

## Developing an approach to teaching and learning in Design Technology

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

NC 2014

“The nature of design and technology is such that it should provide opportunities for pupils to engage in activities that are challenging, relevant and motivating. This should give pupils enjoyment, satisfaction and a sense of purpose.”

(DATA Primary Guidance, p4)

Teaching and learning in DT at Wormley Primary School aims to:

- develop the creative, technical and practical expertise of children needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- support children to build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- support children to critique, evaluate and test their ideas and products and the work of others
- help children understand and apply the principles of nutrition and learn how to cook
- develop a love of design

We encourage children to notice carefully and deeply, and demonstrate their learning in a variety of ways: designs, models, drawings, fact files etc. During their time at this school, they will make products and learn how to use a wide variety of tools, equipment, materials and components.

Learning can be recorded in the children's artistic logs, class topic books, a class folder etc.

### DEVELOPING SKILLS

There are key skills for pupils as designers:

Curiosity	Be curious about the world. Ask questions and wonder why
Active Listening	Give your full attention to what different people say, taking time to understand the points being made and asking questions as appropriate
Critical Thinking	Use logic and reasoning to identify the strengths and weaknesses of alternative ideas, conclusions or approaches to problems
Active Learning	Investigate ways to find out information from different sources to help with problem-solving and decision-making
Judgment and Decision Making	Have respect for alternative perspectives that may be different from our own. Take on advice from others
Collaboration	Work with others to learn from them and achieve more
Writing	Communicate effectively in writing for the needs of the audience.
Speaking	Talk clearly to others to convey information effectively.
Social Awareness	Recognise that people see things in different ways. Appreciate difference.
Persuasion	Persuade others to change their minds or behaviour based on your evidence

Through a variety of creative and practical activities, children should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts.

### MASTERY IN DT

We want children to achieve mastery of the DT curriculum by being able to plan, design and make an item, to fulfil a given criteria, in different contexts. This would require a good level of technical skill with a broad range of tools and use of innovative ways to enhance the outcome of an item. As our scheme of learning is a spiral curriculum, children revisit previous learning – skills and knowledge - and can improve over time.

## OVERVIEW

Autumn	Spring	Summer
Year 1		
Textiles Templates and joining techniques (puppet, bag, fabric placemat)	Mechanisms Sliders and levers (storyboard/poster/greetings card)	Food Preparing fruits and vegetables (including cooking and nutrition requirements) (fruit salad/kebab/drink)
Year 2		
Food Preparing fruits and vegetables (including cooking and nutrition requirements) (salad/kebab/smoothie)	Structures Freestanding structures (bridge for billy goat gruff, furniture for the 3 bears, enclosure for animals)	Mechanisms Wheels and axles (push/pull toy, vehicle)
Year 3		
Food Health and varied diet (including cooking and nutrition requirements) (toasties/sandwich)	Textiles 2D and 3D product (pencil case/purse/fashion accessory)	Structures Shell structures (including computer aided design) (gift box/desk tidy/party box)
Year 4		
Electrical systems Simple circuits and systems (including programming and control) (bulb eyes for a robot/noise making toy)	Food Health and varied diet (including cooking and nutrition requirements) (wrap/pitta pocket/rice cakes)	Mechanical systems Levers and linkages (story book/information book)
Year 5		
Food (Celebrating culture and seasonality including cooking and nutrition requirements) (bread/pizza)	Structures Frame structures (kite/bird hide/market stall)	Textiles Combining different fabric shapes (including computer aided design) (mobile phone holder/slippers/hat)
Year 6		
Electrical systems More complex switches and systems (including programming and control) (electrical board game/alarm for an artefact)	Mechanical systems Pulleys and gears (dragster/carousel)	Food (Celebrating culture and seasonality including cooking and nutrition requirements) (soup/savoury biscuits/scone)

### 4 KEY PRINCIPLES AND PROGRESSION IN DT (split into KS1/KS2)

The following principles are taught and assessed:

<b>Design</b>	<ul style="list-style-type: none"> <li>design purposeful, functional, appealing products for themselves and other users based on design criteria</li> <li>generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology</li> </ul>
	<ul style="list-style-type: none"> <li>use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups</li> <li>generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design</li> </ul>
<b>Make</b>	<ul style="list-style-type: none"> <li>select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]</li> <li>select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics</li> </ul>
	<ul style="list-style-type: none"> <li>select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately</li> <li>select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities</li> </ul>
<b>Evaluate</b>	<ul style="list-style-type: none"> <li>explore and evaluate a range of existing products</li> <li>evaluate their ideas and products against design criteria</li> </ul>
	<ul style="list-style-type: none"> <li>investigate and analyse a range of existing products</li> <li>evaluate their ideas and products against their own design criteria and consider the views of others to improve their work</li> <li>understand how key events and individuals in design and technology have helped shape the world</li> </ul>
<b>Technical knowledge</b>	<ul style="list-style-type: none"> <li>build structures, exploring how they can be made stronger, stiffer and more stable</li> <li>explore and use mechanisms [for example, levers, sliders, wheels and axles] in their products</li> </ul>
	<ul style="list-style-type: none"> <li>apply their understanding of how to strengthen, stiffen and reinforce more complex structures</li> <li>understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]</li> <li>understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]</li> <li>apply their understanding of computing to program, monitor and control their products</li> </ul>

## PROJECTS ON A PAGE

At Wormley Church of England Primary School, we chose to adopt *The Projects on a Page* scheme of learning, designed by the Design and Technology Association. It offers an excellent structure for primary school teachers who are non-specialists to teach the National Curriculum for D&T in an imaginative way. It is based on universal principles of effective teaching and learning in D&T. Each DT plan has 20-step planning guidance and accompanying teacher tips, a glossary, an example of iterative design appropriate to the project, and practical advice on using resources. Side 1 of the plan is supplied as an editable digital version that can be adapted and printed.

<p><b>1. Year Groups</b> Years 1/2</p>	<p><b>2. Aspect of D&amp;T Mechanisms</b> Sliders and Levers</p>	<p><b>4. What could children design, make and evaluate?</b> Designing a mobile phone case Designing an interactive book Designing other - specify</p>	<p><b>6. Intended users</b> Individuals younger children parents grandparents friends older to school senior - specify</p>	<p><b>8. Purpose of products</b> Education event education process Education hobby educational other - specify</p>	<p><b>16. Possible resources</b> Books and e-resources Products with levers and other mechanisms</p>	<p><b>17. Key vocabulary</b> Slider lever pivot axle Diagonals</p>
<p><b>3. Key learning in design and technology</b> <b>Prior learning</b> Early experience of working with paper and card to make simple toys and objects Experience of simple cutting, shaping and joining skills using scissors, glue, paper fasteners and staples</p>	<p><b>7. Links to topics and themes</b> Festival and Celebrations Traditional Toys Learning Through History Science-based topic Other - specify</p>	<p><b>6. Possible contexts</b> Imaginary story-based text games Language we help do home school garden playground local community environment other - specify</p>	<p><b>9. Project title</b> Design, make and evaluate a _____ product To be completed by the teacher. Use the project title to guide the topic for the project's learning plan to activities in 10, 12 and 14</p>	<p><b>11. Related learning in other subjects</b> <b>Spoken language</b> - participate in discussion about books and their products with moving parts, using facts and drawing to relate others may. Ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary.</p>	<p><b>17. Key vocabulary</b> Paper fastener glue Fold, punch, cut, draw Design, colour, draw, bookends, bookends</p>	<p><b>16. Possible resources</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>
<p><b>Designing</b> Generate ideas based on simple design criteria and their own experiences, exploring what they could make. Develop, modify and communicate their ideas through drawing and mock-ups with card and paper</p>	<p><b>10. Investigative and Evaluative Activities (IEAs)</b> Children explore and evaluate a selection of simple and complex products that have moving parts, including those with levers and axles. e.g. What is it? What is it for? What is it made of? How well does it work? How well does it meet the need? What part of the product is most important? How did it come? How do you think the mechanism works? What else could make it the product? How well does it work? Introduce and develop vocabulary e.g. lever, pivot, axle, wheel, right, push, pull, up, down, forwards, backwards, in, out</p>	<p><b>12. Focused Tasks (FTs)</b> Investigate simple levers and axles to the children using prepared teaching aids. It is helpful if these are not used to restrict the child's use to a small assembly from which to learn, the lever is used to show a butterfly flying to a flower. Use questions to develop children's understanding e.g. How does the slider move? How does the lever work? What part of the mechanism is the pivot? What does the movement of the slider and lever control the movement of the rest of the mechanism? Having teacher demonstration of the correct use of tools and materials, children should develop their knowledge and skills by representing the slider and lever learning aids. Encourage children to add pictures to their mechanisms.</p>	<p><b>13. Related learning in other subjects</b> <b>Spoken language</b> - children listen and respond to questions by adults. Ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary. <b>Mathematics</b> - identify position, direction and movement. Use appropriate standard and non-standard measures.</p>	<p><b>18. Key competences</b> problem-solving teamwork negotiation consumer awareness organisation motivation persistence leadership perseverance other - specify</p>	<p><b>17. Key vocabulary</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>	<p><b>16. Possible resources</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>
<p><b>Making</b> Plan to represent what to do next Draw and cut out tools, applying their criteria to the design that they have made Use simple drawing techniques suitable for the child's age and ability</p>	<p><b>14. Design, Make and Evaluate Assignment (DMEA)</b> Discuss with the children what they will be designing, making and evaluating e.g. What will your product be for? What is the purpose? How do you want it to work? How do you want it to look? Encourage simple design criteria with the children e.g. the mechanism should work smoothly, it should make the right type of movement. Encourage the children to develop their ideas through talking, drawing and making mock-ups of their ideas with paper and card. Discuss the finishing techniques the children might use e.g. using digital text and graphics, paint, felt board pens or oil pastels. It is a decision time. How often the slider to which the mechanism will be made. Ask children to evaluate their developing ideas and their products against the original design criteria.</p>	<p><b>15. Related learning in other subjects</b> <b>Spoken language</b> - ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary. Use appropriate standard and non-standard measures. <b>Mathematics</b> - identify position, direction and movement. Use appropriate standard and non-standard measures. <b>Art and design</b> - use colour, pattern, line, shape. <b>Computing</b> - digital graphics and text could be incorporated into final products to be the background or moving parts.</p>	<p><b>19. Health and safety</b> Pupils should be taught to work safely, using both equipment, materials, components and techniques appropriate to the task. This necessarily should be learned first prior to undertaking the project.</p>	<p><b>18. Key competences</b> problem-solving teamwork negotiation consumer awareness organisation motivation persistence leadership perseverance other - specify</p>	<p><b>17. Key vocabulary</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>	<p><b>16. Possible resources</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>
<p><b>Technical knowledge and understanding</b> Explain and use sliders and levers. Understand that different mechanisms produce different types of movement. Use simple technical vocabulary relevant to the project.</p>	<p><b>14. Design, Make and Evaluate Assignment (DMEA)</b> Discuss with the children what they will be designing, making and evaluating e.g. What will your product be for? What is the purpose? How do you want it to work? How do you want it to look? Encourage simple design criteria with the children e.g. the mechanism should work smoothly, it should make the right type of movement. Encourage the children to develop their ideas through talking, drawing and making mock-ups of their ideas with paper and card. Discuss the finishing techniques the children might use e.g. using digital text and graphics, paint, felt board pens or oil pastels. It is a decision time. How often the slider to which the mechanism will be made. Ask children to evaluate their developing ideas and their products against the original design criteria.</p>	<p><b>15. Related learning in other subjects</b> <b>Spoken language</b> - ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary. Use appropriate standard and non-standard measures. <b>Mathematics</b> - identify position, direction and movement. Use appropriate standard and non-standard measures. <b>Art and design</b> - use colour, pattern, line, shape. <b>Computing</b> - digital graphics and text could be incorporated into final products to be the background or moving parts.</p>	<p><b>19. Health and safety</b> Pupils should be taught to work safely, using both equipment, materials, components and techniques appropriate to the task. This necessarily should be learned first prior to undertaking the project.</p>	<p><b>18. Key competences</b> problem-solving teamwork negotiation consumer awareness organisation motivation persistence leadership perseverance other - specify</p>	<p><b>17. Key vocabulary</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>	<p><b>16. Possible resources</b> Design, make, evaluate Use purpose ideas, design criteria, product, function</p>

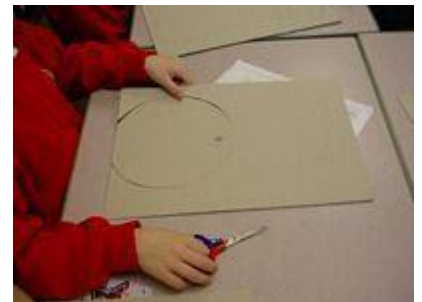
## ASSESSMENT

Teachers assess pupil progress against the school's assessment criteria in Insight at the end of a unit/project. They assess their project using the following tool:

## FOCUSSED PRACTICAL TASKS



## PRODUCTS



## Exemplar 1 PUPPETS – Link to Lion King Theater Project

Use a range of puppets to develop pupils' designing skills - Ask a range of questions with increasing cognitive difficulty. (The categories have been taken from Blooms Taxonomy)

Examples of questions. Look carefully and notice:

### Knowledge or Recall

Questions designed to build or reinforce core knowledge or terminology

- What do we call this?
- Which parts move?

### Comprehension

Establishing and reinforcing depth of knowledge

- Can you describe three things about this puppet?
- What makes the puppet move?

### Application

Using newly acquired knowledge, ideas and skills in different situations.

- Which puppets are made of the same material?
- Which puppet would you use for ....?
- What other examples are there?

### Analysis

Drawing conclusions from information.

- Why has this character been made in this way?
- Why are puppets made in different ways?
- How do we know this puppet is stiffened?

### Synthesis

Extended meaning and pattern from information

- What can you tell me about all of these?
- What can you tell me about...?
- How could we add to, improve, design, solve?

### Evaluation

Encouraging critical judgements to be made, often engaging feelings.

- Which puppets would you choose for your baby sister?
- Which puppet is the easiest to use?
- Why?

These photographs demonstrate types of puppets that could be used.

Puppets made by children



## Exemplar 2 MASKS - Link to story writing

Make a collection of Masks. Get the pupils to look carefully at the masks, notice details and ask questions that will focus attention on the features of masks.

**Activity** - pupils work in threes, a questioner, a note taker and pupil with the product who answers the questions.

**Questioner** – asks questions about the mask- prompting information about detail.

**Product Holder** - pupil with product who answers questions

**Note taker** - observes how they fulfil their roles and reports back at the end.

The rules can be changed e.g. only ask closed question, only ask open questions, pupil answering the question is not allowed to give additional information. This prepares a design sheet.

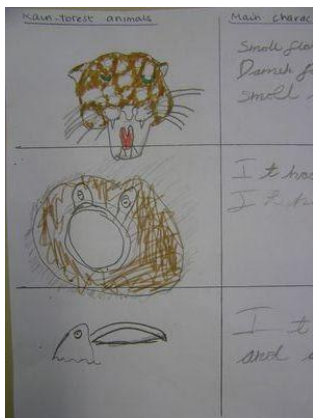
### Neoprene Masks

Make a mask. Start with a design brief e.g. Design and make a mask which can be worn for a performance of a traditional story.

Build in the success criteria -

Wearer must be able to: see speak clearly move freely

Collect ideas from books, internet, CD Rom, films, posters, other masks.



Design the mask using the design sheet.

(NB Show the children the range of materials before starting to design. Limit the choice from a range of materials e.g. feathers or pipe cleaners, pompoms or feathers, vivelle or neoprene off cuts).

Pupils complete the design sheet in pencil. Photocopy this twice, one to be used for the pattern and the other to add further details (a working design).

