Design Council

A ten step guide to running a primary school D&T design challenge.

Advice for design and technology teachers in primary schools

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Introduction

This 'How to' guide takes you through 10 easy steps to running a D&T design challenge and includes advice on what materials you will need, how to push the pupils to think bigger and better and how you can tailor units to fit the time you have to spare.

A design challenge/unit will help you take your pupils out of the classroom and into more complex opportunities on a unit that's focused on identifying opportunities for design improvement, understanding user needs and working in teams to create products and systems that solve real problems and improve the quality of life.

It will help you as a teacher make links between your design and technology classes and other subjects and areas of the curriculum, including ICT for research and idea development, and other subjects like science, maths, geography or history that take pupils out of the classroom. It will also help you make cross curricula links with citizenship and sustainability teaching.

The workshop-style format will get pupils researching problems in their local community and the wider world then let them take these findings back to the classroom where you can help direct the pupils to use their practical and intellectual skills with their newly acquired understanding of:

- aesthetic
- technical
- cultural
- health
- social
- emotional
- behavioural
- economic
- industrial
- environmental

issues that they have directly experienced.

It will help you develop their design skills including: generating, developing, modeling and communicating ideas to each other and people with design needs.

It should be noted that these 10 easy steps are suggestions and that, if used, they should be adapted to fit a particular class or group of children as appropriate.

The challenge can address many areas

There is potential to address many areas of the D&T Progression Framework (available from the D&T Association). Coded areas such as PDA1 (working confidently with a range of contexts), PDA10 (carry out research, using surveys, interviews, questionnaires and web-based resources), PDB6 (generate realistic ideas, focusing on the needs of the user) and PEA9 (consider the views of others, including intended users, to improve their work) are just some that would lend themselves well to this challenge.

An awareness and understanding of local issues will also be welcomed in the Ofsted EIF (Education Inspection Framework).

Establishing the context

The first stage of the challenge is to look for problems anywhere outside (or inside) school. Before you and the pupils go out of the classroom you can set the scene and explain that during the design and technology challenge the pupils will be using design skills like user research, brainstorming and voting to solve real life problems.

Your pupils will need to pay attention to things that they see aren't working while they are out of school. Once they identify a problem, like a waitress finding it difficult to serve people in a crowded cafe or an older person taking too long to cross the road, you want them to talk to the people who are affected to find out what they feel. They could also draw a sketch or take a photograph of the person they have spoken to and of the problem they have identified.

At this stage it is important to work fast and spot lots of different problems, because each is a potential design opportunity that the pupils can discuss and design to solve when they are back in the classroom.

What is a problem?

Problems can be found anywhere and at any time. Consider going on a 'problem-spotting' trip. This can simply be a walk around the school site. Think about problems you may encounter on your way to work... They could include: not being able to find your keys, running late because of a bad hair day, nowhere to put suitcases on the bus or forgetting when to get off the tube.

01

Take your class on a trip out of school to identify opportunities for design improvements

Perhaps you could work with another teacher who is already taking the class on a field trip. You could use this opportunity to get your pupils to take photographs or sketch pictures of problems they encounter on their journey there. The field trip may be a local trip to the park, supermarket or elsewhere.

Image credit: Alys Tomlinson

ICT opportunity: Pupils could use cameras, iPads, USB audio recorders to capture the problems they see and learn how to upload and save the files to a school computer.

02

If you can't get the class out of school, get your pupils to look for problems elsewhere

Ask pupils to browse through copies of the local newspaper or website online and discuss stories about things they think are problems. Or you could ask them to talk about their journey into school that morning and identify problems they experienced along the way.

Explain that this unit/challenge is all about designing something which meets real user needs. So the pupils have to think of themselves as designers but also as clients in the sense that they are using a product, or a service or a space and experiencing problems with it. They have to think about how their age, physical ability and the amount of money they have may have affected how and why they feel there is a problem.

Reading and writing objective: ask the pupils to skim read the text of a newspaper or internet article and retrieve the relevant information.

03

Think about what it's like to be someone else

Remind your pupils that this unit/challenge is all about using design to solve a problem that real people experience. A focus on user needs is crucial for any good design project.

To help your pupils understand the point of view of the people who are experiencing a problem, the best way is to get them to talk to these people and find out what affects their point of view.

Pupils often find it easier to talk to people if they are in groups or have an iPad / recorder with them so they don't miss any information and also if they are well-prepared with suitable questions, so make sure they feel like they have all the equipment they need.

If the pupils can't get out of the school to see problems happening for themselves, they can still think about what informs their own perspective after they have identified problems from newspapers or from remembering their journey to school.

Perhaps they could create a simple user persona picture with some notes alongside to show the age, gender, likes and dislikes of the sort of person they are going to be designing for.

A user persona can be as simple as making up a character with a name, drawing their picture then talking through what sort of characteristics this person has. All these characteristics will be informed by the discussion the class has about this person's perspective.

Use a computer / iPad to plan a questionnaire and use the internet to research information about the problems they identify.

Pupils can get into character as they think what it's like to be somebody else. This role play / body storming is a good way to develop empathy.

Image credit: Ashley Bingham, A&M Photography Ltd.

Asking the right questions

You could dedicate a class before the field trip to explaining why it's helpful when you're designing to understand other people's point of view. The class could work together to design a short questionnaire that will help them capture information they think will be helpful when they get to designing.

Some things they may want to think about are:

- What age and gender are they people they speak to?
- What most affects how they act: money, physical ability, their views on the environment or perhaps fashion trends?
- How important do they think it is that you try to design a solution to the problem you've been talking to them about?

Creating a user persona

The class may decide their user persona is a girl, aged 13 called Mara. Mara really likes nature and has a keen interest in the environment and sustainability. She also likes clothes, fashion and going shopping with her friends. However, she knows that the manufacture of clothes and buying lots of clothes just for fashion isn't good for the environment. She really needs to think of a way to change her clothes/appearance without it harming the environment.

A model may help pupils bring their user persona to life during the unit.

Image credit: Ashley Bingham, A&M Photography Ltd.

04

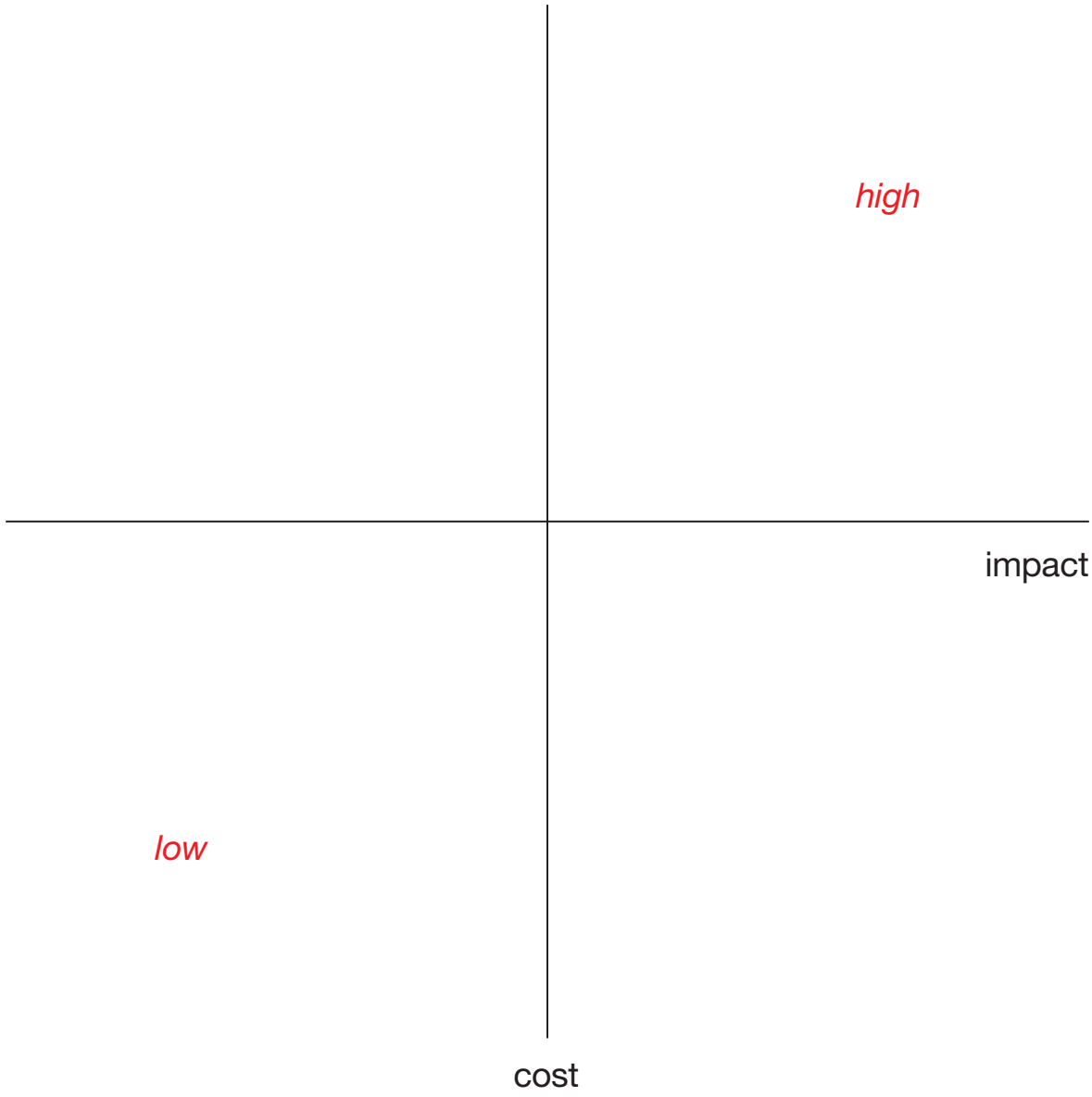
Get the pupils to share the problems they identified with the rest of the class

Divide the pupils into small groups. Get every group to write down on individual sticky notes the three most memorable problems they came across on their trip out of school. Now get the class to nominate one person to be a problem sorter. The problem sorter will help order all the sticky notes on a big problem board.

Speaking and listening objectives: group discussion and interaction. You may be able to make this stage happen more quickly if you act as the problem sorter. Or you could dedicate more time to this problem capturing by asking pupils to use a computer spreadsheet to record the problems alongside comments and details captured with their questionnaires.

Give the chance for pupils and teachers to discuss the problems they saw on their trip.

Image credit: Lydia Evans



Ordering problems

You may want to use a set of axis to organise problems according to: the number of people they affect, the cost of things not working properly, the anticipated cost of solving the problem or how important the class feels the problem is.

Discuss with the class where the problem sorter should position the problem on the axis you've chosen. Is it a problem that affects lots of people? Group it with other problems which affect similar numbers of people. Does the problem feel really important to the class? If so, put it up high on the board to show it's of high importance to the class.

05

Get the class to vote for which problem they want to use design to address

Now your elected problem sorter has helped you arrange the sticky notes describing all the problems the class identified, the whole class needs to choose one that they think they can design a great solution to.

Encourage whole-class debate by counting votes cast by raising hands after you call each problem. You could ask one pupil to keep a tally of the number of votes cast for each idea. Remind the pupils that they don't need to choose the most serious problem. You may want to do the vote anonymouos to prevent peer pressure.

Not always serious

Problems that win pupil votes may not always be the most serious. One group may vote to solve bad hair days even though they found it difficult to get through train station barriers with heavy luggage and had seen homeless people moved on by police from the shelter offered on a station platform. There is nothing wrong with looking at these 'small' problems!

06

Brainstorm initial ideas for ways to solve this problem

Give the pupils five minutes to work out, in their groups, one thing they could design which would help solve the problem they've all voted for. Get them to write down notes about this on a big bit of paper, or start to sketch out their ideas. Be strict with time.

After five minutes ask the groups to think about another solution which uses a different design technique to address the problem. So for example, if their first thought was to design a poster to make people aware that crossing the road could be dangerous could they now think about a product that would do the same thing? Or if they thought a product could make recycling easier on public transport, could they think of an incentive scheme as well?

Consider getting the pupils to share their ideas with the class possibly on something like Padlet, Google docs or even sticking them up around the room so that the rest of the class can easily see each group's ideas.

Image credit:
Alys Tomlinson

07

Vote again

Get the pupils to vote for which sort of design solution they are going to pursue. This time they could put stickers against the idea they like best.

The vote should reflect the research the pupils did while out of school. Their final design has got to meet the needs of the people they interviewed or of their user personas. Design here is not about what's cool or looks great. It's about creating a solution that really meets user needs.

To help them decide on the best solution, the whole class will need to listen again to the recordings made when they were out identifying problems. If the class wasn't able to use iPads to record the answers of the people they interviewed ask each team of pupils who spotted the problem to give a quick one minute run down of the answers they got to their questions. The things people said should affect the class's decision about which design idea is the most appropriate solution.

For instance, the pupils may really enjoy using modern technologies, but the problem they are addressing mostly affects people aged 60 and older. Is the best solution to the problem actually the app they've just come up with, or would a series of low tech devices like brochures or posters be less frustrating for older people to use?

Before they vote the pupils have come up with a huge number of potential ways forward. They need to use this vote to think about which ideas are achievable and take into account the resources available. Perhaps the teacher may set a limit to how much to end product or service could cost to deliver as a way to help the pupils refine their ideas.

This section of the unit will test how well the class has listened to the people they talked to and whether they have really heard the important parts of their answers.

Pupils can use stickers to vote for the most appropriate design solution or possibly a Microsoft form? If you want a wider community opinion, what about setting up an iPad in kiosk mode with a voting system in the school reception area?

Image credit: Lydia Evans

Not just making stuff

This challenge is a great way to move away from a purely ‘Design and Make’ teacher-led approach. By working like a designer and listening to others, the pupils will develop a range of other skills and attributes including empathy, teamwork, resilience, negotiation and persuasion. Areas that may not normally be attributed to D&T lessons.

08

Refine the idea by creating models

In this challenge there aren't any specific making skills, like making linkages or improving the strength of a structure, to be learned. Instead the 2D or 3D models the pupils create will be a useful way to try out and visualise their ideas and the models will act as a prompt to help the pupils reflect on and discuss how their design meets user needs. You may wish to consider using C.A.D. to do this? Programs such as TinkerCad may be good to use. You can also use A.R. (Augmented Reality) to visualise what it may look like in situ.

Pupils should be able to use a wide range of modeling materials to cut, draw, stick and build a model that visualises their idea. At this stage the model doesn't need to work perfectly. It's an important way for each group of pupils to explore how well their idea will meet user needs and why it's better than another solution.

Image credit: Ashley Bingham, A&M Photography Ltd.

Modelling

By creating models to communicate and test their ideas, pupils are able to address many aspects of the D&T Progression Framework, especially:

PDB3 (model ideas by exploring materials, components and construction kits and by making templates and mockups) and PDB11 (model their ideas using prototypes and pattern pieces) depending on the key stage you work with on the challenge.

09

Display the models and ask pupils from other classes for their feedback.

Take photographs of the class at work, or provide the pupils with cameras/iPads so they can take photos of themselves at work, during all stages of the design unit so that these can be displayed alongside the final models they have created.

You may want to arrange these pictures of the pupils working at different stages of the design unit on a diagram which explains the process they went through to get to their brilliant end result. (See the following page.)

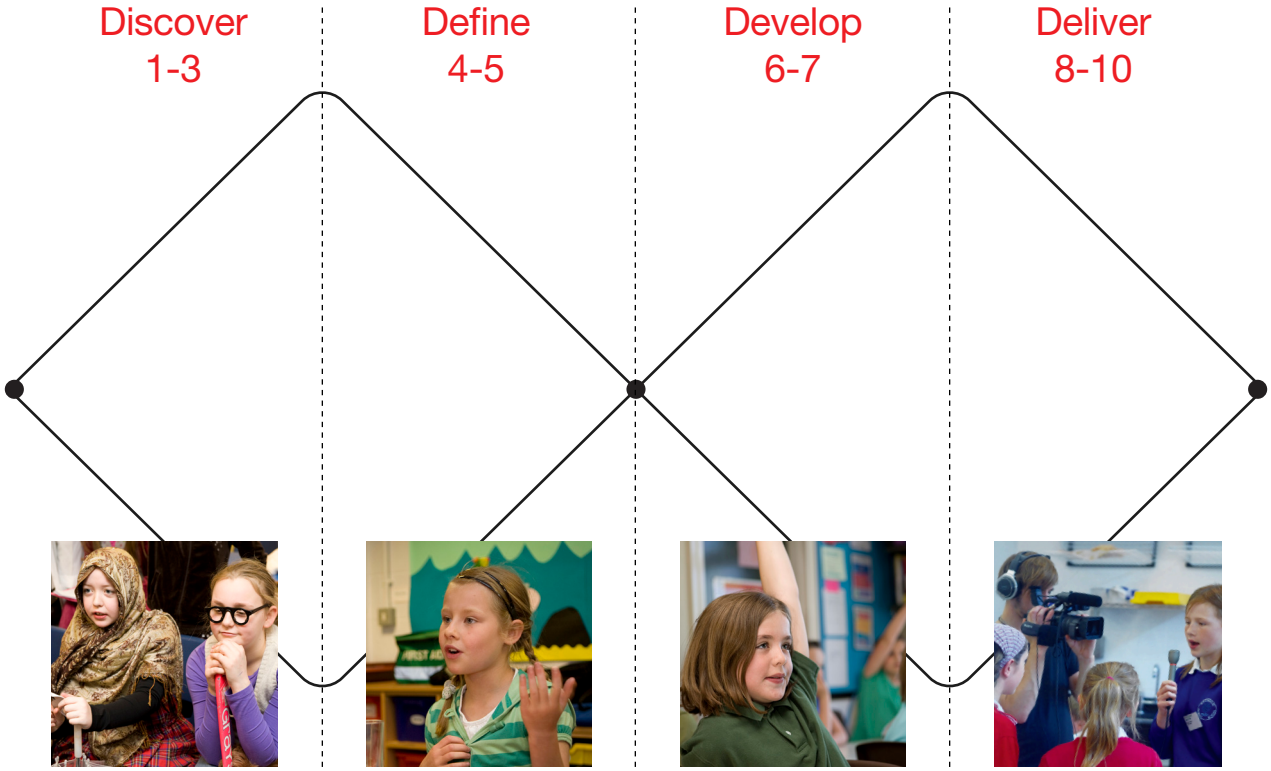
Once the models are on display alongside photographs showing how the pupils came up with the ideas for these models, the class has the opportunity to critique their final ideas. With pictures reminding them of the people they are designing for, and evidence of how they arrived at their final product or system idea in front of them, the pupils may realise there are further opportunities for design improvements.

Image credit: Alys Tomlinson

Focus on getting the pupils to take pictures of themselves at work at different stages of the project. You can organise these photographs on the process map. This is good practice for secondary D&T approaches and the Non-Examined Assessment (NEA) of the GCSE.

Double diamond

You could use this double diamond process diagram because it depicts how during stages 1-3 the class was getting lots of great ideas and opening up the scope of their design project. Then during stages 4-5 they started refining their ideas to decide on what problem to tackle. Once they'd done this, stages 6 and 7 got them coming up with many ways to address the problem, before they created models and did some user testing which helped them focus towards their final solution in stages 8-10.



10

Iterate and improve

Having had the opportunity to step back and appraise their final designs the pupils now need an opportunity to make improvements. As they make final improvements ask each group to write down their thought process and communicate this to the rest of the class in a two minute presentation that will help them all give feedback to each other and perhaps begin to decide which final product is the most user focused and the best response to the context unit.

Image credit: Lydia Evans

At the end of the unit/challenge it may be a good idea to present a range of prizes to groups of pupils who worked particularly well, or who came up with the best user-focused design. You could also offer prizes to the best product design response or the best graphic design response depending on the scope of the projects you have helped them undertake.

Resources

- Access to computers/iPads/tablets for internet searching, uploading photos, spreadsheets, word processing and CAD modelling.
- Brainstorming equipment including: Copies of local newspapers, colourful sticky note pads, big pens, large sheets of paper, cameras / USB audio recorders / iPads.
- Voting equipment including stickers, Google forms / Microsoft forms
- Modelling equipment including: paper, card, glue, masking tape, tin foil, balloons, stickers, pens, newspapers, scissors, staplers, rulers, pencils, Lego. Make sure you provide lots of different materials to enable the pupils to create their models. They will be able to see the creative potential in seemingly insignificant objects.

Consider recording pupils' presentations and uploading to your VLE / website / Facebook page. You could get feedback from members of the school community

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