# Characteristics of a genuine D&T experience within the school curriculum: Principles for guiding and evaluating practice

Six, interrelated principles have been agreed by the National Curriculum Expert Group for D&T. They describe the features of a genuine D&T experience from the pupils' perspective and can be applied to all material areas and aspects of the subject. Each principle should be evident to a greater or lesser degree in each project that pupils undertake. The principles do not represent an exhaustive list, but provide a helpful starting point for clarifying and securing the distinctive nature of D&T in the classroom. The new National Curriculum requirements are consistent with the six principles:

- User

- Purpose

- Functionality

- Design Decisions

- Innovation

- Authenticity

Freely available guidance on each of the six principles can be found in the tables below.  The purpose of the guidance is to enable primary and secondary teachers and trainees to evaluate their own practice, reflecting on the experience they are providing for pupils in relation to each of the principles. Each principle is defined and illustrated through examples of practice in key stages 1 to 3. Teachers and trainees are asked to consider a number of questions. When responding to the questions, teachers and trainees are asked to make a note of strengths and areas requiring development in their own practice, and identify any action needed to improve the D&T experience that pupils are offered.

During the National Curriculum review the DfE set up the National Curriculum Expert Group for D&T. This group has been given the task of advising the DfE on implementation and works closely with the Design and Technology Association. The materials have been created by the Expert Group in a voluntary capacity. They have been produced by the design and technology community for the education community.  We hope that they will be of value to you. Please note that these materials may not be used for commercial purposes.

| School curriculum principles for design and technology | Examples of practice in KS1 to 3 | Questions to support teachers' and trainees' reflection | Needs identification – please complete |
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| **User**<br><br>Pupils should have a clear idea of who they are designing and making products for, considering their needs, wants, values, interests and preferences. The intended users could be themselves or others, an imaginary or story-based character, a client, a consumer or specific target group. | KS1: At the beginning of a food technology project, a class of Y1/2 pupils discuss food they enjoy and realise that people have preferences for different types of products and ingredients. They taste a range of products made with fresh fruit, saying which they like and dislike, and describing their sensory characteristics. When designing and making their own fruit salads for a class summer picnic, pupils carry out a simple survey of favourite fruit in order to decide which combination of fruit to include in their dishes.<br><br>KS2: When evaluating a range of bags, Y5 pupils discuss who they have been designed for and what the needs, wants and values of the intended users might be. They think about how the bags have been designed to be carried, how they are fastened, and how each of the storage compartments might be used. They ask questions about why users might choose to buy the bags, such as their appearance, size, strength and any special design features. When designing and making their own bags, they use this experience to identify a range of possible users and purposes, and to develop design criteria.<br><br>KS3: When investigating the difficulties elderly people experience when opening containers, pupils consider and model various prototypes using CAD/CAM to provide ergonomic solutions. They consider the specific needs, wants and preferences of the target user group through working with them, observing the problem first hand and collecting information to inform their designing. They draw up conclusions from their findings and use them to rationalise their proposals. Physical factors including anthropometrics and ergonomics are considered as well as the analysis of a range of existing products. | To what extent does your practice enable pupils to:<br><br>KS1, 2 and 3<br>• identify who their products will be for?<br>• suggest possible users of a range of existing products?<br>• explore how existing products are used?<br>• consider where and when their own and others' products might be used?<br>• evaluate whether users' needs and preferences have been met effectively?<br>• appreciate the importance of the 'user' within design and technology?<br><br>KS2 and 3<br>• explore users' needs within a range of contexts?<br>• use research to identify potential problems and opportunities for users?<br>• analyse findings and draw conclusions from their research?<br>• distinguish between needs, wants, values, interests and preferences?<br>• design products for individuals, clients, consumers and target groups?<br><br>KS3<br>• identify and address factors that motivate users, such as financial, environmental and cultural?<br>• explore the health and wellbeing, cultural, religious and socio-economic contexts of their intended users?<br>• consider the influence of a range of lifestyle factors when designing products?<br>• identify and address factors such as ergonomics, anthropometrics or dietary needs? | In relation to this principle:<br><br>What do you consider to be strengths in your practice?<br><br><br><br>What aspects of your practice need to be developed?<br><br><br><br>What action will you take to improve your practice? |

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| **Purpose**<br><br>Pupils should be able to clearly communicate the purpose of the products they are designing and making. Each product they create should be designed to perform one or more defined tasks. Pupils' products should be evaluated through use. | KS1: When designing and making safety jackets for Teddy, Y2 pupils think about the purpose of helping him to be seen when he is out in the dark. They explore and discuss examples of safety clothes, describing how they have been made and the colour and type of fabrics that have been used. They develop simple design criteria for Teddy's jacket, such as making sure that it can be seen at night, that it is the right size, that it has suitable fasteners and can be taken on and off easily.<br><br>KS2: When designing and making packaging to protect fragile products that are to be put on sale, Y4 pupils consider both the functional and aesthetic elements needed to successfully achieve this purpose. Through modelling ideas, they investigate which 3D shapes are strong enough to provide the necessary protection, and explore techniques for reinforcing and stiffening the card they are using though laminating, ribbing or corrugating. Using simple computer-aided design they create nets, develop ideas for text and graphics, and incorporate a window in their packaging to help sell the products.<br><br>KS3: Using their knowledge of growing food in a greenhouse, pupils design and manufacture an electromechanical system that controls either the environment or an automated watering system, incorporating the use of electronics and/or pneumatics. Through investigating the context, they develop design criteria and a specification to inform their designing. They consider the range of technical, functional and aesthetic requirements to ensure their outcome is fit for purpose. | To what extent does your practice enable pupils to:<br><br>KS1, 2 and 3<br>• state what their products are for?<br>• suggest the purposes of a range of existing products?<br>• develop design criteria that take account of the intended purpose of their products?<br><br>KS2 and 3<br>• clarify the purpose of the products they are designing and making?<br>• evaluate how well existing products meet their intended purpose?<br>• understand the concept of 'fitness for purpose' in the context of their own designing and making<br>• distinguish between how well products are designed and how well they are made?<br>• discuss whether their own and existing products have an impact beyond their intended purpose?<br>• recognise when products have to fulfil conflicting requirements?<br><br>KS3<br>• appreciate that the purpose of a product is fulfilled when it meets a range of requirements, including technical, functional and aesthetic?<br>• identify whether their own and existing products could have more than one purpose? | In relation to this principle:<br><br>What do you consider to be strengths in your practice?<br><br><br><br>What aspects of your practice need to be developed?<br><br><br><br>What action will you take to improve your practice? |

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| **Functionality**<br><br>Pupils should design and make products that work/function effectively in order to fulfil users' needs, wants and purposes. | KS1: In order to design and make moving pictures to illustrate nursery rhymes in a whole class book, Y1 pupils explore how simple levers and sliders work, how they are used, and how they produce different types of movement. Through focused practical tasks they develop technical knowledge and skills, such as joining paper fastener pivots to card levers and using strips of card to make sliders. They select and use mechanisms according to how they want the parts in their pictures to move, using both directional and technical vocabulary to explain their thinking.<br><br>KS2: To help them to design and make battery-powered night lights for a specific user, Y3/4 pupils construct and evaluate a range of handmade switches drawing on their science understanding of circuits, conductors and insulators. They test the effectiveness of their switches in series circuits and develop an understanding of how night lights are controlled through an electrical system that incorporates an input, process and output. They use their science understanding of translucent, transparent and opaque materials when selecting materials to make the shade for their night lights.<br><br>KS3: When designing and making a textiles accessory to make pedestrians or cyclists more visible to motorists, pupils explore aspects of a product's functionality.  They consider technical requirements for specific users such as children, cyclists and commuters. Factors for consideration include properties of the materials and components, the means of construction, user appeal, reliability and the need for their designs to conform to health and safety requirements. Having first developed the technical knowledge, pupils design and incorporate an electronic circuit to control flashing LEDs embedded in the product. | To what extent does your practice enable pupils to:<br><br>KS1, 2 and 3<br>• know that their products should work in some way?<br>• know how a range of existing products work?<br>• develop specific technical knowledge and understanding in order to ensure that their products work well?<br><br>KS2 and 3<br>• understand the meaning of 'functionality' and its importance to design and technology?<br>• know how functionality is relevant to the product they are designing?<br>• know how the materials and components they use assist the functionality of the product?<br>• contrast the functional properties of materials and components with their aesthetic qualities?<br>• understand that how products work affects how they are used?<br><br>KS3<br>• use the concept of functionality to support their designing and making?<br>• contrast functionality with user appeal?<br>• understand that the functionality of a product may depend on their accuracy and precision when using materials and components?<br>• recognise when conflicting resource requirements may affect the functionality of the product? | In relation to this principle:<br><br>What do you consider to be strengths in your practice?<br><br><br><br>What aspects of your practice need to be developed?<br><br><br><br>What action will you take to improve your practice? |

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| **Design decisions**<br><br>Pupils need opportunities to make their own design decisions. Making design decisions allows pupils to demonstrate their creative, technical and practical expertise, and draw on learning from other subjects.<br><br>Through making design decisions pupils decide on the form their product will take, how their product will work, what task or tasks it will perform and who the product will be for. | KS1: Before designing and making their own toy vehicles in Y2, pupils explore a range of existing products, identifying different types of vehicles, who they are for, what materials and components they are made from, and develop technical vocabulary for each of the parts. When designing their own products, pupils decide what type of vehicles they will create, who they will be for, what purpose they will perform, and what materials and components to use, including the type of wheels, axles and axle holders.<br><br>KS2: After evaluating a wide range of bread from different cultures and learning how to bake bread by following a basic recipe, Y6 pupils design and make their own bread product for a specific purpose and person. They make design decisions about the ingredients and techniques they will use, such as the type of yeast, which ingredients to add to the recipe, how these ingredients should be prepared, what effect they have on the mixture, and which finishing techniques to use, such as shaping, glazing and decoration.<br><br>KS3: When designing and making lightweight, solid fuel, aluminium camping stoves, pupils use CAD and card modelling to inform their decision making with respect to scale, ease of manufacture, assembly and efficiency. They engage in discussion prompted by the testing of models and identify the technical and practical expertise they need to acquire in order to manufacture their products. They validate their designs through testing their stoves using data logging devices to generate performance statistics. Using this data they compare their own designs with those of their peers and make value judgements about which are most effective. | To what extent does your practice enable pupils to:<br><br>KS1, 2 and 3<br>• make their own design decisions?<br>• discuss the design decisions that have been made in existing products?<br>• take into account users' needs when making design decisions?<br>• develop their technical and practical expertise in order that they can make informed design decisions?<br>• use D&T-related visits and inputs from experts to make informed design decisions?<br><br>KS2 and 3<br>• discuss the effectiveness of the design decisions made in existing products?<br>• discuss effectiveness of the design decisions made in their own products?<br><br>KS3<br>• consider alternative design decisions that could be made in their own and existing products?<br>• avoid making stereotypical design decisions?<br>• demonstrate resourcefulness and ingenuity when making design decisions | In relation to this principle:<br><br>What do you consider to be strengths in your practice?<br><br><br><br>What aspects of your practice need to be developed?<br><br><br><br>What action will you take to improve your practice? |

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| **Innovation**<br><br>When designing and making, pupils need some scope to be original with their thinking. Projects that encourage innovation lead to a range of design ideas and products being developed and are characterised by engaging open-ended starting points for learning. | KS1: Pupils in Y1/2 are given the problem of designing and making a hat to keep Teddy cool in the Australian sun and free of insects. They investigate which materials are suitable for protection from the sun and explore different ways of keeping insects away from the face. Keeping in mind the purposes of the hat, pupils are encouraged to generate creative and imaginative ideas and solutions, developing and communicating these by modelling with paper and card.<br><br>KS2: When designing and making containers using recycled textiles, Y3/4 pupils are given scope to develop and respond to their own design briefs, creating ideas for products that fulfil a range of purposes and meet user needs they have identified. They are encouraged to take creative risks with their design ideas, gathering information about the problems encountered by their intended users and avoiding stereotypical solutions, leading to the creation of a variety of final products that are original, functional and appealing.<br><br>KS3: Pupils consider mass food packaging waste at an event or festival that they may be aware of or have attended. They explore the context of outdoor 'festival food' and the concept that if food packaging were re-designed, it could be restorative instead of polluting. They rethink the notion that lost packaging litter is damaging, instead considering that food packaging can nourish the ground within which it degrades. Pupils develop creative use of materials, taking risks and developing their understanding of the concept of innovation, such as including wild flower seeds in the product and the messaging contained with the applied graphics. | To what extent does your practice enable pupils to:<br><br>KS1, 2 and 3<br>• respond creatively and imaginatively to design briefs and problems?<br><br>KS2 and 3<br>• demonstrate some originality when designing and making?<br>• learn how to take creative risks?<br>• understand the meaning of 'innovation' within design and technology?<br>• understand how innovation is an important part of the process of designing and making products?<br><br>KS3<br><br>• use the concept of innovation in a way that supports their designing and making?<br>• evaluate how innovative they are when creating products? | In relation to this principle:<br><br>What do you consider to be strengths in your practice?<br><br><br><br>What aspects of your practice need to be developed?<br><br><br><br>What action will you take to improve your practice? |

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| **Authenticity**<br><br>Pupils should design and make products that are believable, real and meaningful to themselves and others. | KS1: Pupils in Y1 are challenged to create a stronger, more stable chair for Baby Bear using construction materials, construction kits and textiles. They respond positively to this imaginary, story-based context which sets a meaningful and engaging design problem for them to solve. Using a soft toy to develop and test their ideas, pupils design and make small-scale chairs. They think about the size, shape and parts of the chairs, what materials, joining and finishing techniques to use, how to make the chairs stand up, and how to make them strong enough for the intended user.<br><br>KS2: Pupils in Y5 develop a range of healthy soups within a mini-enterprise context. They visit a local supermarket which commissions them to develop a new range of soups suitable for primary-aged children. Pupils carry out market research using existing soups to identify the preferences of their target group. They establish design criteria that specify the taste, texture, appearance and aroma of their products, how they will form part of healthy, varied diet and how they will offer good value for money. They pitch the range of soups to representatives from the supermarket and modify their recipes on the basis of feedback.<br><br>KS3: Pupils investigate the range of products sold in a museum, shop or visitor attraction. They make contact with the client and make a presentation to a representative from the venue. They consider the opportunity for business and enterprise, designing a range of small souvenirs reflecting the specific location. They conduct a survey to identify the potential market and engage in discussion with the client before, during and at the end of the development process. Pupils clarify the client's specific requirements, and consider the point of sale. They conduct a real cost analysis and make business proposals for scaling up production. | To what extent does your practice enable pupils to:<br><br>KS1, 2 and 3<br>• carry out projects that are real and meaningful to them and others?<br>• work within a range of relevant contexts, ranging from domestic to industrial?<br>• work towards realistic and credible outcomes that can be evaluated in use?<br>• engage in activity that mirrors design and technology in the wider world?<br>• create products with a genuine purpose and for a real user?<br>• create products which need to work in some way in order to be successful?<br><br>KS2 and 3<br>• understand the difference between genuine D&T products and outcomes created in other areas of the curriculum? | In relation to this principle:<br><br>What do you consider to be strengths in your practice?<br><br><br><br><br>What aspects of your practice need to be developed?<br><br><br><br><br>What action will you take to improve your practice? |