Design for life

Design and technology and engineering magazine

Spring 2016

Find out more at:
aqa.org.uk/subjects/design-and-technology

AQA
Realising potential

Contents

Introduction

Welcome to the latest edition of our *Design for life* magazine, the publication aimed specifically at teachers delivering our design and technology and engineering qualifications.

In our last edition (summer 2015) I referred to the period of change we were about to embark upon. Many of you will have since become more aware of these changes and how they are likely to impact upon your teaching of GCSE and A-level Design and Technology and GCSE Engineering.

Many of you may have taken part in the consultation process where there was an opportunity to comment upon the revised subject content for GCSE and A-level Design and Technology and GCSE Engineering.

Since this content was formally approved we have been meeting teachers around the country to ensure the qualifications we are currently developing are fit for purpose and will meet the needs of teachers and students alike.

Towards the end of the summer term you will be able to see the draft specifications and materials we're submitting to Ofqual for accreditation.

In the autumn term there will be a series of showcase events where you will learn more about these specifications and portfolio of new technical awards we are developing.

I would encourage you to set aside some time from your busy teaching schedules to attend and find out more about what is coming from 2017 onwards.

Our new GCSE Food Preparation and Nutrition specification, which is available for first teaching from September 2016, has been accredited by Ofqual. If you have not already done so, I'd recommend you look at the wealth of information and resources available on our website.

The remainder of the magazine refers to the above in much more detail as well as including other articles which I hope you will find interesting. As always, if there are any issues you would like to see addressed in future editions or any personal contributions you would like to share with other readers, please email us at dandt@aqa.org.uk

With best wishes,

Steve Healy
Qualifications Manager
Design and Technology
Engineering
Food Preparation and Nutrition

Our GCSE Food Preparation and Nutrition specification is now accredited

We're delighted to announce that our new GCSE Food Preparation and Nutrition has been accredited by Ofqual.

The new GCSE is an exciting, practical and creative course. It will equip students with a robust understanding of nutrition and the food science principles underpinning the cooking and preparation of food, as well as the skills and knowledge they'll need to cook to a high standard. The first assessments will take place for this qualification in summer 2018.

We've worked with teachers, key stakeholders and subject experts at every stage of the development of the new GCSE to make sure that our specification and assessment materials are high quality, clear and easy to understand.

The layout of our specification reflects this and integrates the theoretical and practical elements of the course. The subject content that needs to be covered in your teaching is shown in two columns: 'content' and 'students must know and understand'. A third column, 'suggested application and food preparation skills' exemplifies how this content could be delivered through practical activities, enabling students to acquire the practical skills they need to cover this GCSE course.

Since we first published our draft specification, there have been some changes to our specification and assessment materials. We have revised some of our specimen questions and added more detail to our mark schemes to improve their clarity. We've also added more detail to our assessment criteria and to the guidance we provide about how to carry out and assess the non-exam assessment (NEA) tasks.

An in-depth explanation of these changes is available on our webinar called *GCSE Food Preparation and Nutrition: the accredited specification*. You can download and listen to this webinar for free from our website. You can view our accredited specification, question paper, mark scheme and NEA tasks at aqa.org.uk/8585

If you have any questions about the new GCSE, call our subject team directly on 0161 957 3334 or email us at: foodprep@aqa.org.uk

Now that our specification is accredited, we are conscious that you'll need to plan how you will deliver the new course. We've released a *Preparing for GCSE scheme of work* to help get your students ready for the new course. An example scheme of work shows how the new GCSE content could be delivered over two academic years. We will have more GCSE schemes of work available shortly. We've recently made sample lesson plans to give you some ideas about teaching the new specification content.

We've also produced a series of fantastic video resources to support the teaching of some of the more complex aspects of the specification. These will encourage your students to start thinking about the science that underpins cooking and preparation food and introduce key concepts such as methods of heat transfer, demonstrated in an accessible format.

In June and July 2016, we're holding free online and face-to-face Preparing to teach meetings. You can book a place on our website. These meetings will be an opportunity for you to receive practical guidance, review exemplar NEA material and discuss any questions that you may have with our subject experts.

From the classroom

Richard Curtis
King's School, Chester

We will soon be receiving the design and technology qualifications which will reshape the way we deliver this exciting and ever changing subject.

In many ways, design and technology has changed immensely throughout my school and teaching career. New technology for the classroom and radical developments in the real world are the main reasons.

The subject has survived many changes in education, whilst maintaining its core identity. We're still the subject which enables students to apply what they learn elsewhere to real world situations, problem solving and creativity.

It's clear from my experience and talking with colleagues that the skills students gain from design and technology can vary greatly. This is down to individual teacher experiences, school/college facilities, location and cultural influences.

Every student who approaches design education or employment post 18 may have different skills, experience and interests. Is this a bad thing? The temptation is to say no, as long as the foundations are there. However, pinning these foundations down is not easy. I found this out for myself when undergoing curriculum development in my own school.

At King's, we give as much focus to the skills and mechanisms for learning, as we do to specific subject knowledge. We've adopted the flipped classroom as fully as possible, ensuring our students develop independence from an early stage.

Self-evaluation and reflection become key skills as students work on an online (office 365) portfolio from Year 7. They respond to comments about their work, setting personal targets to stretch and challenge their skills.

Each year, we give students a breakdown of the projects and theoretical knowledge we intend to look at. The emphasis is for them to read, record and explore these themes in their portfolio. This extends their learning beyond the classroom experience.

Lesson tasks include practical activities to develop specific making skills, through to conceptual design activities where communication, design methodology and the big idea are assessed through concept models and presentations.

We expect pupils to be inquisitive about the world and to know how to develop their knowledge and experience of a particular subject area.

This reflects the broad knowledge required in the new subject content. When we embrace independent learning with our students and as more schools focus on independence, I believe all design and technology teachers can be national leaders in this area.

Update on our new design and technology qualifications

Development work is well underway for our new GCSE and A-levels in Design and Technology.

We have recently undertaken market testing around the country. We showed our draft materials to over 250 teachers. The feedback has been really helpful in shaping our new qualifications before we submit them for accreditation.

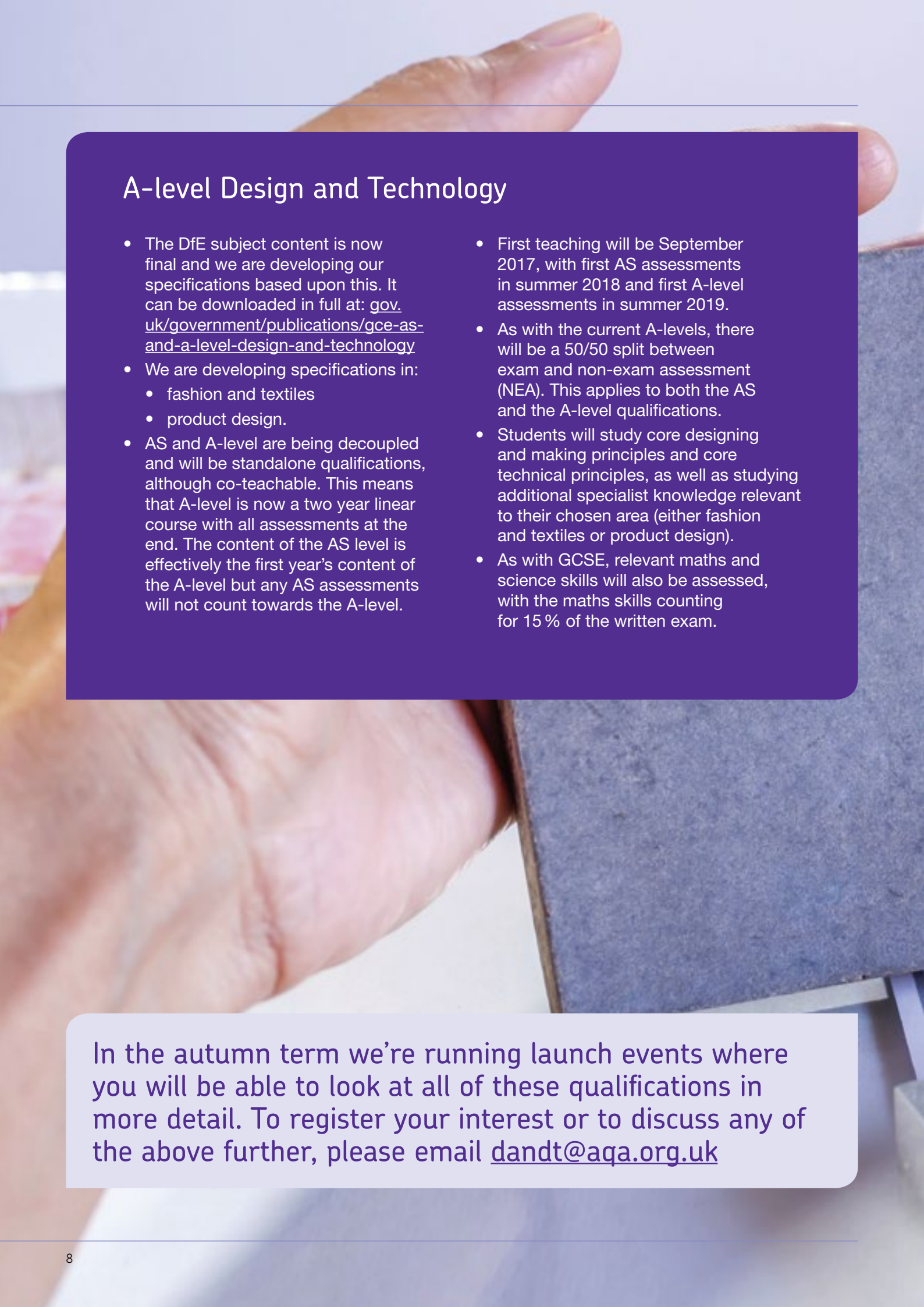
The following specifications will be submitted to Ofqual on 19 May 2016:

- GCSE Design and Technology
- A-level Design and Technology (Fashion and Textiles)
- A-level Design and Technology (Product Design).

From this date you will be able to download draft versions of the specifications and specimen assessment materials from our website. The current situation with regard to each area is as follows:

GCSE Design and Technology

- The Department for Education (DfE) subject content is now final and we are developing our specification based upon this. It can be downloaded in full at: gov.uk/government/publications/gcse-design-and-technology
- A single specification with no endorsed routes will replace the existing range of titles.
- Being developed for first teaching in September 2017, with first assessments in the summer of 2019.
- 50/50 split between exam and non-exam assessment (NEA).
- Students will study core designing and making principles and core technical principles, which will include a broad knowledge of design processes, materials, techniques and equipment.
- They will also have the opportunity to study specialist technical principles in greater depth through a chosen material area.
- As with all new GCSEs it will adopt the new 1–9 grading system.
- Contextual challenges for the NEA will be released annually on 1 June. These will be non-material specific and provide students with a starting point for their project. Within the given context students will be expected to identify a problem or opportunity and create their own design brief in response to this.
- There will be a strong focus on the iterative design process and we would expect to see this reflected in the work produced by students. Research, analysis and evaluation should be evident throughout and the different iterations of the prototype should reflect this.
- Relevant maths and science skills will also be assessed, with the maths skills counting for 15 % of the written exam. Examples of how these skills apply to design and technology include the calculation of quantities of materials, costs and sizes and the analysis and presentation of performance data and client survey responses.



A-level Design and Technology

- The DfE subject content is now final and we are developing our specifications based upon this. It can be downloaded in full at: gov.uk/government/publications/gce-as-and-a-level-design-and-technology
- We are developing specifications in:
  - fashion and textiles
  - product design.
- AS and A-level are being decoupled and will be standalone qualifications, although co-teachable. This means that A-level is now a two year linear course with all assessments at the end. The content of the AS level is effectively the first year's content of the A-level but any AS assessments will not count towards the A-level.
- First teaching will be September 2017, with first AS assessments in summer 2018 and first A-level assessments in summer 2019.
- As with the current A-levels, there will be a 50/50 split between exam and non-exam assessment (NEA). This applies to both the AS and the A-level qualifications.
- Students will study core designing and making principles and core technical principles, as well as studying additional specialist knowledge relevant to their chosen area (either fashion and textiles or product design).
- As with GCSE, relevant maths and science skills will also be assessed, with the maths skills counting for 15 % of the written exam.

In the autumn term we're running launch events where you will be able to look at all of these qualifications in more detail. To register your interest or to discuss any of the above further, please email dandt@aqa.org.uk

Level 1/2 Technical Awards

You may be interested in the work we are doing to develop a suite of Level 1/2 Technical Awards that will be offered alongside GCSE Design and Technology. They will focus upon practical skills within a specific material area and complement the new GCSE or provide an alternative area of study.

- We are developing the following Level 1/2 Technical Awards:
  - Materials Technology
  - Fashion and Textiles
  - Visual Communication
  - Food and Catering.
- They are being developed for first teaching in 2017 alongside the new GCSE.
- Technical Awards are government backed qualifications that will count towards the progress 8 performance measures. They are practical qualifications that will give students the opportunity to demonstrate a range of skills within their chosen area. They will be graded on pass, merit, distinction.
- They will consist of three units with a 40 % written exam and two non-exam assessment (NEA) units worth 30 % each. The first of these NEA units will be skills based, where students will produce a series of small made outcomes to demonstrate core skills outlined in the specification. The second NEA unit will be a larger making task, based upon a brief released by us and pulling together the skills developed in unit 2.
- There will be one re-sit opportunity allowed for each unit.
- Students will also be assessed on transferable skills such as communication and team work and learn about careers in related industries.
- We are working closely with stakeholders to ensure that these exciting new qualifications will meet the needs of both industry and further education (FE).

Ready for the new GCSE Design and Technology?

Matt McLain
Head of Secondary Programme
Liverpool John Moores University

I've been helping to develop the subject content documents for the new GCSE and A-level Design and Technology courses. When I ask teachers if they've read them, their responses generally fall into one of four categories:

1. They've read the documents, been to meetings with the likes of the Design and Technology Association and have a good idea of what's coming.
2. They've read the document, but wonder where the detail is.
3. They haven't read the documents, but have participated in discussion groups.
4. They're blissfully unaware of the changes ahead.

If you're reading this article, you're probably not in the fourth group.

The subject content documents are a bit like specifications for the specifications.

We created over 100 versions before they were finally approved by the DfE and Ofqual in November 2015. It's fair to say they took a while to finalise. It's for this reason that the new design and technology qualification launches were delayed until 2017.

Having spoken to lots of teachers about the changes being made, it's the GCSE alterations which people seem most concerned about.

Why is this? I think it comes down to two things; both of which have been the focus of concern and potential misinterpretation:

1. the introduction of the single design and technology title
2. use of contextual challenges.

A number of people don't like the fact titles like textiles technology and resistant materials are being removed, as design and technology has often been referred to by its titles rather than its actual name.

Saying that, design and technology has been called design and technology since it became a National Curriculum subject in the 1990s. The 'material area' specialisms or titles came from the pre-National Curriculum craft subjects which the subject evolved from.

Worried that your design and technology specialism won't exist anymore?

Even if your specialism isn't highlighted in the subject content, that doesn't mean you can't introduce your students to it. Many specialist areas can still be studied in depth.

When you think about it, what are 'resistant materials' or 'graphic products'?

When do resistant materials cease to be 'resistant'? Is metal rope a resistant or compliant material?

The line between resistant and compliant materials is easily and increasingly blurred.

By removing restrictions on which materials students can use, they gain the freedom to choose their own, more appropriate materials and components to solve design problems. This helps them develop a far broader knowledge of materials and components and builds on the Key Stage 3 (KS3) programme of study.

What about the new 'technical principle' content?

Pinning down required design and technology knowledge was challenging, mainly because it's changing so quickly. However, it's an important area of the subject. It provides opportunities to build clearer progression from the National Curriculum programme of study and develops a general consensus of what's important in design and technology.

AQA's qualifications are designed to educate every child and young person for life and society, rather than train them for specific designer or technologist roles.

Many subject leaders treat GCSE as a five year course, using the KS3 curriculum to develop the broader knowledge built on at GCSE. Taking this curriculum model could help departments address tensions between breadth and depth, as well as issues around facilities and teacher expertise.

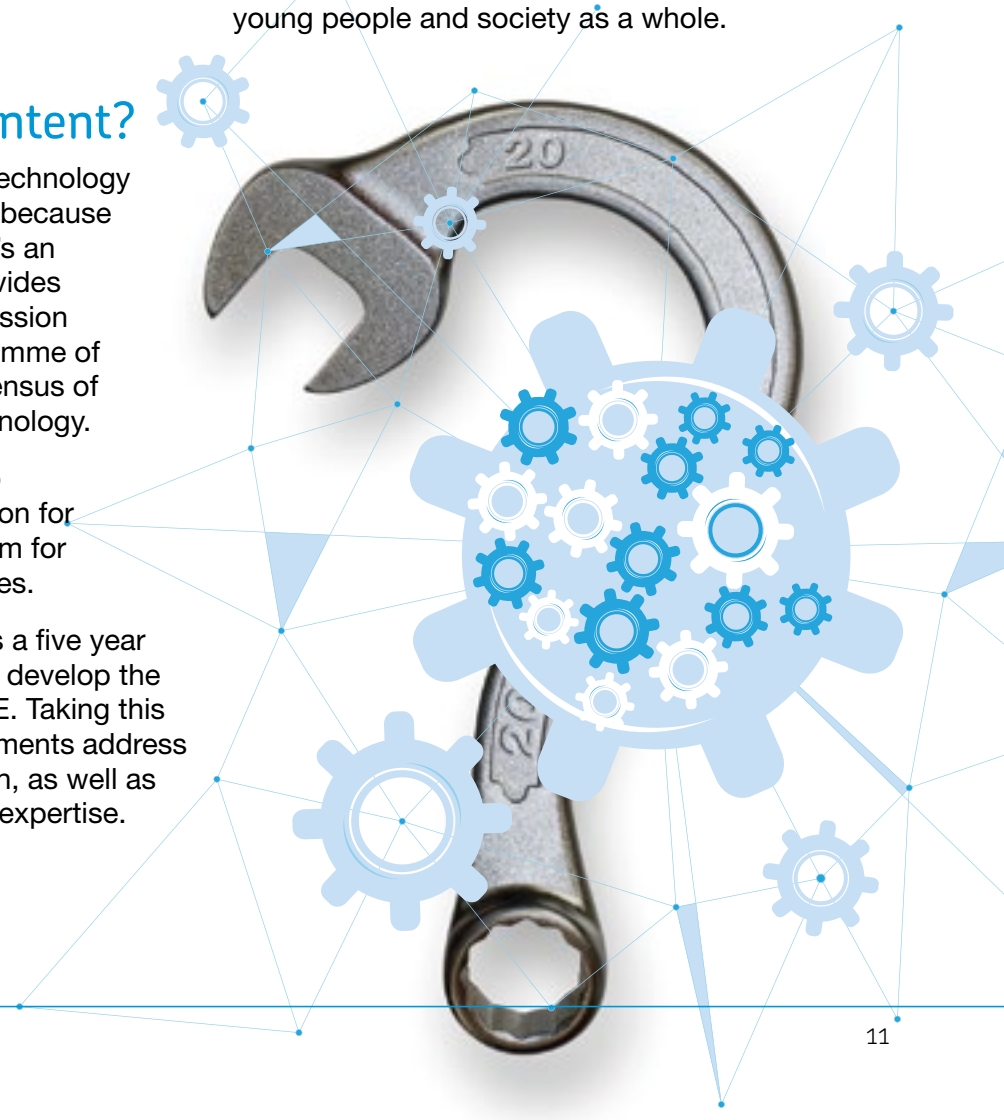
Is design and technology academic, practical, vocational or creative?

I've long debated this with my colleagues and I've come to the conclusion it's all of these. We should help young minds to engage with and transform the world however they can, rather than squeezing them into rigid categories.

Forget whether learners can use a tenon saw, solder or pin and tack correctly (even though these skills are useful). It's the ability to think, solve problems and use a broad knowledge of materials, components, technology, tools and equipment that will be most beneficial.

We always ask our teacher training interview candidates to tell us what they think the purpose of design and technology teaching in secondary school is.

There are challenges ahead for the subject, which means now's the time to reassess the role of design and technology within the curriculum and demonstrate it's positive impact on children, young people and society as a whole.



GCSE Engineering

We are delighted to announce that we are developing a new GCSE Engineering specification. This decision has been made following a period of consultation with various stakeholders and teachers in order to agree the subject content with the Department for Education (DfE). Final subject content was agreed in December 2015 and can be found on the DfE website at gov.uk/government/publications/gcse-engineering

In line with government policy there was a requirement to increase the rigour of this qualification. To achieve this, changes have been made to the content and structure of the qualification. The new specification will be 60 % external examination/40 % non-exam assessment (NEA).

Areas covered within the new specification are:

- **engineering materials** – including properties of materials, identification of common materials, how properties of materials change, energy production methods, costs and economies of scale
- **engineering manufacturing processes** – including, additive manufacture, material removal, joining and assembly, surface finishing
- **systems** – mechanical systems, structural systems, pneumatic/hydraulic systems
- **testing and investigation** – including, quality control methods, testing and evaluating materials, calculations such as stress/strain
- **impact of new and emerging technologies** – new and emerging technologies, impact upon social and economic infrastructure.

We are delighted to announce that we are developing a new GCSE Engineering specification.

There will also be the new, challenging area of 'application of practical engineering skills'. This will be assessed through NEA, worth 40 % of the total assessment. Students will learn to:

- solve problems using block diagrams and flowcharts
- produce engineering drawings and schematics
- use CAD/CAM and CNC
- predict performance
- test materials
- produce and follow production plans
- select materials, tools, component, equipment
- apply quality control methods.

There is also a requirement to apply relevant mathematical knowledge, skills and understanding from Key Stage 3 and 4. Mathematical content will form 15 % of the total assessment and will be assessed in the written paper and the NEA.

We are now working hard to submit the draft specification and specimen assessment materials in May this year. We aim to have specifications published in autumn 2016, supported by launch and preparing to teach meetings.

Look on our website for updates on the development of this new, exciting specification.

Design and technology: a view from higher education

Marie Judge is a Senior Lecturer in Design and Technology Education at Sheffield Hallam University.

She has significant experience of working on Undergraduate (UG) and Postgraduate (PG) Initial Teacher Training and has worked in secondary and special needs schools. Marie has close links with colleagues in higher education (HE) and works on a number of projects to bridge the gap between school and new recruits on UG courses. An area of focus at the moment is how to improve or indeed start meaningful conversations between school and HE to develop mutually beneficial relationships and continue to evolve the curriculum.

Higher education (HE) wants students to focus on learning rather than their final grade. We want talented students who apply design thinking to every aspect of their work. This includes researching and gathering information, having an inquisitive outlook and making the connections to become multi skilled, intellectual and thoughtful individuals.

The new subject content for design and technology (D&T) links closely with this. The aims and objectives state: 'Students should take every opportunity to integrate and apply their understanding and knowledge from other subject areas.' The addition of descriptors such as 'develop intellectual curiosity about design and manufacture of products and systems and their impact on daily life and the wider world' are a welcome change of emphasis.

The tone of subject content is aspirational

Changes reflect the challenges which face the world today. An individual isn't going to solve climate change, diabetes or depression, but design thinking and collaboration can.

HE teaches about how design has changed the world (for good or bad), what contribution it makes and how design can improve life.

HE wants D&T students who may not know where their project will lead, but trust in the process and are open minded about creating solutions. This is reflected in the subject content. The A-level states, 'The project should be of sufficient complexity and offer an appropriate degree of uncertainty of outcome to enable students to demonstrate their ability to initiate, sustain and manage the iterative processes of designing, making, testing, refining, improving and evaluating.'

There's good provision for skills development

HE would like applicants with a high level of practical skill and an in-depth knowledge of materials. Terms such as accuracy of production, design for manufacture, how to achieve optimum use of materials and working properties of materials imply students have spent time getting to know and understanding materials.

Arguably the best way of doing this is by making something with it. Shaping, bending, wasting, forming, destructing and changing the emphasis to hands on rather than internet research. This won't be new to many teachers, but if an in-depth understanding of material is gained, they may feel more confident with the experiential approach required.

The emphasis on terms such as circular economy, user centred design, systems thinking and responsible designers and citizens open opportunities to develop links with industry and work with practicing designers, makers and engineers.

Gaining insight to how these people think and work gives students the opportunity to think about their future in a different way. It allows pupils, teachers, HE and professionals to work together to develop and resource an exciting, creative and 'school specific' curriculum.

Finally, under the 'Core designing and making principles' the extrapolation of 'user centred design' is the most important paragraph for HE. More needs to be done to allow students to investigate real situations and define and validate design opportunities.

The opportunities to improve life under these circumstances are clear and this is why design is so important to our schools and our future designers, makers, artists and engineers.

I'd like to thank my HE colleagues for their advice and support on the new subject content, particularly Jo Rucklidge and Joe Langley.

Unit Award Scheme and ELC Design and Technology

The Unit Award Scheme (UAS) recognises learners' achievement based on the completion of short units of work.

It can be used with learners of any age, any ability, and in any subject area or activity. Thousands of units are available for you to use or amend, or you can write your own.

It can be used as an alternative to our ELCs – like design and technology, which are not being redeveloped after September 2016.

With UAS, no step is too small to be counted, and even if a learner achieves just one unit, they can still have this achievement formally recognised through the issue of a Unit Award Certificate.

UAS is a recording of achievement scheme rather than a qualification.

Benefits of the UAS

UAS is a really useful tool to use for recognising learning at Entry Level:

- you can use the individual UAS/ELC Design and Technology units with your learners
- they'll receive a UAS certificate from us each time a unit is successfully completed
- certificates are sent out about 10 days after you've told us the learner has achieved
- there are 100s of other design and technology units, not linked to ELC, which you can use
- there are 1000s of units in a wide range of other subjects and activities which you can use
- UAS is quick and easy to join
- you pay per learner, not per unit, no matter how many units are achieved
- you can make minor changes to existing units, eg to change the type of evidence
- you can write your own units from scratch if you need to.

Examples

Examples of some UAS/ELC units written to match AQA's Design and Technology ELC specification

10925	Health and Safety in Design and Technology
10928	Evaluating Existing Products
10934	Food Handling, Preparation and Storage
10937	Preparing Food for a Specified Function
10977	Designing and Making a Wooden Product
10949	Designing and Making a Metal Product
10952	Graphics Products: 2D and 3D Drawing
10978	Disassembly and Investigating Packaging
10980	Designing and Making a Fabric Bag
10982	Using Electronic Modules
10984	Electronic Products: Using Robots

All these units and more can be accessed via aqa.org.uk/uas

For centres already registered with AQA for ELCs, UAS is free to join. Please contact us and we'll send you a UAS registration form and a short PowerPoint presentation outlining what you need to do.

How to contact us

AQA Unit Award Scheme Department
31–33 Springfield Avenue, Harrogate HG1 2HW
T: 01423 534 235
E: unitawardscheme@aqa.org.uk
W: aqa.org.uk/uas

Outgoing specifications

Dates of last exams for our outgoing design and technology and engineering specifications.

Qualification	Last certification
ELC	
ELC Design and Technology	June 2016
GCSE	
GCSE Design and Technology: Food Technology	June 2017 (no re-sit opportunity)
GCSE Design and Technology: Short Course	June 2018 (no re-sit opportunity)
GCSE Design and Technology: Electronic Products	June 2018 (no re-sit opportunity)
GCSE Design and Technology: Graphic Products	June 2018 (no re-sit opportunity)
GCSE Design and Technology: Product Design	June 2018 (no re-sit opportunity)
GCSE Design and Technology: Resistant Materials Technology	June 2018 (no re-sit opportunity)
GCSE Design and Technology: Systems and Control Technology	June 2018 (no re-sit opportunity)
GCSE Design and Technology: Textiles Technology	June 2018 (no re-sit opportunity)
GCSE Engineering (single and double award)	June 2018 (no re-sit opportunity)
AQA Certificate Level 1/2	
Level 1/2 Engineering and Innovation	June 2017 (no re-sit opportunity)
Level 1/2 Engineering and Computer Applications	June 2017 (no re-sit opportunity)
A-level	
A-level Design and Technology: Food Technology	June 2018 (with one re-sit opportunity)
A-level Design and Technology: Product Design (3D)	June 2018 (with one re-sit opportunity)
A-level Design and Technology: Product Design (Textiles)	June 2018 (with one re-sit opportunity)
A-level Design and Technology: Systems and Control Technology	June 2018 (with one re-sit opportunity)

Noticeboard

Teacher online standardisation

When you mark controlled assessments or coursework, you need to mark in the same way as other teachers delivering the same specification. Teacher standardisation is the process that sets the national standard. All of our design and technology and engineering qualifications are now standardised via the Teacher online standardisation system (TOLS). Within the TOLS you can view exemplar work and compare your marking to that of the principal moderator, receiving instant feedback as you go. Working through TOLS is the safest way to ensure that your marking is in line with the AQA standard. TOLS can be accessed via e-AQA.

Submission dates

Thursday 7 May
GCSE Design and Technology (all specifications)

GCSE Engineering

Level 1/2 Certificates in Engineering

Friday 15 May
A-level Design and Technology (all specifications)

Entry Level Certificate Design and Technology

e-Subs

e-Subs is a web based system which allows schools to submit their coursework marks or grades online to AQA and to moderators. Access it by logging on to e-AQA. The key benefits are:

- improved speed, quality and processing of marking
- a better level of service to our customers and key stakeholders
- moderators and staff in schools can submit marks not just the exams officers
- no manual processes for scanning.

Further information can be found on our website: aqa.org.uk/esubs

Moderation process

Once you have submitted your marks, you will need to send a sample of your students' work to the moderator. This can be sent by post as hard copies or electronically on a pen drive. If you have fewer than 20 students, you should send the entire cohort. You will receive the outcome of your moderation, along with feedback on your marking, with your results in August. If you have any queries on any of the above, please contact your controlled assessment/ coursework adviser, who will be happy to assist.

Use of preliminary material

Please be advised that the preliminary material is for teachers and students only, for use during preparation for the examination. It cannot be used by anyone else for any other purpose, other than as stated in the instructions issued, until after the examination date has passed. It must not be provided to third parties.

Exam dates

Dates for all upcoming examinations can be found on our website: aqa.org.uk/exams-administration/dates-and-timetables

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Contact us

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