Design and technology

Design and Technology

Intent

At Nerrols Primary School and Nursery, we aim to provide a wide range of opportunities for our children to design, make and evaluate functional products with specific users and purposes in mind.

We encourage our children to design and make products for meaningful contexts and to solve real and relevant problems. We want our children to take risks, develop planning skills, become resourceful, innovative and enterprising. Evaluation is an integral part of the designing and making process at Nerrols. Our children test, adapt, adjust and develop their products as they work and are encouraged to problem solve and work imaginatively and creatively to overcome any hurdles they may face.

We hope that through their design and technology education, our children begin to develop an interest in and understanding of the ways in which people from the past and present use design to meet need and have influenced the products we use in everyday life. We hope that our children gain a greater understanding of products and their effect on people and the world around them and are inspired to continue their Design and Technology learning as they move on to the next stage of their education.

Implementation

Throughout our Design and Technology work, our children are encouraged to use their creativity and to reflect and adjust as they work, rather than work towards a pre-defined end result. They follow an iterative process during which they repeat, tweak and improve.

For each project, the children's Design and Technology work will consider:

- The user – our children should have a clear idea of who they are designing and making products for, considering their needs, wants, interests or preferences.
- The purpose – our children should know what the products they design and make are for. Each product should perform a clearly defined task that can be evaluated in use.
- Functionality – our children should design and make products that function in some way. Pupils should think about how their products will work.
- Design Decisions – our children have opportunities to make informed decisions when designing and making such as selecting materials, components and techniques and deciding what form the products will take, how they will work, what task they will perform and who they are for.
- Innovation – our children will have scope to be original with their thinking when designing and making, by offering engaging, open-ended starting points for children's learning.
- Authenticity – our children should design and make products that are believable, real and meaningful to themselves enabling them to make design decisions with clear users and purposes in mind and can be evaluated through use.

In the Early Years, our children access a wide range of activities and experiences enabling them to safely use and explore materials, tools and techniques. They design, talking about what they intend to do, are doing and have done and they identify who and what their products are for. They have plentiful opportunities to make their own choices and discuss reasons for these, adapting and amending as they go. Throughout their work, our children learn appropriate procedures for safety and hygiene and become proficient in using a range of small tools with increasing accuracy.

In each year group, we look at both the designing and making and the cooking and nutrition strands of Design and Technology.

In Key Stage One, the children learn about mechanisms, structures, food and textiles, and in Key Stage Two they learn about mechanical systems, electrical systems, structures, food and textiles, each with a specific focus. They apply computing to programme and control and use computer aided design.

Scope and Sequence

	Autumn	Spring	Summer
Year 1	Mechanisms: Sliders and levers	Structures: Freestanding structures	Food: Preparing fruit and vegetables
Year 2	Mechanisms: Wheels and axles	Food: Preparing fruits and vegetables	Textiles: Templates and joining techniques
Year 3	Structures: Shell structures (including computer aided design)	Food: Healthy and varied diet	Textiles: 2D shape to 3D product
Year 4	Mechanical systems: Levers and linkages	Electrical Systems: simple circuits and switches (including programming and control)	Food: Healthy and varied diet
Year 5	Structures: Frame structures	Food: Celebrating culture and seasonality	Electrical systems: Complex switches and circuits including programming, monitoring and control
Year 6	Textiles: Combining different fabric shapes (including computer aided design)	Mechanical systems: Pulleys and gears	Food: Celebrating culture and seasonality

Each Design and Technology project includes three types of activity:

- Investigative and Evaluative Activities where children learn from a range of existing products and find out about D&T in the wider world;
- Focused Tasks where they are taught specific technical knowledge, designing skills and making skills;
- Design, Make and Evaluate Assignments where children create functional products with users and purposes in mind

Evaluation is a key part of our design and technology work. The children develop their ideas, act and reflect throughout their learning.

Throughout their Design and Technology work, our children are taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task.

Progression

<table>
<tr><th colspan="4">Designing</th></tr>
<tr><td></td><td>Key Stage One</td><td colspan="2">Key Stage Two</td></tr>
<tr><td></td><td>Year 1 and 2</td><td>Year 3 and 4</td><td>Year 5 and 6</td></tr>
<tr><td rowspan="3">Understanding contexts, users and purposes</td><td rowspan="3">• work confidently within a range of contexts, such as imaginary, story-based, home, school, gardens, playgrounds, local community, industry and the wider environment
• state what products they are designing and making
• say whether their products are for themselves or other users
• describe what their products are for
• say how their products will work
• say how they will make their products suitable for their intended users
• use simple design criteria to help develop their ideas</td><td colspan="2">• work confidently within a range of contexts, such as the home, school, leisure, culture, enterprise, industry and the wider environment
• describe the purpose of their products
• indicate the design features of their products that will appeal to intended users
• explain how particular parts of their products work</td></tr>
<tr><td>• gather information about the needs and wants of particular individuals and groups
• develop their own design criteria and use these to inform their ideas</td><td>• carry out research, using surveys, interviews, questionnaires and web-based resources
• identify the needs, wants, preferences and values of particular individuals and groups
• develop a simple design specification to guide their thinking</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">Generating, developing, modelling and communicating ideas</td><td rowspan="3">• generate ideas by drawing on their own experiences
• use knowledge of existing products to help come up with ideas
• develop and communicate ideas by talking and drawing
• model ideas by exploring materials, components and construction kits and by making templates and mock- ups
• use information and communication technology, where appropriate, to develop and communicate their ideas</td><td colspan="2">• share and clarify ideas through discussion
• model their ideas using prototypes and pattern pieces
• use annotated sketches, cross-sectional drawings and exploded diagrams to develop and communicate their ideas
• use computer-aided design to develop and communicate their ideas</td></tr>
<tr><td>• generate realistic ideas, focusing on the needs of the user
• make design decisions that take account of the availability of resources</td><td>• generate innovative ideas, drawing on research
• make design decisions, taking account of constraints such as time, resources and cost</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="4">Making</td></tr>
<tr><td rowspan="3">Planning</td><td rowspan="3">• plan by suggesting what to do next
• select from a range of tools and equipment, explaining their choices
• select from a range of materials and components according to their characteristics</td><td colspan="2">• select tools and equipment suitable for the task
• explain their choice of tools and equipment in relation to the skills and techniques they will be using
• select materials and components suitable for the task
• explain their choice of materials and components according to functional properties and aesthetic qualities</td></tr>
<tr><td>• order the main stages of making</td><td>• produce appropriate lists of tools, equipment and materials that they need
• formulate step-by-step plans as a guide to making</td></tr>
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<tr><td rowspan="2">Practical skills and techniques</td><td rowspan="2">• follow procedures for safety and hygiene
• use a range of materials and components, including construction materials and kits, textiles, food ingredients and mechanical components
• measure, mark out, cut and shape materials and components
• assemble, join and combine materials and components
• use finishing techniques, including those from art and design</td><td colspan="2">• follow procedures for safety and hygiene
• use a wider range of materials and components than KS1, including construction materials and kits, textiles, food ingredients, mechanical components and electrical components</td></tr>
<tr><td>• measure, mark out, cut and shape materials and components with some accuracy
• assemble, join and combine materials and components with some accuracy
• apply a range of finishing techniques, including those from art and design, with some accuracy</td><td>• accurately measure, mark out, cut and shape materials and components
• accurately assemble, join and combine materials and components
• accurately apply a range of finishing techniques, including those from art and design
• use techniques that involve a number of steps
• demonstrate resourcefulness when tackling practical problems</td></tr>
<tr><td colspan="4">Evaluating</td></tr>
<tr><td rowspan="2">Own ideas and products</td><td rowspan="2">• talk about their design ideas and what they are making
• make simple judgements about their products and ideas against design criteria
• suggest how their products could be improved</td><td colspan="2">• identify the strengths and areas for development in their ideas and products
• consider the views of others, including intended users, to improve their work</td></tr>
<tr><td>• refer to their design criteria as they design and make
• use their design criteria to evaluate their completed products</td><td>• critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make
• evaluate their ideas and products against their original design specification</td></tr>
<tr><td rowspan="2">Existing products</td><td rowspan="2">• what products are
• who products are for
• what products are for
• how products work
• how products are used
• where products might be used
• what materials products are made from
• what they like and dislike about products</td><td colspan="2">Investigate and analyse:
• how well products have been designed
• how well products have been made
• why materials have been chosen
• what methods of construction have been used
• how well products work
• how well products achieve their purposes
• how well products meet user needs and wants</td></tr>
<tr><td>• who designed and made the products
• where products were designed and made
• when products were designed and made
• whether products can be recycled or reused</td><td>• how much products cost to make
• how innovative products are
• how sustainable the materials in products are
• what impact products have beyond their intended purpose</td></tr>
<tr><td>Key events and individuals</td><td></td><td colspan="2">• Know about inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products</td></tr>
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<tr><th colspan="4">Technical knowledge</th></tr>
<tr><td rowspan="2">Making products work</td><td rowspan="2">• about the simple working characteristics of materials and components
• about the movement of simple mechanisms such as levers, sliders, wheels and axles
• how freestanding structures can be made stronger, stiffer and more stable
• that a 3-D textiles product can be assembled from two identical fabric shapes
• that food ingredients should be combined according to their sensory characteristics
• the correct technical vocabulary for the projects they are undertaking</td><td colspan="2">• how to use learning from science to help design and make products that work
• how to use learning from mathematics to help design and make products that work
• that materials have both functional properties and aesthetic qualities
• that materials can be combined and mixed to create more useful characteristics
• that mechanical and electrical systems have an input, process and output
• the correct technical vocabulary for the projects they are undertaking</td></tr>
<tr><td>• how mechanical systems such as levers and linkages or pneumatic systems create movement
• how simple electrical circuits and components can be used to create functional products
• how to program a computer to control their products
• how to make strong, stiff shell structures
• that a single fabric shape can be used to make a 3D textiles product
• that food ingredients can be fresh, pre-cooked and processed</td><td>• how mechanical systems such as cams or pulleys or gears create movement
• how more complex electrical circuits and components can be used to create functional products
• how to program a computer to monitor changes in the environment and control their products
• how to reinforce and strengthen a 3D framework
• that a 3D textiles product can be made from a combination of fabric shapes
• that a recipe can be adapted by adding or substituting one or more ingredients</td></tr>
<tr><th colspan="4">Cooking and nutrition</th></tr>
<tr><td>Where food comes from</td><td>• that all food comes from plants or animals
• that food has to be farmed, grown elsewhere (e.g. home) or caught</td><td colspan="2">• that a recipe can be adapted a by adding or substituting one or more ingredients
• that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world
In late KS2 pupils should also know:
• that seasons may affect the food available
• how food is processed into ingredients that can be eaten or used in cooking</td></tr>
<tr><td rowspan="2">Food preparation, cooking and nutrition</td><td rowspan="2">• how to name and sort foods into the five groups in the Eatwell Guide
• that everyone should eat at least five portions of fruit and vegetables every day
• how to prepare simple dishes safely and hygienically, without using a heat source
• how to use techniques such as cutting, peeling and grating</td><td colspan="2">• how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source
• how to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking</td></tr>
<tr><td>• that a healthy diet is made up from a variety and balance of different food and drink, as depicted in the Eatwell Guide
• that to be active and healthy, food and drink are needed to provide energy for the body</td><td>• that recipes can be adapted to change the appearance, taste, texture and aroma
• that different food and drink contain different substances – nutrients, water and fibre – that are needed for health</td></tr>
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Food Technology

In their food technology learning at Key Stage One, the children apply the principles of nutrition and healthy eating, learning how to prepare a range of dishes and develop their understanding of where food comes from. In Key Stage Two our children learn how to prepare and cook a range of dishes, developing their understanding of seasonality and where and how a variety of ingredients are grown, reared, caught and processed.

Skills and knowledge food diet and physical activity		
	By the end of Key Stage One, children should:	By the end of Key Stage Two, children should:
Diet (food and drink)	• Recognise that food and water are essential for life. • Be aware that we all need a balanced and varied diet to grow, be active and maintain health, and that we need to eat more of some foods than others, e.g. as depicted in *the eatwell guide.* • Be aware that being active and looking after yourself are important for health, e.g. brushing teeth twice a day. • Know that it is important to eat breakfast every day. • Know that some people eat or avoid certain foods for different reasons, e.g. due to allergy/intolerance, religion. • Drink plenty and not get thirsty, e.g. drink 6-8 glasses a day.	• Make food choices based on the current healthy eating advice and understand that a healthy diet is made up from a variety and balance of different food and drinks, as depicted in *the eatwell guide*. • Be aware of the importance of a healthy and balanced diet, good oral health and being physically active for health and wellbeing. • Know that food and drinks provide energy and in different amounts • Know that a variety of food is needed in the diet because different foods provide different substances required for our health, namely nutrients (carbohydrate, protein, fat, vitamins and minerals), water and fibre. • Be aware that food needs change and that some people eat or avoid certain foods, e.g. allergy/intolerance or religious belief. • Know that it is important to drink regularly throughout the day to stay hydrated.
Consumer Awareness *Food origins*	• Recognise that all food comes from plants or animals. • Understand and value where food comes from, e.g. a farm, the sea. • Recognise that food can be purchased or grown at home or at school.	• Understand where and how a variety of ingredients are grown, reared, caught and processed. • Know the basic steps in the producing food.
Food choice	• Be able to talk about which foods they like or dislike. • Know that people choose different types of food, based on who they are with, preferences, season, time of day, allergy/intolerance, religion and occasion (including celebrations). • Be aware that different settings may affect food and drink choice, e.g. home, school, eating out.	• Consider cost when helping to shop for food and cook at home. • Explore the factors involved in food and drink choice and how this may be influenced by availability, season, need, cost, minimal packaging, where the food is produced, culture, religion, allergy/intolerance and peer-pressure. • Be aware that advertising can influence what they choose to eat. • Be aware that it is important to choose an appropriate portion size for their needs.
Food labelling	• Be aware that some foods have labels which provide information to help when making a choice.	• Read and make use of the main information on food and drink labels.
Cooking (Food Preparation and Handling Skills)	• Recognise and taste a range of familiar ingredients, e.g. fruit, vegetables, cereals, dairy, meat, eggs, fish, potatoes. • Name and use a range of basic tools safely, e.g. small knife, chopping board, measuring spoon. • Use a range of food preparation skills with supervision, e.g. peeling, slicing, mixing, scooping, grating, spreading. • With help prepare a range of healthy dishes and drinks safely and hygienically. • Avoid wasting food during preparation and cooking and recycle food packaging. • Be able to eat sociably with others.	• Name, taste and prepare a broad range of ingredients and healthy recipes, reflecting cultural diversity. • Select and use appropriate tools and equipment safely when preparing and cooking food. • Demonstrate an increasing range of food preparation skills, e.g. accurate weighing and measuring, kneading. • Know how to store, prepare and cook a variety of predominantly savoury dishes safely and hygienically. • Actively minimise food waste, be aware of portion sizes, compost fruit and vegetables and recycle food packaging. • Appreciate the value of eating together with family and friends.
Food Safety	• Recognise the importance of preparing and cooking food safely and hygienically, e.g. handwashing, cleaning up regularly, keep work surfaces clean. • Be able to get ready to cook, e.g. tie back long hair, wash hands, wear an apron. • Be aware that food purchased or cooked needs to be stored in different ways to keep it safe, e.g. fridge, freezer.	• Know that food safety means preventing contamination, spoilage and decay when handling and storing food, so that it is safe to eat. • Demonstrate good food safety practices when getting ready to store, prepare and cook food, e.g. keep raw meat away from other food, thorough handwashing. • Understand the use of date-marks and storage instructions on food and drink labels.
Active Lifestyles (physical activity)	• Know that an active lifestyle is good for health. • Know how to get plenty of physical activity throughout the day during their normal routine. • Choose activities that they enjoy. • Take opportunities to take part in physical activity/sport. • Know that sitting down for too long at a stretch is not good for the body. • Drink more when being active.	• Know how much physical activity they should do in a day, the benefits of vigorous intensity activity, and know how they could achieve this in practice. • Know what it feels like to be active at a moderate and vigorous intensity. • Be able to take part in more formalised types of physical activity. • Know the basics of how physical activity affects their health. • Know that being physically active uses energy. • Understand how physical activity helps to build physical confidence, which contributes to a positive sense of themselves. • Be aware that doing regular physical activity makes their body fitter and stronger. • Know that the body uses more water when being physically active and this needs to be replaced.

Practical food skills progression

		Age 3-5	5-7	7-9	9-11
Food skills		**Pull** - Hull fruit, pick grapes from vine			
		Crush – soft fruit with a potato masher or fork e.g. raspberries as a topping for yoghurt or for a fruit drink	**Juice** – using a juicer extract juice e.g. orange	**Press -** using a garlic press	
		Peel – by hand e.g. satsuma, banana	**Peel** – with a swivel peeler with adult support	**Peel** – with a swivel peeler with adult supervision	**Peel** – with a swivel peeler to create food ribbons to be used in a dish e.g. courgette / carrot ribbons with supervision
			Spread – soft ingredients e.g. hummus	**Spread** – ingredients evenly over another food	
		Shape – foods by hand and with a rolling pin	**Shape** – with accuracy for a desired effect e.g. basic bread roll. Use a rolling pin	**Shape and mould** – to create visually appealing products e.g. mini cottage loaf or plait, wrap	
		Mix/stir – to loosely combine ingredients. Mash ingredients together using a fork	**Mix / stir** – with increasing thoroughness to combine ingredients. Whisk foods using a fork. Rub In fat to flour. Knead dough	**Mix / stir** – any ingredients thoroughly. Whisk foods using a hand whisk	**Mix / stir** – fold ingredients together carefully
		Spoon – ingredients between containers	**Spoon** – ingredients into different containers with increasing accuracy and minimal spillage	**Spoon** – be able to use two spoons to transfer ingredients into different size / shape containers with minimal spillages e.g. liquid foods into baking cases (muffin mixture)	**Spoon** – be able to gauge the quantities spooned to ensure an equal amount of ingredient in each container.
		Measure – using a spoon e.g. dried herbs, dried fruit Count ingredients	**Measure** – using different size measuring spoons e.g. liquids. Refer to ingredients in simple fractions e.g. half , quarter	**Measure** – using a measuring jug with support to obtain accuracy. Using digital scales with support to obtain accuracy	**Measure** – using a measuring jug independently and accurately. Using digital and analogue scales accurately and independently
		Cut out – ingredients with a cutter e.g. dough for scones	**Cut out** – ingredients neatly with a cutter. Use a table knife to cut dough into equal portions, e.g. cheese straws.	**Cut out** – placing the cutter in positions to make good of the material available and avoid waste	
		Grate – softer foods e.g. cheese, cucumber	**Grate** – firmer foods e.g. carrots, apples	**Grate** – using the zesting part of a graters e.g. lemon, orange. Using a nutmeg grater	
		Tear – fresh herbs	**Snip** – fresh herbs, spring onions	**Snip** – with greater dexterity and control e.g. to shred lettuce or cabbage leaves for salad.	
		Sift – sift flour into a bowl			
		Thread – thread soft foods into cocktail sticks e.g. fruit kebab – strawberries, satsuma segments	**Thread** – medium resistance foods onto kebab sticks e.g. mushrooms, courgettes	**Thread** – higher resistance foods onto kebab sticks e.g. peppers, onions	
		Cut – soft foods with butter knife e.g. banana, canned peach slices	**Cut** – low resistance foods with a table knife into equal size pieces / slices e.g. canned pineapple slices, sticks of pepper, mushrooms. Use a fork to secure foods	**Cut** – medium resistance foods with a vegetable knife, e.g. cucumber. Use a fork or the claw grip to secure foods. Medium resistant or partly prepared food using a bridge hold egg cut half a tomato into quarters, halve canned potatoes, halve large grapes.	**Cut** - higher resistance foods with a vegetable knife using the claw grip e.g. celery, carrots Higher resistant foods from whole using the bridge hold e.g. halve an apple, raw potato.
Recipe instructions		**Follow** – instructions given one at a time by an adult **Carry out** – instructions with support	**Follow** – a simple recipe supported by an adult **Carry out** – instructions with a little support	**Follow** – a simple recipe with guidance from an adult **Carry out** – instructions independently	**Follow** – a simple recipe independently **Carry out** – modifications to recipes
Equipment	Crushing / squeezing	Potato masher and fork	Juicer	Garlic press	
	Peeling	Peel by hand	Swivel peeler (adult support)	Swivel peeler (adult supervision)	
	Shaping	Rolling pin			
	Mixing	Mixing spoons	Whisk	Blender (adult support)	
	Measuring	Spoons and cups	Measuring spoons of different sizes	Measuring jug and digital scales	Analogue scales
	Cutting	Butter knife and cutters	Table knife	Vegetable knife (adult supervision)	
	Snipping		Kitchen scissors (adult supervision)		
	Grating		Grater (adult support)	Grater (adult support)	Grater (light adult supervision)
	Heating			With adult support and under adult supervision use toaster, hob	Under adult supervision use kettle, grill, oven

Impact

Progress in Design and Technology is demonstrated through regularly reviewing and scrutinising children's work over time. Evidence is obtained by considering outcomes and products, observing processes and techniques, and discussing what is known. Our children are encouraged to assess and evaluate both their own work and that of other pupils. Conversation based assessment takes place throughout the design and making process. Conversations might be whole class, group or 1:1 and will feed into processes of reflection and evaluation.

Teachers use ongoing discussion with the children to inform their observations and the information gathered during projects about the performance of individual children and groups enable teachers to provide carefully tailored feedback, questioning, explanation and support, according to their needs. At the end of each project, staff review the children's progress in relation to curriculum expectations and consider the progression framework to support their judgements. Opportunities for teachers to meet to review children's Design and Technology work across the school and to 'standardise' judgements are built into the school calendar.