Defining Design and Technology in an Age of Uncertainty:
What we know and where are we going?

David Wooff and Dawne Bell

Change in Design and Technology entries, 2009/10 to 2014/15

Source: SFR01/2016: GCSE and equivalent results in England 2014/15 (Revised). Department for Education January 2016. *'Other D&T' includes Graphics, Motor Vehicle Studies, D&T Engineering, D&T Product Design and D&T (not specified)

Edge Hill University
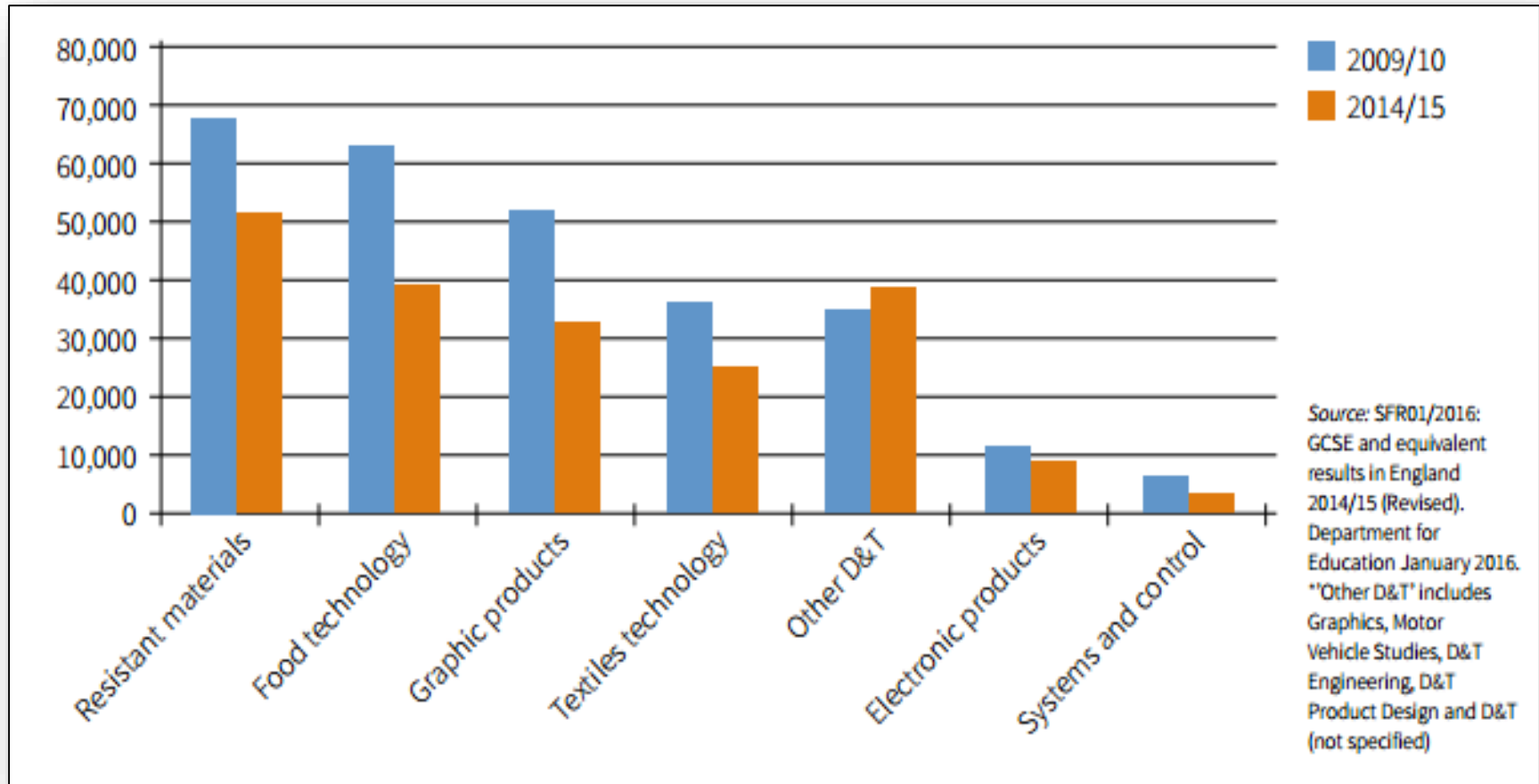
Change in Design and Technology entries, 2009/10 to 2014/15 – Raw Data

D&T subject	2009/10	2014/15	% change
Electronic products	10,957	7,895	-27.9
Food technology	62,104	38,416	-38.1
Graphic products	51,355	31,859	-38.0
Resistant materials	67,402	51,096	-24.2
Systems and control	5,637	2,979	-47.2
Textiles technology	35,835	24,198	-32.5
Other D&T*	33,978	38,207	12.4
Total	267,268	194,650	-27.2

Source: SFR01/2016: GCSE and equivalent results in England 2014/15 (Revised). Department for Education January 2016.
* 'Other D&T' includes Graphics, Motor Vehicle Studies, D&T Engineering, D&T Product Design and D&T (not specified)

Edge Hill University

How does Design and Technology compare against other subjects?

Impact of the English Baccalaureate ?

	GCSE entries summer 2016	% change since 2015
EBacc subjects		
Computing*	63,670	84
Additional science	353,490	11
Geography	227,730	8
Science	384,610	8
History	243,520	7
Chemistry	131,660	6
Physics	130,620	5
Biology	133,680	4
Modern foreign languages and classical subjects	320,600	-3
Non-EBacc subjects		
Physical education	119,680	3
Business studies	89,670	-2
Religious studies	327,990	-3
Drama	68,250	-4
Arts and Design subjects	172,550	-5
Design & technology	175,130	-10
Media/film/TV studies	51,410	-15
ICT*	74,770	-27

Design and Technology Teacher Recruitment

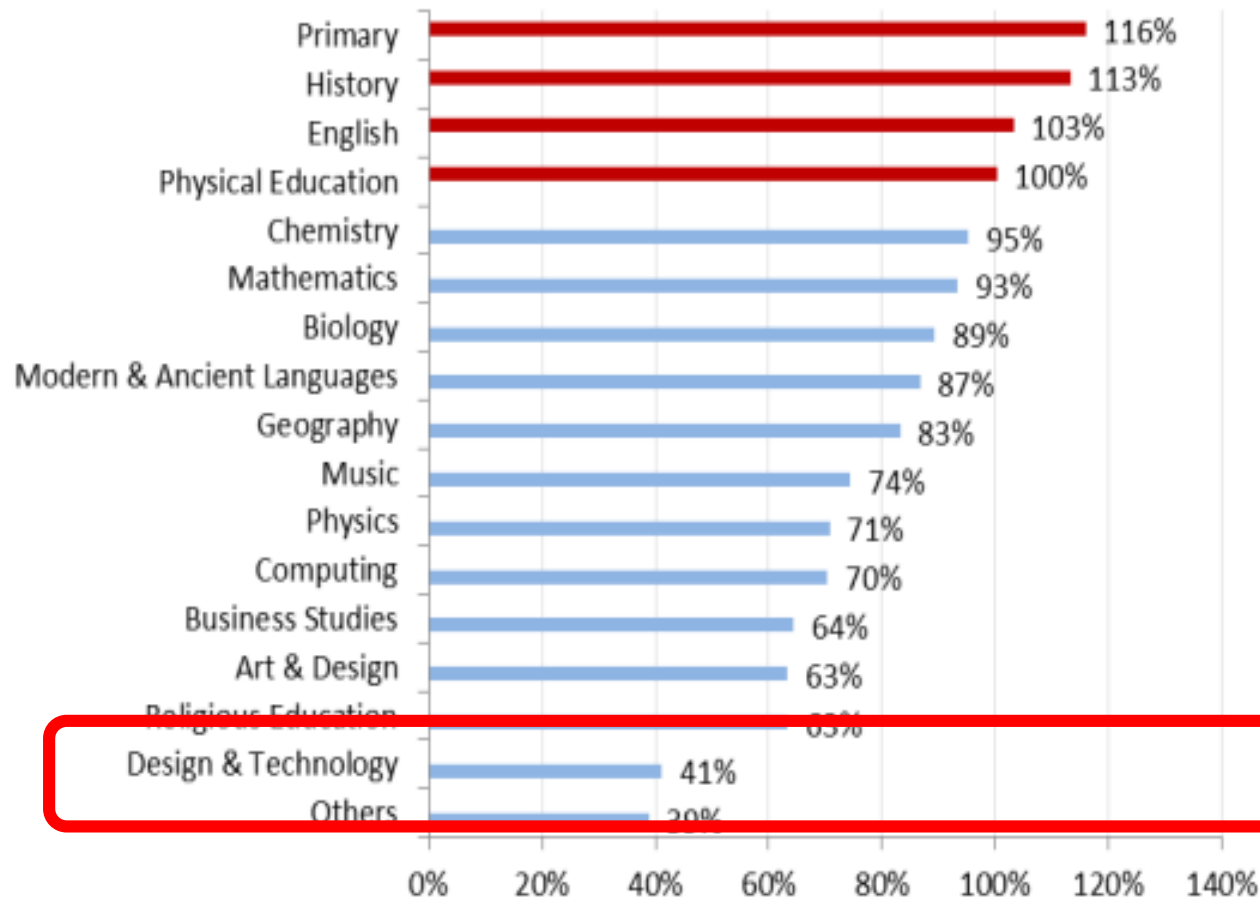**Design and Technology Teacher Recruitment 2011/12 – 2015/16**

	Recruited	Target	% of Target
2011/12	1,878	1,728	108.7%
2012/13	632	760	83.2%
2013/14	360	800	45.0%
2014/15	409	981	41.7%
2015/16	526	1,279	41.1%

Department for Education

Initial teacher training census for the academic year 2015 to 2016, England

How does Design and Technology Teacher Recruitment Compare?

New Key Stage 3 National Curriculum Content

Department for Education

Design and technology programmes of study: key stage 3

National curriculum in England

Purpose of study

Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

**New
Key Stage 4
GCSE Subject
Content**

Department for Education

Design and technology

GCSE subject content

November 2015

Department for Education

Engineering

GCSE subject content

December 2015

Department for Education

Food preparation and nutrition
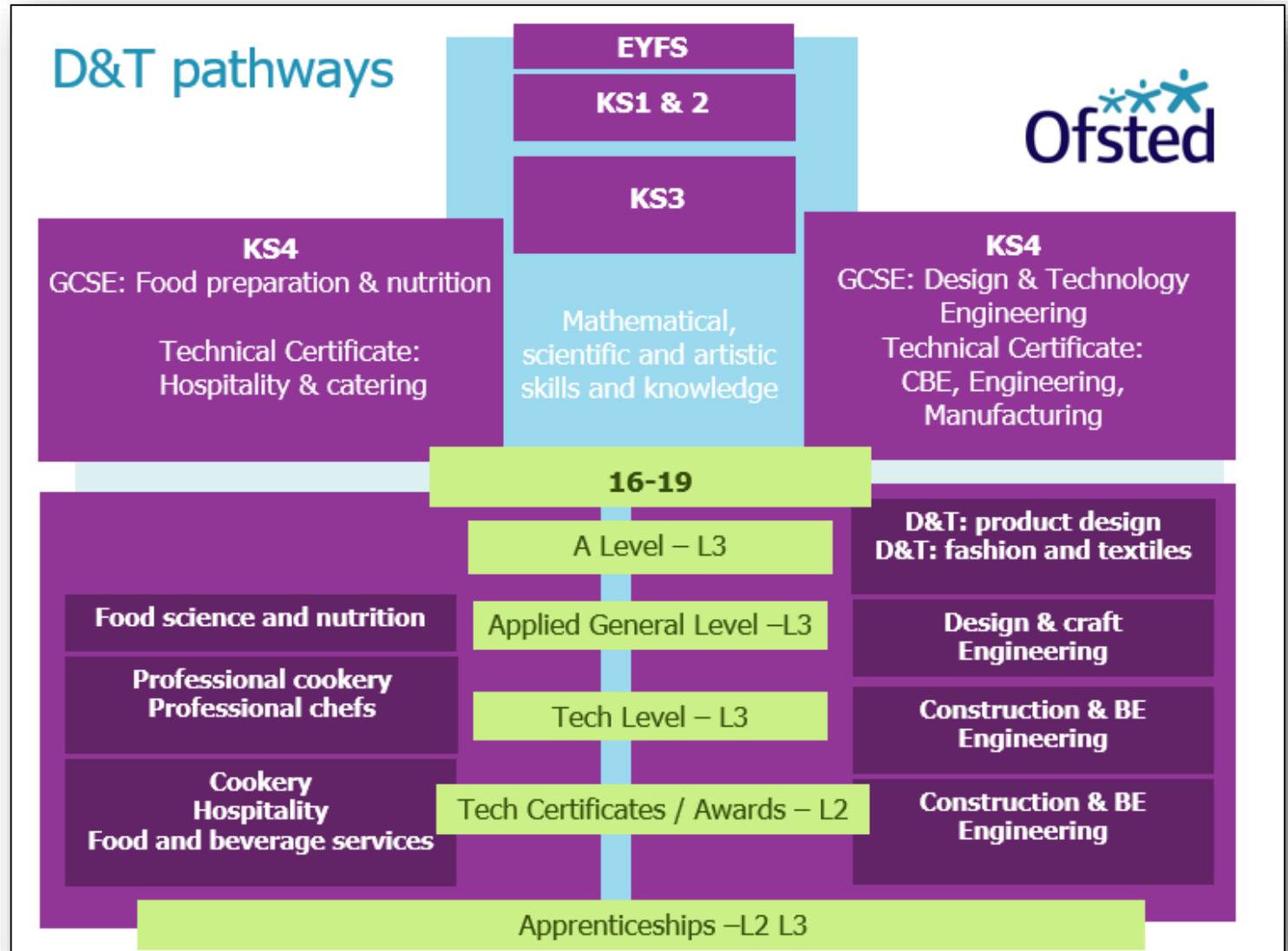
GCSE subject content

February 2015

Department for Education

Electronics

GCSE subject content

February 2016

In Summary

- Falling numbers of students opting to study design and technology

- Falling numbers of teachers training to deliver design and technology

- Significant changes to KS3 National Curriculum (Separating Food out, no specific mention of textiles technology)

- Significant changes to GCSE Specifications at KS4 (Initially Food & Nutrition and Design and technology only – now expanded to include Separate GCSE Electronics).

The Immediate Future

D&T pathways

EYFS

KS1 & 2

KS3

Ofsted

KS4
GCSE: Food preparation & nutrition

Technical Certificate:
Hospitality & catering

Mathematical, scientific and artistic skills and knowledge

KS4
GCSE: Design & Technology
Engineering
Technical Certificate:
CBE, Engineering, Manufacturing

16-19

A Level – L3

D&T: product design
D&T: fashion and textiles

Food science and nutrition

Applied General Level –L3

Design & craft
Engineering

Professional cookery
Professional chefs

Tech Level – L3

Construction & BE
Engineering

Cookery
Hospitality
Food and beverage services

Tech Certificates / Awards – L2

Construction & BE
Engineering

Apprenticeships –L2 L3

D&T GCSE changes implications timeline

	2015-16	2016-17	2017-18	2018-19
Yr7	National curriculum or other curriculum that prepares pupils for new GSCSEs			
Yr8	NC 14 or other curriculum that prepares pupils for new GSCSEs If choosing GCSE options these must be New Food GCSE or New D&T GCSE- N.B. *New D&T specifications not yet available*			
Yr9	Options New Food GCSE or Existing D&T GCSE in RM, GP, EP, Te, S&C or PD – but not Food Technology	NC 2014 or other curriculum that prepares pupils for new GSCSEs Options New Food GCSE or New D&T GCSE		
Yr10	Existing D&T GCSE (RM, GP, PD, Te, S&C, EP and FT)	New Food GCSE- 9-1 Or Existing D&T GCSE in RM, GP, EP, Te, S&C, PD	New Food GCSE- 9-1 Or New D&T GCSE- 9-1	New Food GCSE Or New D&T GCSE 1-9
Yr11	Existing D&T GCSEs (RM,GP,PD,Te,S&C,EP and FT) A*-G	Existing D&T GCSEs (RM,GP,PD,Te,S&C,EP and FT)- A*-G	New Food GCSE-9-1 Or Existing D&T in RM, GP, EP, Te, S&C, PD- A*-G	

Implications of the new Design and Technology GCSE (i)

- Pupils at Key stage 3 should be studying a D&T curriculum that enables them to progress successfully on to D&T and Food preparation and nutrition GCSEs.

- At the heart of the D&T GCSE is the expectation that pupils will understand and apply iterative design processes through which they explore, create and evaluate a range of outcomes. Therefore pupils should be developing these skill at Key Stage 3 even if the school does not follow the National Curriculum.

- All pupils studying D&T GCSE will need to develop technical knowledge and understanding of how electronic systems and programmable components provide functionality to products and the function of mechanical devices. So key stage 3 should prepare pupils for this.

Implications of the new Design and Technology GCSE (ii)

- Pupils will be required to produce at least one final prototype based on a design brief they develop in response to a contextual challenge set by the awarding body in the summer of year 10. It is unlikely that teachers will be able to set the same projects each year, which is often the case with the current GCSE.

- Pupils can select one material category for the production of their assessed prototype/s but will need a broader working knowledge of other material categories than in the existing GCSE.

- The separation of Key Stage 3 into separate subjects, e.g. Graphics, RM and Textiles becomes even less appropriate subject titles than previously as these subjects no-longer exist at GCSE.

Challenges in teaching the new Design and Technology GCSE

- Teachers often seeing themselves as teachers of textiles, resistant materials or graphics rather than teachers of design and technology. – *the need to teach more broadly therefore very daunting*

- Some teachers, understandably trying to fit the subject to their skills but potentially resulting in pupils not getting the right learning experience.

- Temptation by some to just avoid D&T and teach a vocational course whether it is right for the pupils or not.

- Teachings needing support to draw on and/or build skills and knowledge beyond their area of expertise

- care need to ensure teachers build confidence to enable pupils to explore materials beyond the teacher's original expertise- *collaboration between experts needed?*
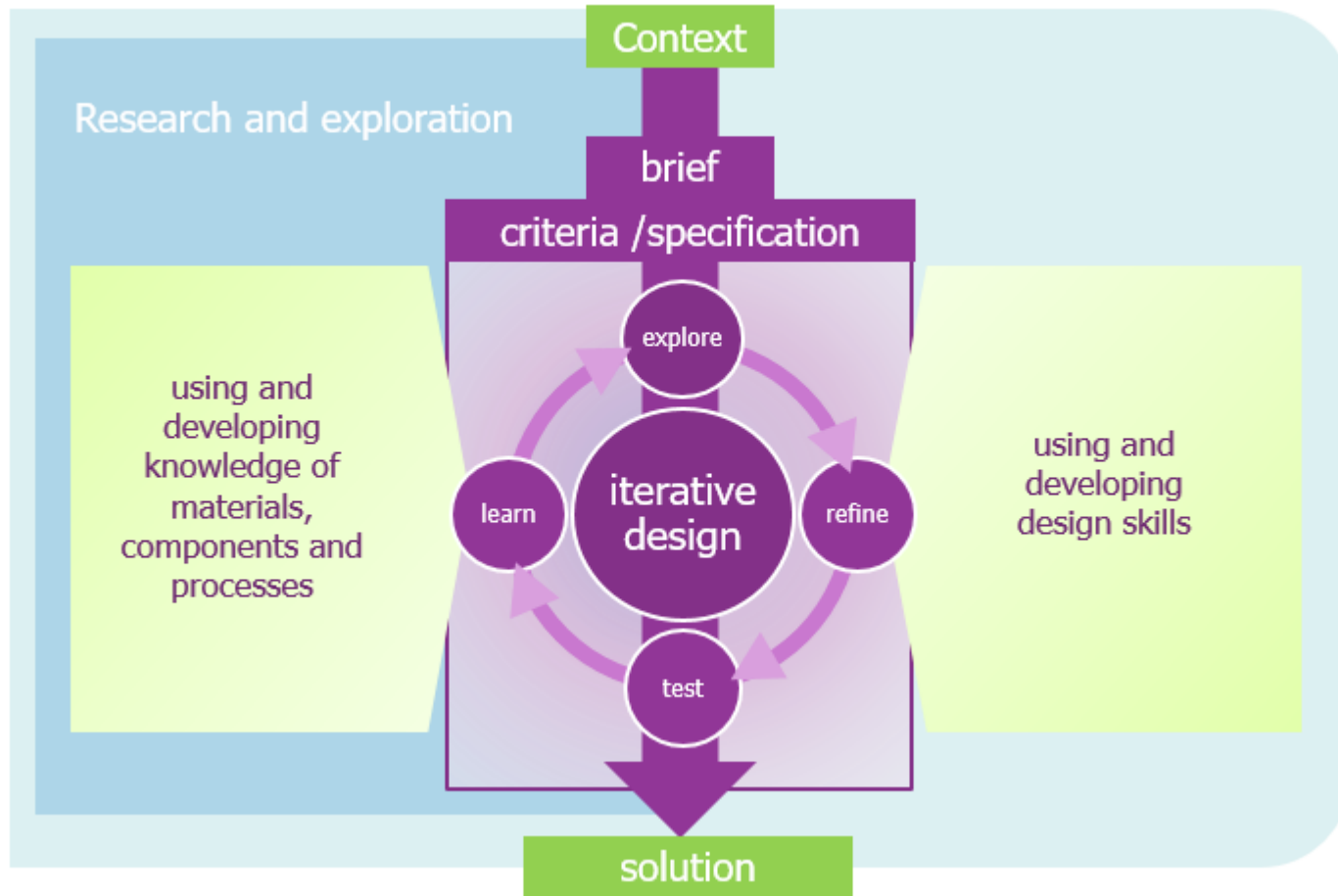
What does this look like though?

Two main elements:

Department for Education

Design and technology

GCSE subject content

November 2015
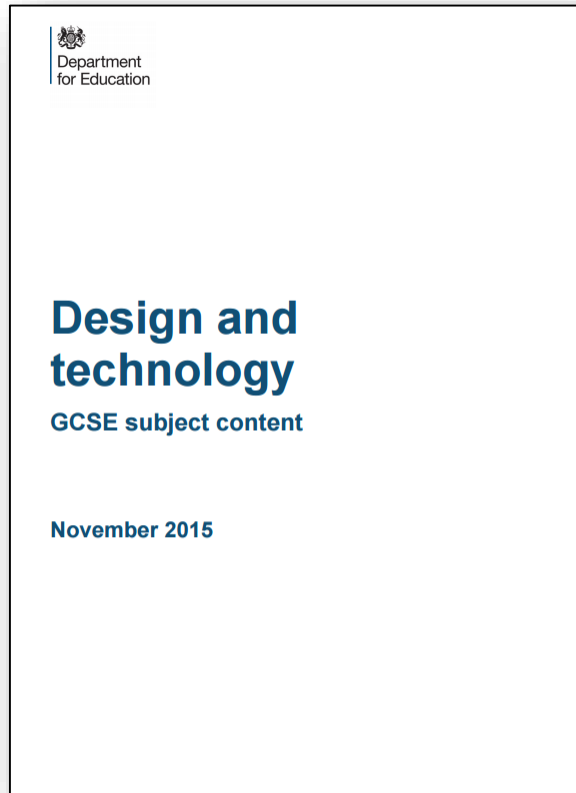
Non-Exam Assessment (NEA)

* 50% Weighting

* 30 – 35 Hours Duration

* Portfolio with Photographs of final product

* Portfolio with maximum of 20 Pages

* Context set in limited range by exam boards

Examination

* 50% Weighting

* Commences with multiple choice questions

* Covers different material areas

* Design task is a modification one, not from scratch

* Significant proportion of paper (30%) mathematics based
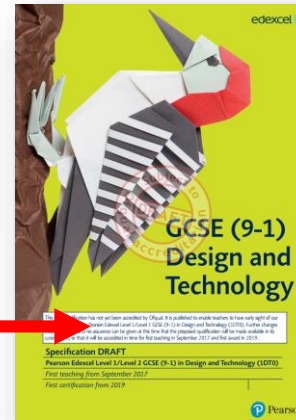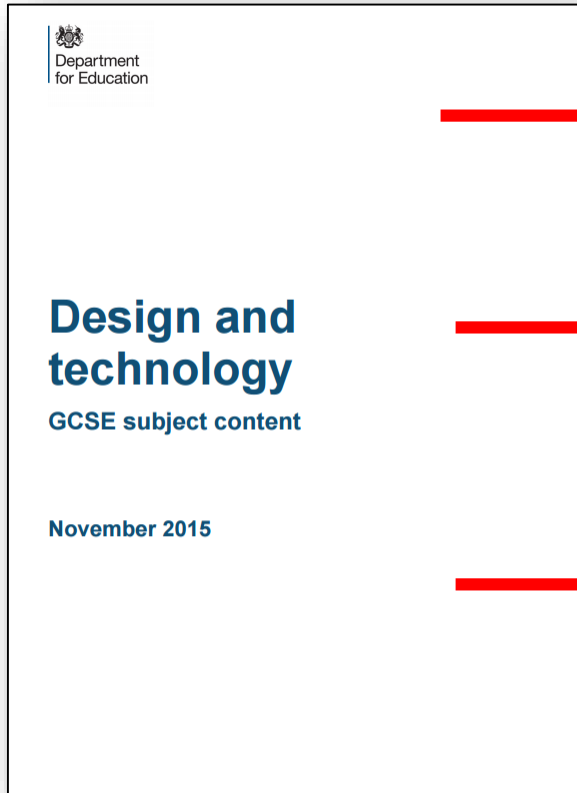
Draft materials available

Example here of NEA Briefing sheet, sent to schools for release on the 1st June in the academic year prior to Submission.

DRAFT – SPECIMEN MATERIAL

AQA

GCSE Design and Technology

Unit 2

NEA – design and make task

What's assessed?

Students will undertake a single 'design and make' activity, which will arise from Investigating one of five Contextual Challenges set by AQA.

Release date: 1st June in the academic year prior to submission

Time: 30-35 hours

Evidence: Written or electronic design portfolio with photographic evidence of final prototype(s). Max 20 pages.

This assessment is to be carried out under supervised conditions.

Sample contextual challenges:

- A high profile event
- Addressing the needs of the elderly
- The contemporary home
- Children's learning and development
- The world of travel and tourism

DRAFT

Draft materials available

Exam Questions incorporate more than one material area.

Choose **one** of the materials below and give **two** of its characteristics or properties. An example has been completed for you.

- Polypropylene
- Foam core board
- Brass
- Mahogany
- Silk

[2 marks]

Material	Characteristics/Properties
Cast iron	1 Brittle
	2 Can rust if unprotected
	1
	2

Draft materials available

Maths !!

When packaging is cut out 'nesting' is used to ensure that minimal material is wasted. The measurements below are in mm. Repeat the triangle on the grid below to ensure that as many fit on the material as possible.

[1 mark]

...uct to make it suitable for a child

...ur scheme according to 250...

60

The diagram shows the movement of a lever which is part of a toy. If point **A** travels 10mm to the right, what is the distance between points **B** and **C**?

C ⟵ ⟶ B

40 mm

10 mm ↕ • Fixed pivot

⟵ **A** ⟶

Using the information from the table above create a bar char... **percentages** of children who like different colours. Label your axis with the scale of your graph.

% of children who like different colours

Pastel Colours	Primary Colours	Fluorescent Colours	Subtle Colours
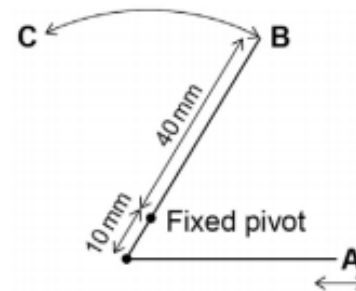
A	10mm	○
B	20mm	○
C	30mm	○
D	40mm	○

[1 mark]

How are you going to prepare students for this in your school?

Closer liaison with the mathematics department

You could try getting the Mathematics department to use Design and Technology / Food & Nutrition examples in their lessons.

How are you going to prepare students for this in your school?

Not forgetting; closer liaison with the science departments
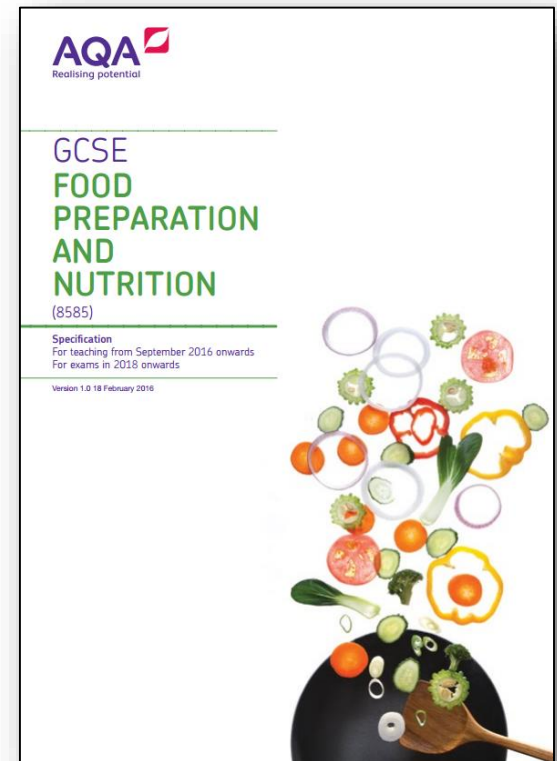
Key Points for developing KS3 Design and Technology to support new GCSE's

- Do the schemes of work from year 7 onwards enable pupils to:

- Solve creative real life problems- derived from a context?

- Engage in an iterative design process?

- Develop an understanding of electronic systems and programmable components that can apply when designing?

- Develop and apply their understanding of modern and smart materials?

- Fully consider environmental and ethical implications?

- Fully develop their design concept, e.g. in textiles using a toile – *or are they just choosing a pattern and adjusting it when they make the final product?*

- Recognise the wide range of ways in which textiles can be deployed in product design?

Key Points for developing KS3 Design and Technology to support new Food GCSE

- Do the schemes of work from year 7 onwards enable pupils to progressively develop and apply knowledge of:

- principles of health and nutrition?

- functional and chemical properties of food?

- Food safety?

- Food provenance?

AQA
Realising potential

GCSE
FOOD
PREPARATION
AND
NUTRITION
(8585)

Specification
For teaching from September 2016 onwards
For exams in 2018 onwards

Version 1.0 18 February 2016

The Future….?

Will design and technology survive the curriculum review?

Designed and Made in Britain?
Campaigning for D&T in Schools
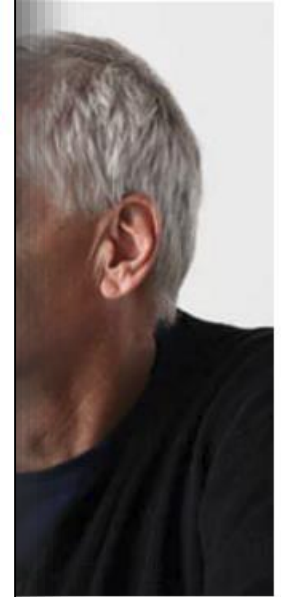
the design and technology association
D&T

the national

DESIGNED AND MADE IN BRITAIN…?

Design and Technology in schools is critical to the UK's future success

Act Now!

D&T

h schools is under pressure. Government
orting the curriculum and limiting the opportunity for
creative and technical subjects. In primary schools the
es very limited time for all other subjects and in
ogress 8 and the latest 'Ebacc for all' proposals
many schools.

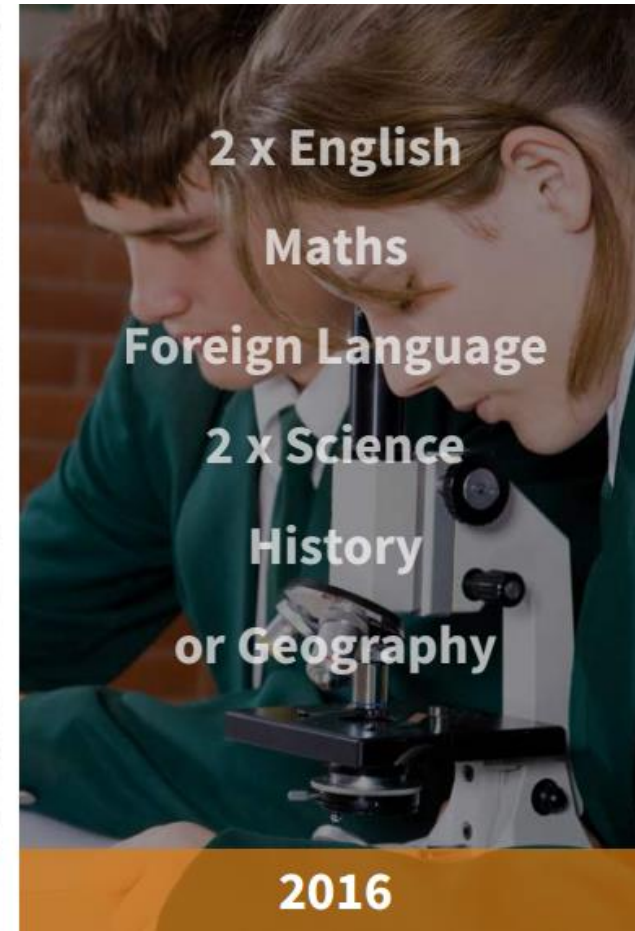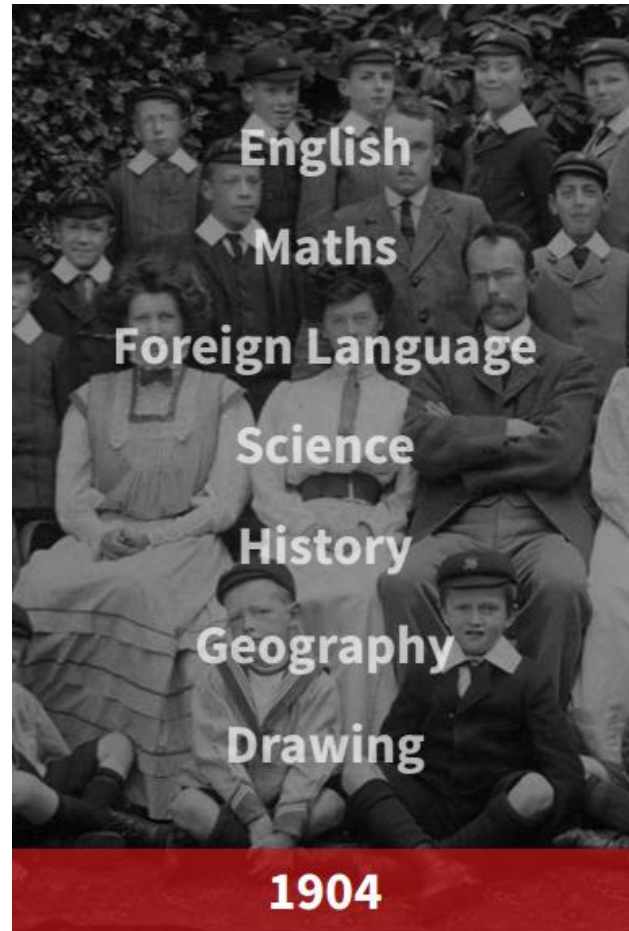roduced in 1989. England and Wales were the first
Design and Technology as a statutory entitlement
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Maths and
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BACC FOR THE FUTURE
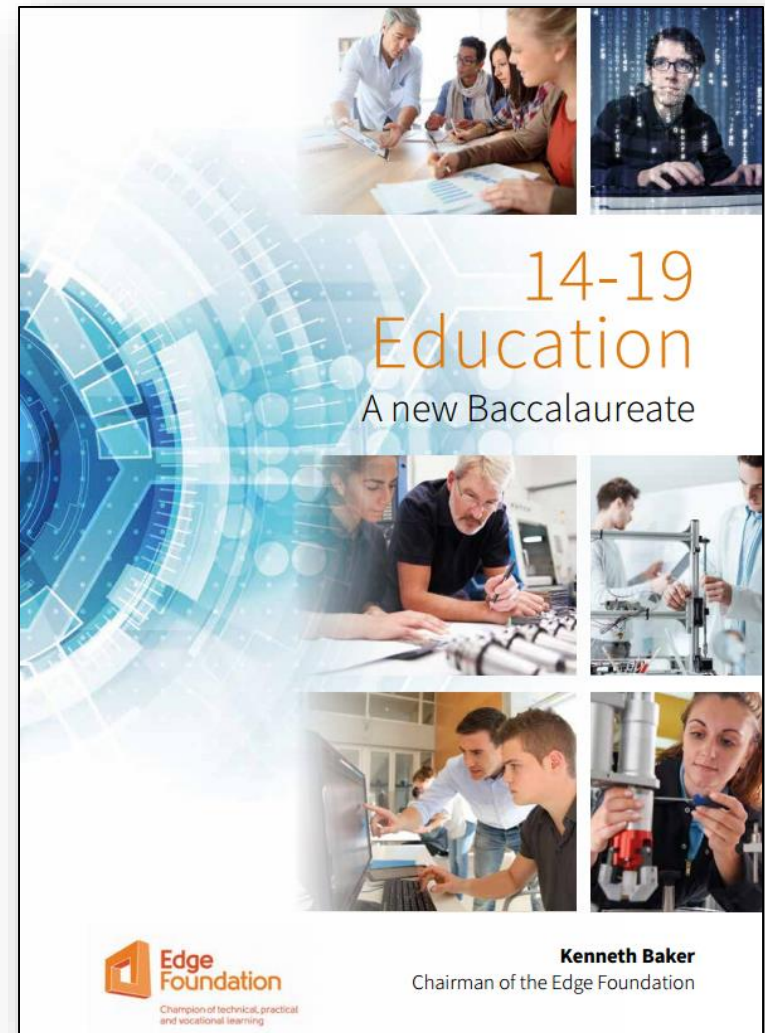
Support from unexpected quarters….

Lord Baker warns of EBacc's damaging 1904 curriculum

The architect of the national curriculum says the current EBacc is 'regressive', 'severely limits learning', ignores the skills needed for today's workforce, and fails poorer students.

English
Maths
Foreign Language
Science
History
Geography
Drawing

1904

2 x English
Maths
Foreign Language
2 x Science
History
or Geography

2016

Lord Baker proposes that the broader EBacc would include:

- English.
- Maths.
- Two science GCSEs – one of which could be computer science.
- A creative GCSE from a list which would include art and design, music, dance and drama.
- A humanities GCSE from a list which would include history, geography, religious education and foreign languages.
- A Design and Technology GCSE or an approved technical award. Examples include the Cambridge National Certificate in Engineering and the Pearson BTEC First Award in Construction and the Built Environment.

14-19 Education
A new Baccalaureate

Edge Foundation
Champion of technical, practical and vocational learning

Kenneth Baker
Chairman of the Edge Foundation

Locally, suggested strategies include:

- Celebrating successes, achievement walls, letters home etc..
- Extending links into other subjects to help contextualise them in Design and Technology (beyond maths and science as indicated in new GCSE Specifications)
- Inviting middle and senior leaders (and governors?) into your departments
- Links to the local community /businesses
- Shared learning opportunities (parents and pupils doing basic food hygiene certificate together afterschool)
- Raising profile of subject in school – hard sell at options /open evening
- Using STEM ambassadors and other invited guests and speakers
- Embracing change and being proactive
- Review projects, exemplar materials and work booklets – are they current?

Suggestions collated from HOD's / HOF's – July 2016

Final Thoughts

There will always be change, and as a subject; Design and Technology is a relatively new one. Arguably we have weakly defined boundaries, and work in a subject that is an "*educational construct*" , that is to say – where does Resistant Materials, Graphic Products or even Design and Technology exist outside of education? The best aspects of our subject use challenge, innovation, creativity and enquiry to stimulate and engage pupils in designing and making products, items and artefacts to make life better for someone else, whilst being ethical and mindful of the world around us. We may not always exist as "Design and Technology", but the essence of what we do, and what we bring to the curriculum, is unique – and we would suggest it is to that which we should look for security in the future.

In Scientia Opportunitas
Opportunity from Knowledge

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