D&T GCSE reform proposal

Notes by David Barlex and Torben Steeg, November 2014

The consultation website is here:

https://www.gov.uk/government/consultations/gcse-and-a-level-reform--2

The D&T consultation document is available here:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358275/Draft_GCSE_Design_and_technology_Content.pdf

Completed responses should be sent to the address shown below by **5:00pm on 20 November 2014**

Send by post to:

Alex Smith
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Great Smith Street
London
SW1P 3BT

Send by e-mail to:
GCSEandAlevelSeptember.CONSULTATION@education.gsi.gov.uk

Online response form for this consultation can be found from:
https://www.education.gov.uk/consultations

The key consultation response for D&T asks:

> Is the revised GCSE content [for D&T] appropriate? Please consider:
> - whether there is a suitable level of challenge
> - whether the content reflects what students need to know in order to progress to further academic and vocational education
> - whether the amount of content in the qualification is appropriate and, if not, whether you have any suggestions for removing or adding content

Our full response is available online at http://dandtfordandt.wordpress.com/.

We hope colleagues will find the following notes useful in formulating their own responses. We are very happy, if you agree with our points, for you simply use our text, or to for you to use it as a starting point for your own comments.

The important thing is that the DfE get a lot of responses!

Overview

The most important elements of the proposals, in our view, are:

1 Design & technology should become a single GCSE title

2 Both products and prototypes are appropriate outcomes

3 The context for design activity is seen as important

4 There is a core of technical principles for **all** pupils including embedded control

5 There are areas which students can concentrate on with regard to their Non Examination Assessment (NEA) of project

We are supportive of these features although they need clarification and we have made 10 Notes providing comment and elaboration in our response below. In particular we draw your attention to our Note 9 which deals with areas students can concentrate on for their NEA. The consultation recommends Areas of Interest but we think these may turn out to be merely focus areas in disguise and believe that a better title would be **Arenas of Challenge**, which allow students to respond using knowledge skill and understanding from across the breadth of design & technology. We believe that adopting the Arenas of Challenge idea is an important means of modernizing the subject and the way it is taught. We urge you to consider supporting the Arenas of Challenge Idea in your response to the consultation and discuss with your department how to develop models of teaching that will support this approach

Response Summary

On whether there is a suitable level of challenge

We believe that the level of challenge is broadly appropriate, but have concerns about specific aspects, which we have detailed below

On whether the content reflects what students need to know in order to progress to further academic and vocational education

Yes, we think that the content is appropriate to support this progression (taking into account our comments on detail)

On whether the amount of content in the qualification is appropriate and, if not, whether you have any suggestions for removing or adding content

We have made suggestion below for changes to the content proposed, but believe the amount of content proposed is appropriate

Notes

1. **Title** (see point 9 of the proposal)

    We agree that having a single GCSE title, rather than a range of separate titles focussed on material areas, is a positive step for D&T. We believe that D&T could offer pupils a much richer experience of designing and making if it was the norm for them to be able to draw on a wide range of materials to design and make with.

    We do recognise however that this proposed change brings risks that need to be acknowledged and ameliorated. For this significant change to D&T

GCSE to be successful it should be accepted that many teachers will need support in the transition. This is not an insignificant issue and it needs to taken seriously by the D&T education community and its supporters.

2. **Outcomes** (see point 2 of the proposal)

We welcome the definition of outcomes as either products or prototypes as an important distinction that supports pupil creativity and enables a wider range of pupil responses than might be the case if the outcome was restricted to fully functioning products.

3. **Iterative design** (see point 2 of the proposal)

The first part of Point 2 reads:

"GCSE specifications in design and technology should encourage students to understand and apply **the** iterative design process that can be summarised as explore, create and evaluate." (Our emphasis.)

We feel there is real the danger that this may be interpreted to mean that there is only one possible iterative design process in terms of explore, create and evaluate. Such an interpretation would of course be completely in conflict with what we know about the way creativity pursues its purposes in a variety of ways. Hence we think it would be better to rephrase the second sentence as follows:

"GCSE specifications in design and technology should encourage students to understand and apply an iterative design process, for example one that can be summarised as iterations of steps such as explore, create and evaluate."

4. **Encourage vs require** (see point 2 of the proposal)

We think the proposal is weak where it says:

"GCSE specifications in design and technology should ***encourage*** students to understand and apply the iterative design process that can be summarised as explore, create and evaluate. They should ***encourage*** students to use creativity and imagination…"

In both cases we think 'encourage' should be replaced by '**require'**.

However we welcome the requirement (also in Point 2) to:

"…solve real and relevant problems, considering their own and others' needs, wants and values"

5. **The educational worth of D&T** (see point 3 of the proposal)

We believe very strongly point 3 should include a justification of the educational worth of D&T. A suggested justification is:

"Imagining what might exist in the future and using tools and materials to create and critically explore that future is a unique human ability, which has led to the development of successive civilisations across history. Such activity embodies some of the best of what it means to be human. Learners study design and technology because it introduces them to this field of human endeavour and empowers them to become people who see the world as a place of opportunity where they and others can, through their own thoughts and actions, improve the world in which they live. At the heart of

this activity is an iterative process that can be summarised as explore, create, evaluate."

Such a justification firmly confirms D&T as a subject for the general education of all young people whatever career path they might choose, justifying the teaching of D&T on the grounds of cultural significance.

6. **Subject aims and learning outcomes** (see point 4 - with multiple bullet points - of the proposal)

We see this as an encouraging list of requirements. However, the way these are interpreted by the Awarding Organisations in the specifications they develop will be critical and we urge those scrutinising proposals from the Awarding bodies to ensure the proposals really do meet ***all*** of these aspirations.

7. **Subject content** (see points 5-9 of the proposal)

We welcome these introductory points and their focus on designing and making that is dependent on a combination of knowledge, understanding and skill.

8. **Designing and making principles** (see point 10 of the proposal)

We broadly welcome these principles, as far as they go, and think they provide continuity from previous good GCSE practice.

There is, however, a lack of appropriate emphasis on context and this is paralleled with an over emphasis on the design brief. It is our view that at Key Stage 4 briefs should rarely be given, but derived by pupils from contexts.

A further area that we think is underplayed is that of expecting pupils to have a clear view of the values that underpin their designing and making – and this includes thinking about the environmental implications. We also think that some reordering of the items would be useful to group items concerned with similar features together.

Although we welcome the indication of support for pupil collaboration, we think that the existing statement doesn't do sufficient justice to the possibilities of pupil collaboration and that the role of collaboration needs much more emphasis. We understand that for assessment purposes it will be essential to prevent collaboration obscuring individual performance but we believe that the role of collaboration in enhancing individual performance should be acknowledged and promoted. In support of a higher emphasis on collaboration, it is worth noting that in many design & technology fields working as part of a team or a group as opposed to an individual is the norm.

Hence we think that the re-wording along the following lines would be useful:

GCSE specifications in design and technology must require students to demonstrate the ability to:

- *understand that all design and technological practice takes place in contexts which will inform outcomes*

- *explore a variety of challenging contexts that have historical, social, cultural, ecological and economic relevance*

- *identify and understand client and user needs through the collection of primary and secondary data*

- *use insights informed by exploration of different cultures, values, ethics, whole system thinking*

- *be aware of current developments in design and technology, including new and emerging technologies, their impact on individuals, business, society and the environment, and the responsibilities of designers, engineers and technologists*

- *analyse the work of past and present professionals in this area*

- *be ambitious and take risks when designing and making, including continuously developing ideas, testing, critically analyzing and evaluating their on going designs in order to inform their decision making*

- *use different design strategies to generate initial ideas and creative intentions*

- *develop, communicate, record and justify design ideas, applying suitable techniques for example: writing, sketching, drawing, planning, labeling, annotating, 3D and mathematical modeling, present orally and digitally and using computer based tools*

- *design & develop innovative, functional, aesthetic and marketable products that respond to needs and are fit for purpose*

- *make informed and justified decisions about their own products/prototypes (and those of others) that identify the potential for further development and deliver solutions for how modification could be delivered*

- *use specialist tools, techniques, processes, equipment and machinery to produce high quality products/prototypes*

- *select and work with appropriate materials and components in order to manufacture functioning solutions*

- *be aware of the availability and cost of materials in relation to the design and manufacture of products*

- *Work collaboratively in those aspects of designing and making where cooperation is advantageous*

9. **Technical principles** (see points 11-12 of the proposal)

We welcome, on the whole, the Technical principles and in particular that all pupils following a GCSE in D&T will be required to study broadly across the range of materials. In particular we are pleased to see that **embedded control** is an element of the 'Technical Principles' for all pupils; an aspect of the subject that seems to be more than ever central to understanding the products that future citizens will interact with, as more and more of these products contain embedded processors, sensing and the ability to connect to the Internet (leading to what is often called the Internet of things).

The division of the Technical principles between students 'having knowledge and understanding of' irrespective of their chosen area of interest (Point 11) and 'applying knowledge, understanding and skills' through their chosen area of interest (Point 12) is interesting and important. Our understanding of

this division is that those features in Point 11 will be open to assessment in the written paper whereas those features in Point 12 will be need to be demonstrated in the NEA. It is however important that this distinction is made explicit. (We have commented on the division of marks between the written examination and the NEA in our response to the Ofqual consultation.)

There are some changes to the detail of Point 11 and Point 12 that we believe are important which we suggest below.

Point 11

- "How materials work together to create functioning products" changed to:

  "How materials and components work together to create products/prototypes that meet functional and structural requirements"

- "The types and properties of the following natural and man made materials: papers and cards, wood, metals, plastics, composites, woven and non-woven fabrics and smart/modern materials" changed to:

  "The types and properties of the following natural and manufactured materials: papers and cards, wood, metals, polymers, composites, woven and non-woven fabrics and smart/modern materials"

- "The functions of mechanical fittings and devices, power sources and discrete and programmeable components and how they can be applied to products" changed to:

  The functions of mechanical fittings and devices, energy and power sources and discrete and programmeable components and how they can be applied to products/prototypes"

Point 12

- "Specialist tools, techniques, processes, equipment and machinery, including computer-aided design and computer-aided manufacture" changed to:

  "Specialist tools, techniques, processes, equipment and machinery, including digital design and digital manufacture"

10. **Areas of interest** (see point 13 of the proposal)

We welcome the idea of Areas of interest in principle; in particular, in the light of our previous comments about the importance of context, we note that the proposals do, to some extent, offer support for the importance of context.

We do have a broad concern. It would be easy to see these areas of interest as simply the previous focus areas in disguise. This would not be in the spirit of modernisation that we see reflected in the rest of this new guidance.

We note, firstly, that the nature of the six proposed Areas are not the same and, secondly, that the examples provided are not always suitably challenging for GCSE.

The proposed Areas of *Fashion*, *Interiors and furnishing*, *Advertising and promotion* and *Leisure* are not the same kinds of thing as *Consumer electronics* and *Mechanical systems*. The former are 'areas of life' (or, possibly, fields of work) that allow for a wide range of product types to

emerge from the area of interest, including, importantly, those utilising mechanical and electronic control. *Consumer electronics* and *Mechanical systems*, on the other hand, are technical disciplines that require a particular mode of functioning. We must emphasise that we very much do want more pupils to engage with the 'technical' aspects of D&T, especially programmable electronics. But it is not clear that trying to force this by contorting the Areas of Interest will be successful; it would be much better to ensure that the technical content that all GCSE D&T students will have to cover is robust enough to provide a basis for them to feel confident that they can apply, say, programmable systems in any Area of Interest.

We think that the three problems we have identified

- the interpretation of the new Areas of Interest as a pre-existing focus area
- the differing nature of the defined Areas of interest
- the need to encourage students to utilize their understanding of technical principles in their work

can be overcome by a change of name that more emphatically signifies the open and interventionist nature of the design & technology endeavour.

We strongly recommend that the term "**Arena of Challenge**" replaces the term Area of Interest.

It is important that the examples given do in fact indicate challenge. Those currently present under Consumer electronics are particularly weak e.g. "products that fulfil a practical need such as torches or light sensors" compared to the other areas of interest. Torches can, clearly, be very sophisticated, but the above could easily be read to suggest that a simple torch (often a KS2 project) might be a suitable GCSE project. The reference to 'light sensors' is even more puzzling since it is a peculiarly specific reference to a component or sub-system in an electronic circuit rather than something that (by itself) is a product "that fulfils a practical need".

We think that the following would provide suitable Arenas of Challenge:

- Exploration

    Possible outcomes could include remotely controlled devices to visit, record data and/or take samples from a range of hostile/distant environments
- Disaster relief

    Possible outcomes could include items concerned with providing short/medium term shelter, clean drinking water, communication with the outside world
- Living and working spaces

    Possible outcomes could include models for elements of the intelligent sustainable city
- Waste Management

    Possible outcomes could include items concerned with safe disposal, minimising waste, utilization of waste or eliminating waste

- Climate change

  Possible outcomes could include items and systems to help individuals and small communities to reduce their carbon footprint

- Protection

  Possible outcomes could include items for individual protection for people in different situations (leisure pursuits, different occupations, travelling)

- Safety

  Possible outcomes could include items to keep possessions free from theft, individuals or groups free from harm

- Comfort

  Possible outcomes could include items to provide physical comfort in a variety of situation or emotional security in times of stress,

- Hygiene

  Possible outcomes could include systems and devices to be used in the wild, in rural areas, in urban areas, and be concerned with individuals, groups and /or communities

- Looking good

  Possible outcomes could range from items of apparel, accessories, hair-styles, cosmetics all in the context of occasion, culture and personal intent

- Challenged communities

  Possible outcomes could include items to enable disadvantaged communities to self-help

- Health and well being

  Possible outcomes could include items to enable changing lifestyles, to enhance well being in the elderly, promote whole family well being

(We have taken inspiration for the chosen Arenas of Challenge from the work of the All Party Parliamentary Engineering Group.)

Much will depends on the way that teachers enable their pupils to learn within Arenas of Challenge and then respond effectively in response to open starting points (we have discussed this further in our response to the Ofqual consultation that is running in parallel with this consultation) and we see this as an area in which many D&T teachers would benefit from relevant and appropriate CPD to help them work in a more integrated way across the traditional material areas.

As the Arena of Challenge approach to NEA becomes successful it should be possible for schools to identify their own challenges