



Key Stage 3 NC2014 D&T Learning Planner and Assessing Without Levels Teachers' Guide and Resource Bank

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Introduction

Welcome to the KS3 D&T Learning Planner and Resource Bank. It has been produced by a group of teachers and D&T experts with a range of experience, to support teachers of design and technology (D&T) as they develop practice in their own schools.

The resource comprises a KS3 plan for D&T learning and a resource bank initially containing 45 activities which you can choose from to populate a unique learning programme (scheme of work) for your school. The resources taken together do not represent a scheme of work on their own, but they can be used in a wide variety of ways to develop or refresh your existing planning, addressing the areas that you have identified as being most in need. It is also important to note that in addition to the tasks and activities presented, good practice D&T teaching and learning should include the use of contextual challenges from which students develop their own design briefs. It is intended that additional resources will be developed to address this together with other Key Resources.

The initiative to produce this bank of resources came about in response to a number of emerging factors. Firstly, the constant requests from schools to provide them with manageable, affordable and realistic tasks that they could use to address aspects of a design and technology curriculum. All of the activities have been taken from existing practice in schools. Secondly, they were developed to provide incremental steps for departments who, for a variety of reasons, have not moved forward in their practice with respect to new materials, processes and techniques. They were developed to provide the scaffolding to enable teachers to introduce them, personalise them and modify them to meet their own particular circumstances. Thirdly, they were developed to demonstrate how over a three year Key stage 3 programme, the requirements of both the English National Curriculum D&T programmes of study plus the additional content included in the Progression Framework produced by the DfE Expert Subject Advisory Group for D&T could be addressed.

The resource is designed to enable you to use the provided KS3 learning programme or to part-populate your own. We would like to invite you to submit any parallel or supplementary resources that you develop yourself, so that they might be considered for inclusion in the Resource Bank.

Planning effective learning in D&T from the National Curriculum 2014

The NC2014 has brought a different approach to the construction of the curriculum. It is now an objective based curriculum that is age related. This means that the curriculum sets out the learning that it is expected that students should be able to achieve by a certain age in the form of objectives (learning objectives). These are defined as 'Age Related Expectations' (ARE) and it is against these objectives and expectations that attainment and progress of students are measured in the NC2014 curriculum.

Assessment without levels in the NC2014

The Commission on Assessment without Levels in July 2015 described the purposes and principles of assessment in the NC2014. They stress the value of formative assessment for teaching and learning and describe how “*levels emphasised the summative functions of assessment*”. They further stress that assessment and pedagogy are inextricably linked and state, “*Assessment of pupils’ attainment and progress should be linked to the curriculum followed by the school.*”

The new national curriculum puts greater emphasis on the specific knowledge pupils should acquire by the end of each key stage and requires greater depth and detail of learning. It is this specific knowledge and detail of learning from the D&T curriculum that provide the objectives for learning. It is these that are the focus of formative assessment from lesson to lesson and summative assessment at the end of a learning unit. This is exactly the approach that has been taken in planning the curriculum content for students in this document and the associated learning units in the resource bank.

The 2014 National Curriculum Design and Technology – Programmes of study

For Design and Technology the age related learning objectives are set out in the D&T programmes of study. Unlike the core subjects i.e. mathematics, English and science, the learning objectives for D&T are not year specific. They set out exactly what students are expected to know and be able to do by the end of Y7, Y8 etc. In D&T the learning objectives are simply divided into key stage related sections.



The Design and Technology Association Progression Framework

To address this lack of detail in the National Curriculum for D&T the Design and Technology Association has developed the programmes of study to produce the [Progression Framework](#). This provides more specific detail describing what should be taught and in what sequence to achieve progression across KS3 in learning for students.

Cumulative progression – an underlying principle of the Framework is that students' learning should be developed cumulatively. This means that learning from previous key stages should be revisited in teachers' planning and practice at KS3 and used in a more sophisticated way in subsequent key stages.

Generic and specific expectations – some of the age-related expectations are generic and ongoing e.g. *generating ideas by drawing on their own experiences* in KS1, whereas others are specific to particular projects e.g. *how to program a computer to control their products* in early KS2. These are developed at KS3.

Most of the statements in the Framework are derived from the programmes of study for KS1 to 3. Some of these provide an age-related interpretation of the requirements to assist with progression. Some link requirements from different parts of the programmes of study to help ensure effective pedagogy. All statements in the Framework directly linked to the National Curriculum are shown in regular font. These cover the Subject Content and also address the Purpose of Study and the Aims in a way that is appropriate to students' ages.

D&T in the school curriculum is the entire experience of D&T that students receive and should go beyond that set out in the programmes of study. It will vary from school to school, but for the vast majority of schools this will include the new National Curriculum requirements as

the main component. In many cases, the school curriculum provided will go beyond the National Curriculum to include additional content chosen by schools to meet local circumstances.

Therefore, some of the statements in the Framework are additional to the programmes of study for D&T and are shown in italic font. These are included to ensure that the D&T curriculum as a whole includes elements needed for effective teaching and learning which are not specified in the National Curriculum. Schools may wish to add to or amend these school curriculum statements to reflect local needs, interests and resources.

The Progression Framework objectives have been coded: DB1, MA2, MB7 etc. A clip from the coded objectives chart is show here. The coded learning objectives are referenced in the units of work plans. The full chart of coded objectives is available in *Appendix 1*.

Design and Technology Progression Framework – NC2014 PoS – Coded Objectives

	Lower KS3	Upper KS3	Across KS3
DA - DESIGNING Understanding contexts, users and purposes	DA 1 - develop detailed design specifications to guide their thinking DA 2 - use research including the study of different cultures, to identify and understand user need DA 3 - identify and solve their own design problems	DA 4 - develop design specifications that include a wider range of requirements such as environmental, aesthetic, cost, maintenance, quality and safety DA 5 - research the health and wellbeing, cultural, religious and socio-economic contexts of their intended users DA 6 - understand how to reformulate design problems given to them	DA 7 - work confidently within a range of relevant domestic, local and industrial contexts, such as the home, health, leisure, culture, engineering, manufacturing, construction, food, energy, agriculture and fashion DA 8 - consider the influence of a range of lifestyle factors and consumer choices when designing products DA 9 - take creative risks when making design decisions DA10 - consider additional factors such as ergonomics, anthropometrics or dietary needs DA 11 - analyse where human values may conflict and compromise has to be achieved
DB - DESIGNING Generating, developing, modelling and communicating ideas	DB 1 - use 2D and begin to use 3D CAD packages to model their ideas DB 2 - produce models of their ideas using CAM to test out their ideas	DB 3 - use 3D CAD to model, develop and present their ideas DB 4 - use CAD and related software packages to validate their designs in advance of manufacture	DB 5 - use specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations DB 6 - combine ideas from a variety of sources DB 7 - use a variety of approaches, for example biomimicry and user-centred design, to generate creative ideas and avoid stereotypical responses DB 8 - decide which design criteria clash and determine which should take priority DB 9 - develop and communicate design ideas using annotated sketches DB 10 - produce 3D models to develop and communicate ideas DB 11 - use mathematical modelling to indicate likely performance before using physical materials and components, for instance when developing circuits or gearing systems DB 12 - give oral and digital presentations and use computer-based tools

Long-term planning of learning in D&T

Turning the national curriculum documentation into a planned learning experience for students

The National Curriculum age related expectations set out *what* students are expected to learn by different points in their chronological development in the form of learning objectives. It does not describe *how* and through what experiences students will or should gather and develop this learning.

As ever the responsibility to design a programme to deliver this specified learning belongs to every school. Historically this has been referred to as the 'scheme of work' and referred to as 'long term planning'. Every school has its own unique context and constraints thus a scheme of work needs to be bespoke. The underlying principle of long term subject curriculum planning is that it charts a sequence of learning experiences designed to deliver the desired ARE learning by its conclusion.

A paradigm shift in the long-term planning teaching and learning in D&T

In the past the way that many 'schemes of work' for Design and Technology were constructed was through the 'project' approach. This meant that interesting or fun projects were thought to be 'good' for a particular year group and were built into a scheme of work. The whole experience across the key stage was then built up in this way by adding one 'project' after another to create a student's experience. The actual learning achieved by experiencing any of these projects was not given priority during the process and was rarely the driving force for the inclusion of a specific project. This 'project focused' approach places projects first with learning a secondary consideration. Thus the coverage of learning objectives and their development in a planned and systematic manner is not guaranteed. In the approach adopted to create the 'KS3 D&T Learning Planner' the approach has been reversed by placing the coverage of objectives and progression of learning central to the construction of a learning experience around which 'projects' are designed and sequenced.

NC2014 KS3 D&T Long term planning – The learning planner

A pragmatic approach taking into account context and constraints evident in many schools underlies the Learning Planner.

The major constraint facing most schools is the amount of curriculum time available. In addition, many schools are challenged by having D&T facilities/equipment in need of updating and teachers in need of continued profession development enabling them to address all aspects of the Progression Framework. The resources provided, accompanied by the associated teaching notes, can be used to develop a teacher's competence in areas where they have less experience and give them the confidence that the activity they are pursuing is in current use in other schools, therefore appropriate.

Time allocation

The amount of time allocated for D&T varies considerably between schools. The times indicated below can be used as a point of reference against which to structure the curriculum in your own school.

- The minimum curriculum time allocation assumed for D&T is calculated as follows:
- 80mins per week for 40 weeks in an academic year, equating to a total of approximately 54hrs spent studying D&T per academic year
- For convenience, four D&T focus areas have been identified: 1. Product Design, 2. Systems & Control, 3. Textiles and 4. Food. The model assumes 13 hrs per year per focus area to 'deliver' the objective based curriculum.
- Units of work of varying lengths have been designed and can be taught in any sequence enabling departments to take units from the resource bank to build a scheme of work that addresses their students and their circumstances.

- Units of work have four types of D&T focus:

- Mainly designing – up to 2hrs
- Mainly making – 3 to 4hrs
- Design and make – 6 to 8hrs
- Technology in society – 2hrs

HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR
1	2	3	4	5	6	7	8	9	10	11	12	13

Mainly Designing
Up to 2hrs

Mainly Making
3 – 4hrs

Design & Make
6 – 8 hrs

Technology in
Society 2hrs

- Units of work have been produced for each of the focus areas: Product Design, Food, Textiles, System & Control and it is possible to select your chosen sequence to build the learning experience for your students addressing the progression and continuity of their learning. The graphic below shows one possible way of sequencing units for textiles. You will notice that at this point no ‘project’ has been selected. The same planning learning approach can be used for any other D&T ‘material’.

HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR	HOUR
1	2	3	4	5	6	7	8	9	10	11	12	13

KS3 TEXTILES UNITS OF WORK Y7

Mainly Designing 4 hrs

Mainly Making 7 hrs

Tech in Society 2hrs

KS3 TEXTILES UNITS OF WORK Y8

Designing/Modelling 5 hrs

Design & Make 7 hrs

TiS 1hr

KS3 TEXTILES UNITS OF WORK Y9

Designing 2 hrs

Design & Make 9 hrs

Tech in Society 2hrs

The grid below shows an extract from a 'KS3 Learning Planner' and shows the focus for the two hour 'Mainly Designing' units for early KS3. You will note that for each of the units selected learning objectives from the Progression Framework are set out and the key learning and skills provided in a bulleted list accompanied by a brief focus description for the unit. The remainder of the Learning Planner for KS3 is designed in this way for the four types of D&T units across the four material disciplines.

Please note: this defines the learning to be achieved in each unit, a 'project' must be created to deliver this learning.

Early KS3 – Units of Work Learning Focus Mainly Designing

Textiles	Food	Product Design	Systems and Control
E3.MD.T Learning to look – 4 hours Overview How do we generate and communicate design ideas in textiles? How does nature influence design? In this unit students look at communication on paper using different methods and how to use annotation effectively. It then considers biomimicry as a means of solving design problems, the use of CAD software to manipulate images to make colourways and appropriate printing methods. Key Learning: - Communication of design ideas - Further development of ideas using CAD/CAM Skills: - Sketching rough ideas - Developing them using CAD and producing fabrics using CAM Learning objectives DB1 Use 2D CAD packages to model their ideas DB7 Use a variety of approaches, for example biomimicry and user-centred design, to generate creative ideas and avoid stereotypical responses DB9 Develop and communicate design ideas using annotated sketches	E3.MD.F Catering for needs – 2 hours Overview Generating food products to meet the needs of the consumer. This considers consumer needs and choices and how to plan diets for children, teenagers, the elderly, vegetarians, and medical and religious needs. It considers adapting recipes using alternative ingredients. In the practical session students are asked to adapt a lasagne to meet the needs of a vegetarian consumer. Key Learning: - Identifying the needs of the consumer - Factors effecting individual consumer choice Skills: - Adapting existing recipes to meet a need - Applying knowledge of safe working practice Learning objectives DA8 Consider the influence of a range of life style factors and consumers' choices when designing products TK21 How to competently use a range of cooking techniques for example, selecting and preparing ingredients; using utensils and electrical equipment CNA4 That people choose different types of food and that this may be influenced by availability, season, need, cost, where food is produced, culture and religion CNB3 How to taste and cook a broader range of ingredients and healthy recipes, accounting for a range of needs, wants and values CNB5 The importance of energy balance and the implications of dietary excess or deficiency, e.g. malnutrition, maintenance of a healthy weight CNB7 How to use a broader range of preparation techniques and methods when cooking, e.g. stir frying, steaming, blending CNB10 How to store, prepare and cook food safely and hygienically CNB15 How to use taste, texture and smell to decide how to season dishes and combine ingredients CNB16 How to adapt and use their own recipes	E3.MD.PD Core skills – 2 hours Overview Learning to develop basic design communication skills including sketching, drawing controlled lines, 3D sketching, annotation, emphasising key points and knowing which points to highlight to get the design ideas across. Key Learning: - Use of basic graphical skills - Develop basic sketching skills - Develop knowledge of key terminology Skills: - Developing freehand sketching skills - Learning how to sketch in 3D - Annotation of work Learning objectives DB9 Develop and communicate design ideas using annotated sketches DB10 Produce 3D models to develop and communicate ideas	E3.MD.SC On the level – 5 hours Overview Designing a casing design for a digital product which uses a number of components, concentrating on its form and function. How would it be developed for different users and markets? The unit includes sections on communicating ideas, using ergonomic and anthropometric data when designing, use of CAD software to capture and make changes to a design and an awareness of modelling and production techniques. Key Learning: - Communication of design ideas - Use of annotation for evaluation - Use of CAD/CAM for ideas development Skills: - Use of drawing and rendering skills - Use of a range of product examples for design idea generation - Use of card modelling to communicate their ideas Learning objectives DA1 Develop detailed design specifications to guide their thinking DA9 Take creative risks when making design decisions DA10 Consider additional factors such as ergonomics, anthropometrics or dietary needs DB1 Use 2D and begin to use 3D CAD packages to model their ideas DB9 Develop and communicate design ideas using annotated sketches TK3 Know more advanced electrical and electronic systems can be powered and used in their products

The full NC2014 D&T KS3 Learning Planner is shown in *Appendix 2*.

NC2014 D&T KS3 – Resource bank of learning units

A 'Resource Bank' has been created that currently contains forty five learning units matched to the objectives in the NC2014 KS3 D&T Learning Planner and the intention is for that bank to grow. Each 'learning unit' is written to the learning objectives detailed for a single unit in the 'Learning Planner'.

The grid alongside provides a 'pen portrait' of 15 'learning units' that are currently in the resource bank, each designed to provide context and content to 'deliver' the learning objectives within the 'learning plan'.

More units will populate the resource bank in time.

Early KS3/Y7 – Learning Units

The full NC2014 D&T KS3 Resource Bank is shown in *Appendix 3*.

Focus	Textiles	Food	Product Design	Systems and Control
Mainly Designing 2-5 hrs	1 - LEARNING TO LOOK How do we generate and communicate design ideas in textiles? How does nature influence design? In this unit students look at communication on paper using different methods and how to use annotation effectively. It then considers biomimicry as a means of solving design problems, the use of CAD software to manipulate images to make colourways and appropriate printing methods.	4 - CATERING FOR NEEDS Generating food products to meet the needs of the consumer. This considers consumer needs and choices and how to plan diets for children, teenagers, the elderly, vegetarians, and medical and religious needs. It considers adapting recipes using alternative ingredients. In the practical session students are asked to adapt a lasagne to meet the needs of a vegetarian consumer.	8 - CORE SKILLS Learning to develop basic design communication skills including sketching, drawing controlled lines, 3D sketching, annotation, emphasising key points and knowing which points to highlight to get the design ideas across.	12 - ON THE LEVEL Designing a casing design for a digital product which uses a number of components, concentrating on its form and function. How would it be developed for different users and markets? The unit includes sections on communicating ideas, using ergonomic and anthropometric data when designing, use of CAD software to capture and make changes to a design and an awareness of modelling and production techniques.
Mainly Making 3-4hrs	2 - UNDERSTANDING FIBRES AND FABRICS What are the properties of fabrics used today and why is it important to understand this? How do we add print and stitch to our fabrics to make them more interesting? How do practising designers achieve this? This unit considers the origins of natural and man-made fibres, the methods of construction and properties of these and how they are adapted by adding colour and decoration, with examples from current textiles designers.	5 - PRACTICAL SKILLS BUILDING This covers the introduction to the kitchen environment, food safety and safe working, establishing routines and building basic culinary skills. It considers at food safety through personal hygiene and the 4 Cs, as well as healthy eating principles. Practical lessons have students making baked beans on toast, a fruit salad, ratatouille and bolognese.	9 - SIGNS A large local store has asked students to manufacture their signage. Use a digital image to then laser cut the existing sign. Improve on this using a specification developed with the client and make a prototype to send to company. Includes understanding of signage and logos to develop brands and convey visual messages.	13 - DUSK LIGHTS ON Designing with a transistor sensing circuit, which could be used in a variety of different settings. The circuit is made using a standard PCB, but one which allows for the learner to customise its operation to suit their particular requirements. Students consider a range of components and systems to design a system that will turn on a light (LED or bulb) when it gets dark.
Design and Make 6-8hrs		6 - DESIGN FOR HEALTH Producing a healthier meal aimed at teenagers. Students investigate factors affecting food choices before designing and making a meal suitable for a teenager. They consider factors such as the importance of a balanced diet, cost, availability, cultural and religious practices and health concerns. Practical lessons include making a stir fry, a curry and kofta before working independently on their final choice of meal.	10 - JEWELLERY DESIGN Design and make pewter cast jewellery to a given theme. In this students research and develop a brief, develop a specification and from this generate ideas for designs. Using CAD software they model and test their designs, and produce a mould before casting and finishing their designed product.	14 - TOUCH TORCH Design and make a product for the 21st Century, using LED(s) and with NO moving parts - touch operated. Students should disassemble and analyse a product to see what it is made of and how assembled, its form and function and whether parts can be recycled. They then design and make a torch using a circuit, having understanding of circuit diagrams, PCBs and the components. They must make the circuit, casing using CAD, and model it before evaluation.
Technology in Society 2hrs	3 - WIDER USE OF TEXTILES How are textiles used in today's society? How has conductive thread and fabric, use of composite textiles in the automotive industry and the use of textiles in medicine had an impact on our world? Using this, students should understand the wider role of textiles in everyday lives, beyond fashion and furnishing. They should investigate technical textiles for specific uses and demonstrate an understanding of the wider use of textiles. Examples from a range of industries are used to illustrate different uses and applications.	7 - FUTURE FOOD This unit considers how we might feed the world population in the future using lab-grown meat or insects as an alternative food source by investigating new and emerging technologies and investigating alternative food production methods.	11 - ECO DESIGN This introduces the concept of designing with the environment in mind, using examples from a range of familiar products, re-thought in keeping with the Six Rs principles. It discusses a product's life cycle and the 'cradle to the grave' concept. Using waste materials students are asked to design and make a new product prototype reusing waste items.	15 - MOBILE PHONE - BRICK & BUTTONS TO SLIM & TOUCH How a modern product has developed over time, what change has there been to their form and function during that time? What developments have taken place in electronics that have driven the development of the mobile phone?

NC2014 D&T KS3 – The learning units

Every learning unit in the resource bank has a 'unit plan' and an associated PowerPoint and in some cases linked video clips and other printed resources are available.

Here is an example, Unit 1 the 'Learning to Look' unit. The unit plan turns the NC2014 objectives into tangible and measurable assessment/learning objectives. Then for each teaching hour of the unit, what and how it could be taught is described with slide references to the associated PowerPoint. On each slide of the PowerPoint notes are provided to ensure key teaching points are made when the slide is shown to students.

Early KS3 (Year 7): Mainly Designing: Textiles 'Learning to look'	
Overview	How do we generate and communicate design ideas in textiles? How does nature influence design? In this unit students look at communication on paper using different methods and how to use annotation effectively. It then considers biomimicry as a means of solving design problems, the use of CAD software to manipulate images to make colourways and appropriate printing methods. Key Learning: - Communication of design ideas - Further development of ideas using CAD/CAM Skills: - Sketching initial ideas - Developing them using CAD and producing fabrics using CAM
Suggested time	4 Hours
Learning objectives	DB1 Use 2D CAD packages to model their ideas DB7 Use a variety of approaches, for example biomimicry and user-centred design, to generate creative ideas and avoid stereotypical responses DB9 Develop and communicate design ideas using annotated sketches
Assessment objectives	- Know methods of communicating design ideas on paper [DB9] - Know how to distinguish between the different types of drawings required throughout the design process [DB9] - Know and understand the use of annotation when communicating and evaluating their design ideas [DB9] - Know what Biomimicry means and how it can be used when solving design problems both in industry and in the classroom [DB7] - When using CAD software know how to bring in an image and manipulate it by changing scale, creating a repeat pattern, adding colour/texture, making colourways [DB1] - Know and understand what methods would be appropriate for creating a printed fabric e.g. sublimation printing [DB1]

Suggested sequence for teaching in hourly sessions	
1	- How do we communicate our ideas for products to other people? At different stages of the design process, different approaches are needed. (Slides 4-6) - Learning to look – Aesthetics: colours, patterns, shapes that we see in the world around us at any time – how do we keep a record of them? Camera on phone, Pinterest, sketch book. (Slides 7-9) - Learning to look – Problem solving: come across a problem for yourself or someone else. Keep a note of what it is. What could you do about it? - Learning to look – New technologies: a new fabric or material e.g. graphene has been developed, what could you do with it? (Slide 10) - Learning to look – an existing product needs updating or improving, how could you do it? Think how designs from previous eras are revamped for today's market. (Slide 11) HW: minimum of one PowerPoint slide to explain what 'Biomimicry/Biomimetics' means in your own words. (Slide 12)
2	- Biomimicry – How do companies solve their design problems? Case study: Fastskin development. (Slide 13). What other products have originated in nature? (Link to previous homework.) - Learning to Look – Natural forms as starting points for shapes, nature's colour combinations - Students draw shapes from 'nature' resource material. Just line drawings. Could these link together? Generate a number of ideas quickly working in biro or pencil (no rubbers). Choose a couple – Why do you like them? Redraw them in different ways. Which works best and why? Annotate the ideas with these evaluations. Photograph this work and save as a jpeg in user area for next lesson. HW: From the shapes drawn in the lesson, what could they be used for? E.g. give you an idea for a certain 3D product, ideas for a fabric design, ideas for shapes that could be cut out and joined together? Outcome should be drawings and annotations.
3	- Using a CAD package to manipulate original designs. Import jpeg of the sketched design to work on into the software. Trace over it to get basic shape. Save this as the master. (Slides 14-19 give some ideas of developing a shape) - New page, bring in traced image and start to manipulate it – resize, stretch, mirror, rotate, repeat and join a number together. Save as line drawing - New page, bring in line drawing and experiment with adding colour. Use resource board to give ideas of colour combinations in nature. Consider introducing/mentioning trend forecasting – magazines such as Elle do bi-annual fashion trend specials, Spring/ Summer and Autumn/ Winter HW: You are going to print your design onto fabric. What would you make out of it? Consider what type of fabric you would print it onto – shiny, smooth and drapery or thicker, stiffer fabric. How would this choice of fabric affect what you make out of it? Outcome should be sketched ideas and evaluation in the form of brief annotations. (Slide 20)

These units are available to download from the Design and Technology [online shop](#).

Ensuring full coverage of all the objectives and auditing the KS3 scheme against the NC2014 PoS

Thus it is vital that the total experience made up of all the learning units in years 7, 8 and 9 across the range of D&T materials collectively cover all the required objectives. To ensure such coverage it is necessary to audit the scheme of work that has been designed for students in KS3.

To assist this audit process an Excel file has been provided which provides a series of planning/auditing matrices. There are three

matrices, one for lower KS3, one for mid KS3 and one for upper KS3. In each matrix it is possible to list all of the learning units that a student will experience and to map them against the coded learning objectives that each will cover. By doing this it is possible to ensure correct balance and complete coverage as well as to consider progression where the same objective is covered in a range of learning units across the key stage. When using the Excel version of the audit tool a fourth screen provides the numeric totals of how many times each objective is covered which can aid planning.

Where objectives are covered a number of times then the department should consider how they manage the progression of learning within that objective. It is not satisfactory to cover it the same way each time it is addressed how it is developed each time it is addressed must be managed by the department. This is further compounded by the fact that the 'carousel' delivery of D&T experienced in most schools means that student's experience the units in a different order. There is no easy solution to this, however suffice it to say that in their lesson planning teachers must give careful consideration to the revisiting of learning objectives by taking into account what students have learnt before and building on that learning.

You can use a blank matrix to insert your own learning units or you can use some that are available in the resource bank. In Appendix 4 you can view a version of this long term planner/audit matrix populated with the 45 units from the resource bank.

Key Stage 3 PoS coverage audit		Designing DA Understanding contexts, users and purposes											Designing DB Generating, developing, modelling and communicating ideas												Making MA Planning						Making MB Practical skills and techniques						Evaluating EA Own ideas and products					Evaluating EB Existing products					Evaluating EC Key events and individuals																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
To be used in conjunction with Progression Framework coded objectives		DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10	DA11	DB1	DB3	DB6	DB7	DB8	DB9	DB10	DB11	DB12	MA1	MA3	MA4	MA5	MA6	MA7	MA8	MB1	MB3	MB4	MB5	MB6	MB7	MB8	MB9	MB10	MB11	EA1	EA2	EA3	EA4	EA5	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EC1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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This matrix can be found in *Appendix 4*.

Short term planning

Creating a lesson plan from the guidance provided in the learning unit

Planning how one is going to teach a lesson is important, however it is also very personal. Some training organisations and schools provide proformas to guide teachers' planning which provide certain sections which have to be populated. This can be time consuming and often of little value in making the lesson more effective than not planning at all as they often don't focus on the important things.

The important components when planning a lesson are:

1. WHAT students are to learn during the lesson
2. HOW you construct tasks that will enable this learning to occur
3. WHICH students need tasks to be modified to meet their learning need
4. WHEN and WHY different aspects of lessons occur

When planning a lesson you will need to concentrate on 2, 3 and 4 as 1 is defined in each learning unit within the department's medium term plan/scheme of work.

The following points set out some generic principles for short term planning/lesson planning:

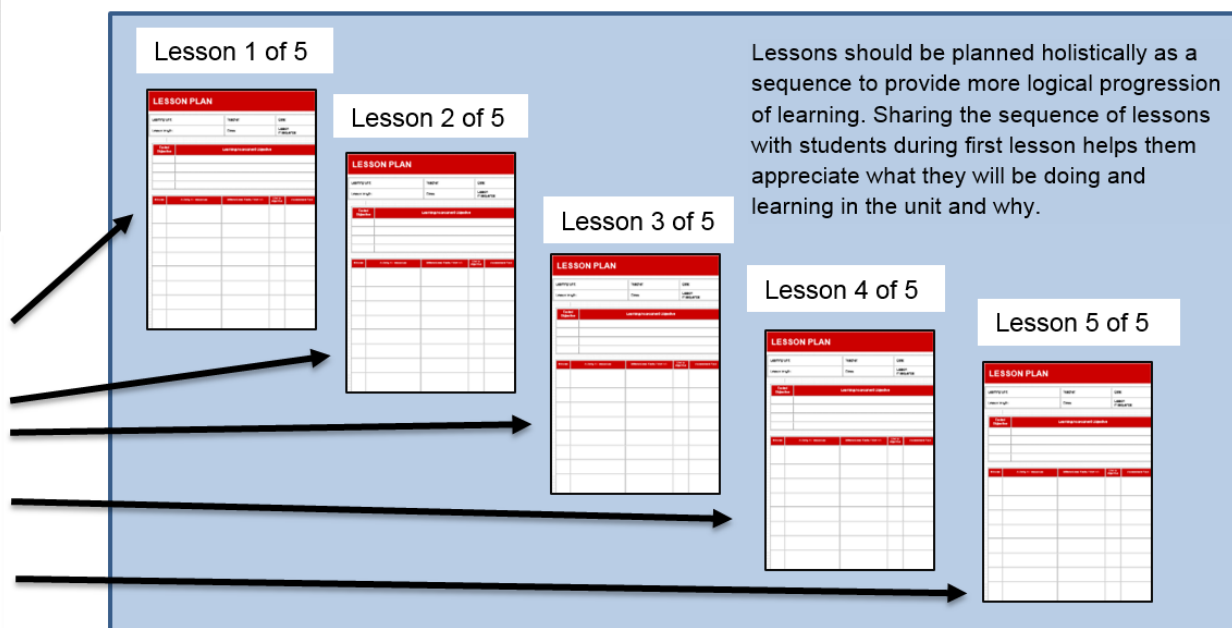
- create lesson plans by working from the departmental medium term plan for the learning unit to be taught
- know how many lesson make up the learning unit and their length
- know how many lesson make up the whole sequence and plan each lesson as a part of a sequence taking account of the evaluation of the previous lesson
- be aware of which lesson in the sequence of lesson you are planning and note this on the lesson plan
- be crystal clear about the learning objectives for the learning unit which describe what students should know and be able to do by the end of the learning unit
- use whatever format of planning makes your lessons the most effective when you teach them – there is no perfect proforma – use one that works for you

- do not spend time writing things when planning that are not going to make your lesson more effective – write concisely in note form – don't forget that the lesson plan is for you
- do not replicate content that is in the unit plan (medium term plan) in your lesson plan (if you are being observed attach the unit plan to your lesson plan and be sure to make note of which lesson in a sequence of lesson is being observed i.e. 'lesson 2 of 8')
- realise that it is the mental process of planning the lesson rather than writing it down that is the most important, though doing the latter improves the former
- ensure that you know the learning strengths and weaknesses of all students in the class and take account of this when planning different types of activities and resources (be aware of students with ehcp plans and take account of their particular learning needs which are described)
- ensure that all the tasks that you design students to be engaged in during the lesson actually contribute to the learning described by the objectives, mark up each task/activity with which objective it is contributing to
- at points during the lesson, plan in times when you will seek to assess how well students are progressing with attaining the learning objectives recording as appropriate
- plan to make a number of timely taught inputs during the lesson, or times when you bring the class back onto a particular area of focus
- plan phases to your lesson, it can be the 'three part lesson' but does not always have to be, in that all lesson don't have to have a 'starter' or a 'plenary' but plan in variety of activity and constantly remind students of the timeframe of the lesson
- always make sure that you link to both the previous and the next lesson at appropriate points
- if you are setting homework make sure it too contributes to the learning objectives
- after evaluating the lesson make notes about it in preparation for the next lesson. indicating what the next lesson needs to cover and which students need particular types of attention
- ensure that all planning is in note form and that planning a lesson takes no more than 15 minutes absolute maximum

A simple lesson planning proforma has been designed which attempts to take account of these principles. This has then been populated to provide an example of taking a learning unit from the resource bank to create the necessary sequence of lesson plans (The examples of short term/lesson planning can be found in *Appendix 5*). It is not essential to use this proforma, you can choose one of your choice but check it against the principles. Of course notes on a plain sheet of paper can be equally appropriate as long as they ensure a quality lesson of learning for all students in the class. Ensure you do not waste your valuable time writing unnecessary 'stuff' that does not help with the lesson, hand written notes are fine plans don't always have to be word processed. Don't forget a lesson plan is a working document and one that is 'used' is likely to have changes and annotations, beware a pristine lesson plan it's probably not worth the paper it's written on!!

Short term planning – example

Early KS3 (Year 7): Mainly Making: Systems & Control 'Dusk – lights on'	
Suggested time	5 Hours
Learning objectives	MA7 Select appropriately from specialist tools, techniques, processes, equipment and machinery, including computer-aided manufacture MB7 Follow procedures for safety and hygiene and understand the process of risk assessment MS2 Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives TK4 How to use simple electronic circuits incorporating inputs and outputs
Assessment objectives	- Know how to recognise some basic electronic components [TK4] - Know how to solder joints on a PCB [MB2] - Know how to use some basic electronic tools safely [MB7] - Know which components are inputs, process and outputs [TK4] - Know how a light sensing circuit operates [TK4] - Know how to read a circuit diagram and fit components correctly into a PCB [MA7]
Suggested sequence for teaching in hourly sessions	
1	- What's a system? How we design using inputs, processes and outputs. (Slide 3) - Use system playing cards to 'create' the system - which inputs / process / outputs are appropriate? - Draw the circuit diagram from the system playing cards and introduce the PCB (Printed Circuit Board) as the final production method. (Slide 4-10) - Use circuit simulation software to create a working model and then a simple PCB. Save and print out the design and PCB, adding appropriate annotations. (Slide 11) HW: What would the circuit be if we were checking for temperature instead of light? Outcome would be an annotated circuit diagram. (Slide 12)
2	- What tools will you be using? Complete a tool use and safety sheet for future reference. (Slide 13) - How to solder - a demonstration of soldering, followed by a trail run using old circuit boards or recycled boards. (Slides 14-16) - Using a production guide or the task could be set up as a production line, students start to add and solder components to the PCB (a standard pre made board in this case). (Slides 16-19) - They test circuit function as they go: input sensor, transistor, completed circuit, as part of the production guide or production line. (Slide 20)
3	- How to setup the circuit - a demonstration of the setting up procedure. (Slide 23) - What level is right? Should it be fixed or variable? - Students setup and test their circuit, does it work as expected if not why not. Record their findings and evaluate the system
4	- How electronic circuit boards are mass manufactured? - Production of PCBs. (Slides 24-25) - Production of populated PCBs ready for fitting into cases. (Slide 26) - Students create a presentation that describes the process - What would it cost if your circuit were mass manufactured? (Slide 27) - Using a spreadsheet students calculate the component costs. 1+, 10+, 100+, 1000+, 10,000+ - What does this tell us about why we mass manufacture products? - Students add this spreadsheet and an explanation of why we mass manufacture products to their presentation



The example in *Appendix 5* is the Early KS3/Y7 Systems & Control whereby the learning unit which is planned over five hours has been worked into five one hour lesson plans. The concise guidance content of these lessons and the PowerPoint slide resources are provided in the learning units.

When planning lessons it is essential to always bear in mind how many lessons make up the whole learning unit and where each lesson sits in the sequence. Ideally all lessons in the sequence should be planned in outline together bearing in mind the likelihood of needing to adjust them after evaluating preceding lessons. Planning the lessons as a sequence helps create a more holistic experience and improves the connectivity between lessons. It is also very valuable to share the outline of the sequence of lessons with students in lesson one. Likewise it is valuable to share sequences of lesson planning with any observer carrying out a lesson observation. This provides them with valuable information about what learning, assessment, teaching strategies etc have occurred in preceding

lessons and what are planned is subsequent lessons as everything does not happen in every lesson in D&T.

Lessons should be planned holistically as a sequence to provide more logical progression of learning. Sharing the sequence of lessons with students during first lesson helps them appreciate what they will be doing and learning in the unit and why.

How to use the lesson planning proforma

LESSON PLAN

Learning Unit: _____ Teacher: _____ Date: _____
 Lesson length: _____ Class: _____ Lesson in sequence: _____

Coded Objective | **Learning/Assessment Objective**

Minutes	Activity/for resources	Differentiated Tasks / WAK or	Link to objectives	Assessment Task

Lesson Evaluation

What do I need to carry forward to next lesson?

Target Students: Which students need to make up on learning not achieved during this lesson

Name: _____ Action: _____

Callout Boxes:

- NC2014 Coded Objective DB1, TK9 etc.
- Insert here the timing of the parts of the lesson in blocks of minutes
- Note form description of the activity and any resources required
- Note form of different task for specifically named students who you are aware have specific learning needs, support or extension, from SEN notes received or other information. Considering the different ways in which learners learn – possibly considering a number of different ways of teaching a new concept or skills
- This is where you can jot down notes about the lesson just taught which you will need to take account of when make slight adjustments to the next lesson in the sequence
- Name of Learning Unit
Length of lesson
Teacher
Class
Date
Lesson in sequence
- Learning/Assessment objectives from the department's plan for this learning unit
- Make a note in this column when the task/activity is making a major contribution to one of the unit's learning objectives
- At timely and appropriate points in some lessons across the sequence short tasks/activities should be planned in when students and or teachers can assess whether or not the units learning objectives have been achieved. When this column is completed the 'Activity' column would be left empty
- This is where you can jot down notes about particular students who were absent, struggled to grasp something or for whatever reason you need to make particular plans for during the next lesson

As an individual student works through the planned units in KS3 they will be seeking to demonstrate that they have achieved the learning objectives defined for each unit. Teachers will have planned in assessment opportunities in the planning of the sequence of lesson to assess whether individual students have achieved the objectives too. At points during the key stage and certainly at the end the school will require the department and its teachers to report how individual students are attaining in relation to their age related expectation (ARE) in D&T. Thus it makes sense to maintain a central record of attainment and progress for all students against ARE objectives. This particularly logical given the complex way in which a student's D&T experience is delivered, from a range of teachers across a range of materials and in learning units experienced in varying order because of the 'carousel' delivery of the subject in many schools. Schools will devise their own systems to do this, however the blank audit matrix in either paper or electronic form could provide an efficient way of mapping such a record.

Here is the audit matrix reworked to contain students' names in the left hand column. An examples of how you can use it to record achievement is shown using an 'A' with a dark background indicating that the student has achieved the objective. If you wish you might also indicate by inserting an 'M' that you have seen some evidence from a student that they have 'mostly achieved'

A single D&T record such as this could be used by a department at any point during a student's journey through Key Stage 3 to ascertain whether they are working at, below or well below ARE.

If a department elected to use a paper version then a numeric count could quickly give the percentage, however if the Excel version was being used then a formula could be inserted which would keep a running percentage of objectives achieved which could quickly be turned into an ARE judgement.

Such a record would be valuable for assessment weeks, reports and parents evenings. It would definitely be useful at the end of the key stage when departments are likely to be required by the school to report whether students are at ARE for D&T by the end of Y9. The DfE does not expect students to work above their age related expectation, it expects such students to be applying their learning in more complex ways, see 'Mastery' section below.

The coded objectives represent all the learning as described in the NC2014. The DfE defines that for a student to be working at ARE they must have achieved 66% or more of the objectives. If they have achieved between 33% and 65% then they are deemed to be working 'below ARE' and less than 32% they are deemed to be working 'well below ARE'. Only the 'achieved' count towards ARE, the use of 'W' and 'M' contributes to teachers' formative assessment and when planning learning for individual students and different groups.

Such a record links objectives in every learning unit across D&T in KS3 to a student's overall attainment in D&T. It achieves this by linking lesson learning objectives to formative assessment in lessons through recording attainment and tracking progress to a summative assessment of attainment against ARE – on one sheet of A3 or in one Excel file!

Mastery in the NC2014

What about students who demonstrate that they have attained all the objectives for a unit, year KS3 well before this end of that phase? Do you move them onto learning for a higher age group?

The DfE's position on this is that such students should be tasked with ever increasing complex contexts where they are required to apply their learning in more complex and interconnected ways. This is quite a normal part of D&T thinking and is probably less challenging than it might be for some other subjects. Thus teachers and departments will be moving towards judging whether students have not only achieved but whether they have 'mastered' the objectives.

Blooms taxonomy is a very useful basis here on which to understand 'mastery' and if you haven't visited it recently now is a good time to do so. Essentially, if students can merely define and identify knowledge, facts and content then they have little application of learning, thus no 'mastery'. If they can explain summarise and demonstrate knowledge, facts and content then they are displaying an expected level of application but still no 'mastery'. However if they demonstrate that they can use facts, information or procedures to respond to, solve and answer complex problems then they are showing good application of learning and 'good mastery'. If however they can independently connect learning together from a very wide variety of objectives and subjects and can apply their own knowledge into alternative and unique contexts then they are demonstrating 'very good mastery'. Guidance indicates that students need to have 'mastered' more than 66% of the objectives to be judged to have 'good mastery' and above 90% for 'very good mastery'.

This is not an exact science and at the time of writing the thinking about how to measure and record this is at a very early stage. Departments need to give this due consideration and adapt their assessment and recording schemes as more clarity emerges over time and through discussion within schools about the concept of 'mastery'.



Conclusion

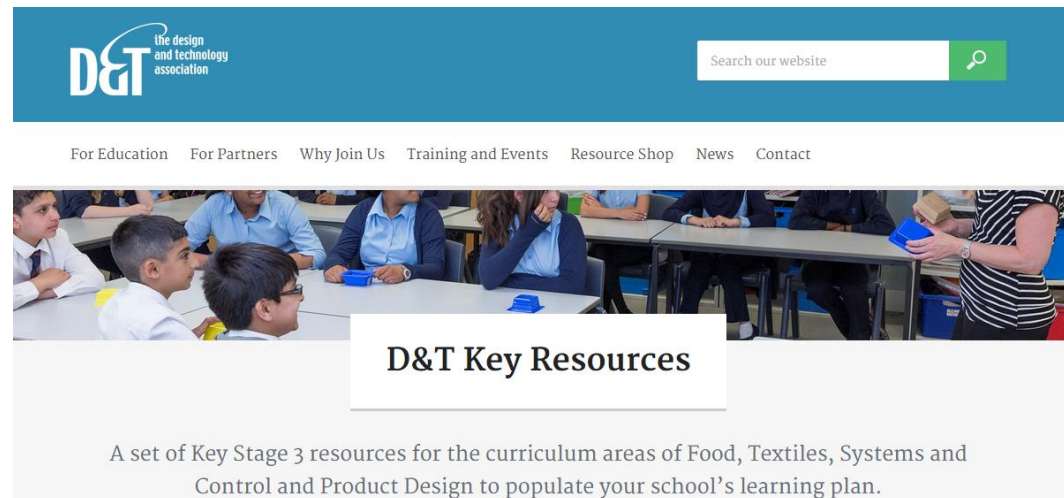
The Key Resources Learning Planner and Resource Bank provide a coherent methodology for the planning, teaching and assessment of the NC2014 curriculum for D&T. It can be taken as a package and taught as is and it would provide an adequate experience for students at KS3.

However it has been designed to be used as a framework against which to update existing schemes, as a resource from which units can be cherry picked to supplement an existing scheme etc.

Use it to make the D&T experience for students in your school meaningful, high quality, fun, rigorous and make them want to follow it on into higher education and a future career in the world of designing and making.

All resources are available online at:

<https://www.data.org.uk/for-education/secondary/dt-key-resources/>



Early KS3	Textiles	Food	Product Design	Systems and Control
Mainly Designing	Learning to look	Catering for needs	Core skills	On the level
Mainly Making	Understanding fibres and fabrics	Practical skills building	Signs	Dusk – lights on
Design and Make	[Blank]	Design for health	Jewellery design	Touch torch
Technology in Society	Wider use of textiles in society	Future food	Eco design	Mobile phone

Mid KS3	Textiles	Food	Product Design	Systems and Control
Mainly Designing	Dual purpose textiles	Multicultural meals for mates	Analyse that	Electronic musical toy
Mainly Making	[Blank]	Protein foods	Salad servers	Moody lights
Design and Make	Textile entrepreneurs	Design and make your school lunch	Lanterns	Smart board game
Technology in Society	The true cost of textile technology	The appliance of science	Floating garden challenge	Music players

Late KS3	Textiles	Food	Product Design	Systems and Control
Mainly Designing	Para-triathlete design challenge	Standards for food	Advanced modelling	Activity toy
Mainly Making	[Blank]	Chilled ready meals	Does it connect?	Rescue me!
Design and Make	Festival headgear	Event food	Learning to learn	Animatronic creature
Technology in Society	Wearable technology	Hydroponics – working water	Evolution and change	Knight Rider - computerised cars

KS3 Resource Bank – A bank of learning units available for purchase from the D&T Association

Textiles

Early KS3 (Year 7)

- Mainly Designing: Learning to look
- Mainly Making: Understanding fibres and fabrics
- Technology in Society: The wider use of textiles in society

Mid KS3 (Year 8)

- Mainly Designing: Dual purpose textiles
- Design and Make: Textile entrepreneurs
- Technology in Society: The true cost of textile technology

Late KS3 (Year 9)

- Mainly Designing: Para-triathlete design challenge
- Design and Make: Festival headgear
- Technology in Society: Wearable technology

Food

Early KS3 (Year 7)

- Mainly Designing: Catering for needs
- Mainly Making: Practical skills building
- Design and Make: Design for health
- Technology in Society: Future food

Mid KS3 (Year 8)

- Mainly Designing: Multicultural meals for mates
- Mainly Making: Protein foods
- Design and Make: Design and make your school lunch
- Technology in Society: The appliance of science

Late KS3 (Year 9)

- Mainly Designing: Standards for food
- Mainly Making: Chilled ready meals
- Design and Make: Event food
- Technology in Society: Hydroponics – working water

Systems and Control

Early KS3 (Year 7)

- Mainly Designing: On the level
- Mainly Making: Dusk – lights on
- Design and Make: Touch torch
- Technology in Society: Mobile phone

Mid KS3 (Year 8)

- Mainly Designing: Electronic musical toy
- Mainly Making: Moody lights
- Design and Make: Smart board game
- Technology in Society: Music players

Late KS3 (Year 9)

- Mainly Designing: Activity toy
- Mainly Making: Rescue me!
- Design and Make: Animatronic creature
- Technology in Society: Knight Rider - computerised cars

Product Design

Early KS3 (Year 7)

- Mainly Designing: Core Skills
- Mainly Making: Signs
- Design and Make: Jewellery Design
- Technology in Society: Eco Design

Mid KS3 (Year 8)

- Mainly Designing: Analyse that
- Mainly Making: Salad Servers
- Design and Make: Lanterns
- Technology in Society: Floating Garden Challenge

Late KS3 (Year 9)

- Mainly Designing: Advanced Modelling
- Mainly Making: Does It Connect?
- Design and Make: Learning to learn
- Technology in Society: Evolution and the Future