.
- Students could consider the wider stakeholders of the problem. For example – for the context of delivering products to people, they could potentially explore the customer, distributor, delivery person etc. Obviously this may be hard in the current climate but still encourages useful discussions for future D&T work.
- Students should get information to help them later on in the challenge. They may present this in any way they wish and share on Sketchdrive.

COLLABORATION

- **We are asking schools to register their interest using Microsoft Forms [HERE](#)** You should then receive an email once we have paired you up with another school. Please contact the other school to try and facilitate collaboration.
- Students should be shown how to add constructive feedback.
- Consider giving 'topics' for younger students to feed back on. You may wish to have 1 main topic per week for feedback. For example, aesthetics, user experience, cost, manufacturing issues etc. By having one a week you could link it to theory as well. For example, 'EB5' in the coded progression framework talks about 'Cradle to Grave'. After some initial discussion on this with your class, students could then hunt for good examples of this and maybe poor examples of this within all the work posted on Sketchdrive.
- Collaboration through the teacher may be best. We are conscious of safeguarding and privacy and it may be easier to have a school-based method of discussion that complies with your school IT policy when contacting other schools. If there is no way around this, do not compromise the safety of your students. Collaboration could simply be within your own school, especially as they will all be working remotely anyway.
- Collaboration has been shown to be really useful at the initial stages of defining problems, and a group brainstorming activity may prove useful. Office 365, Google docs, Padlet, [Freehand by Invision](#) are all good examples of how to collaborate on a single document remotely.
- You may wish to pair students up from your 2 schools that have similar interests?

- The Big Life Fix [HERE](#) is very good at demonstrating collaboration. At the early stages of the challenge they tend to brainstorm as a team, even if they then do go off and work on their own to an extent. Regular touch-points are important to engage with others.
- Please 'police' your students. While we foresee no issues, please do check in with what your students are uploading.
- Platforms such as Autodesk Fusion 360 allow for [collaboration](#). This could form an interesting class discussion regarding the advantages and disadvantages of such approach, especially when students have had a go. It links in well to 'The impact of new and emerging technologies' in the GCSE specifications.
- You could consider restricting your students to just sending files to each other ready for manufacture without any additional comments. For example, can they produce a clear orthographic drawing to allow someone else to manufacture? Can they identify all aspects such as materials, colours etc from the information they have provided? Could they send files to you (if you are still working in school) to 3D print or laser-cut? These could then be posted back to the students?
- We would love to hear of examples where remote working and collaboration has been used effectively!

DEFINE

- This is where students try to get the real root of the problem.
- 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.
- [DUAL CODING](#) may be a useful resource to help you/older students to share their thoughts in a graphical and joined-up way. Sites such as <https://thenounproject.com/> and <https://www.flaticon.com/> may be handy for this.
- [Freehand by Invision](#) integrates into TEAMS and is a good program to use a virtual whiteboard to share thoughts on.

IDEAS

- 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.
- A range of drawing apps are available for ipads and other tablets. Such as **Autodesk Sketchbook**, **Adobe Photoshop Sketch** and many more.
- Ideas can be written also. Encourage students to think wide initially. No ideas are too silly, too big.
- Get students to keep sketching. It may not be the whole item, it may be parts of it.
- 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.
- Research may be needed. Whilst they don't need to present it on Sketchdrive, it may be useful for them. Can they think of things that do a similar job?
- Ideas don't have to be revolutionary and completely new. Consider 'development' with your class. Maybe they can start with an existing product and improve it. This [VIDEO](#) is a good introduction to this for older students / teachers.
- You could introduce modern / smart materials such as QTC which may generate alternative approaches or ideas for students.

MODELLING

- 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
 - [TECHSOFT](#) are giving free home licences to students who schools have the software email@techsoft.co.uk
- There are some good Fusion 360 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.
- How will students get feedback from their model? Can it be passed to someone to try? Models are used in the [BIG LIFE FIX](#) a lot, with feedback gained from the client / user. This is then used to help improve their next design / model / research.
- For older students, virtual simulations are a powerful thing to explore with students. This can be done in software such as Fusion 360. A (rather long) video is [HERE](#) and a course [HERE](#) that students can take to learn how to do simulations.
- Consider AR (Augmented Reality). If you use windows, PAINT 3D allows you to open .obj files (Can easily be exported on Fusion 360) and students can then view their design in their own home to see it in situ.

EVALUATE

- 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.
- 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?” etc

- 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 Fusion 360 allow you to calculate the amount of material you have used [HERE](#).
- Although a fairly old resource, there are some nice evaluation / testing prompts from OCR [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?
- 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.
- Life Cycle Assessments are a great tool for students to look at the environmental impact of their product. Although it’s hard to do accurately, it is a good exercise to do as a group, possibly on Teams, using Freehand? This [VIDEO](#) is a good example from a company.
- Designing for disassembly may be a good approach to prompt students into developing their ideas. A fab video from Autodesk is [HERE](#).

EXPERT HELP

- We are really lucky to have industry professionals giving input and feedback during this process. They will be providing weekly videos on different stages of the challenge. We will add these to the Sketchdrive modules. You will see a little blue dot to indicate new content.
- For any further help / information please contact ryan.ball@data.org.uk