

# Bill Quay Primary School



## Design and Technology Policy

## **Purpose of this policy**

The purpose of this policy is to outline our practice in design and technology (D & T) and the principles upon which it is based. It sets out a framework within teaching and non-teaching staff can work, and gives guidance on planning, teaching and assessment.

## **A rationale for teaching design and technology.**

Design and technology gives children the opportunity to develop skills, knowledge and understanding of designing and making functional products. It makes a high-quality contribution to a broad and balanced primary curriculum. ***One of the main aims is that DT is a vehicle for oracy, discussion and development of presentation skills, allowing children to make and justify their choices, express opinions and develop a sense of individual achievement, while sharing their learning with each other and learning from one another.*** A simple definition for D & T is outlined by the Design and Technology Association:

Something for

Somebody for

Some purpose

At Bill Quay Primary School, the design and technology curriculum is based on six key principles set out by the D & T Expert Advisory Group which ensure pupils' learning is genuinely design and technological in nature. These are:

### **User**

Pupils will 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 a specific target group.

### **Purpose**

Pupils will be able to clearly communicate the purpose of the products they are designing and making. Each product they create will be designed to perform a task and will be evaluated through use.

### **Functionality**

Pupils will design and make products that function effectively in order to fulfil users' needs, wants and purposes.

### **Design Decisions**

Pupils need opportunities to make their own design decisions. Making design decisions allows pupils to demonstrate their creative, technical and practical expertise, and use learning from other subjects. When 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.

## **Innovation**

When designing and making, pupils will be given 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.

## **Authenticity**

Pupils should design and make products that are believable, real and meaningful to themselves and others.

## **What is taught?**

At Bill Quay Primary School, children will acquire and apply knowledge and understanding of:

- materials and components
- mechanisms and control systems
- structures and existing products
- cooking and nutrition

## **Early Years**

The statutory Early Years Foundation Stage (EYFS) framework for England identifies D & T within the area of learning, 'Expressive Arts and Design'. In Reception class, pupils will: 'safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function' and 'use what they have learnt about media and materials in original ways, thinking about users and purposes'. Pupils will design and make products for a purpose and a user using a variety of materials, and engage in imaginative role-play where they create and use indoor and outdoor environments based on the designed and made world.

D & T also makes a contribution to all seven areas of the EYFS, in particular:

- Understanding of the world  
Pupils will have opportunities to explore existing products, as well as the designed and made world through the outdoor and indoor environment. They know how to operate simple equipment, and discuss why things happen and how things work.
- Mathematics  
D & T activities help pupils develop and apply their knowledge, understanding and skills in numbers, shape, space and measures through practical activities.
- Communication and Language  
Children listen carefully to instructions and follow them accurately when using tools and practising techniques. They explain how their own and others' products work, say who they think they are for and what purposes they fulfil.

Elements of effective practise in Reception class include:

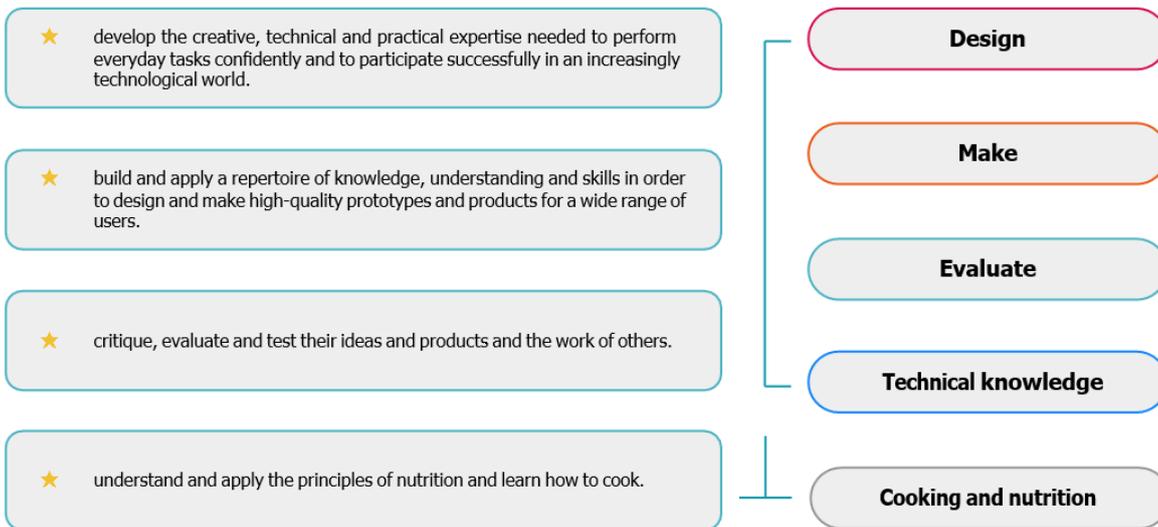
- Authentic activities that promote playing and exploring, active learning and creating and thinking critically.
- Pupils designing as they make.
- Activities which are sometimes child-initiated and sometimes adult-led.
- Pupils orally communicating what they are doing and have done, and physically arranging and rearranging materials and components.
- Pupils exploring a range of construction kits.
- Pupils exploring aspects of the designed and made world through indoor and outdoor play, and role play.

- Pupils are given opportunities to make their own choices/decisions and to discuss the reasons for these.

## National Curriculum Programme of Study

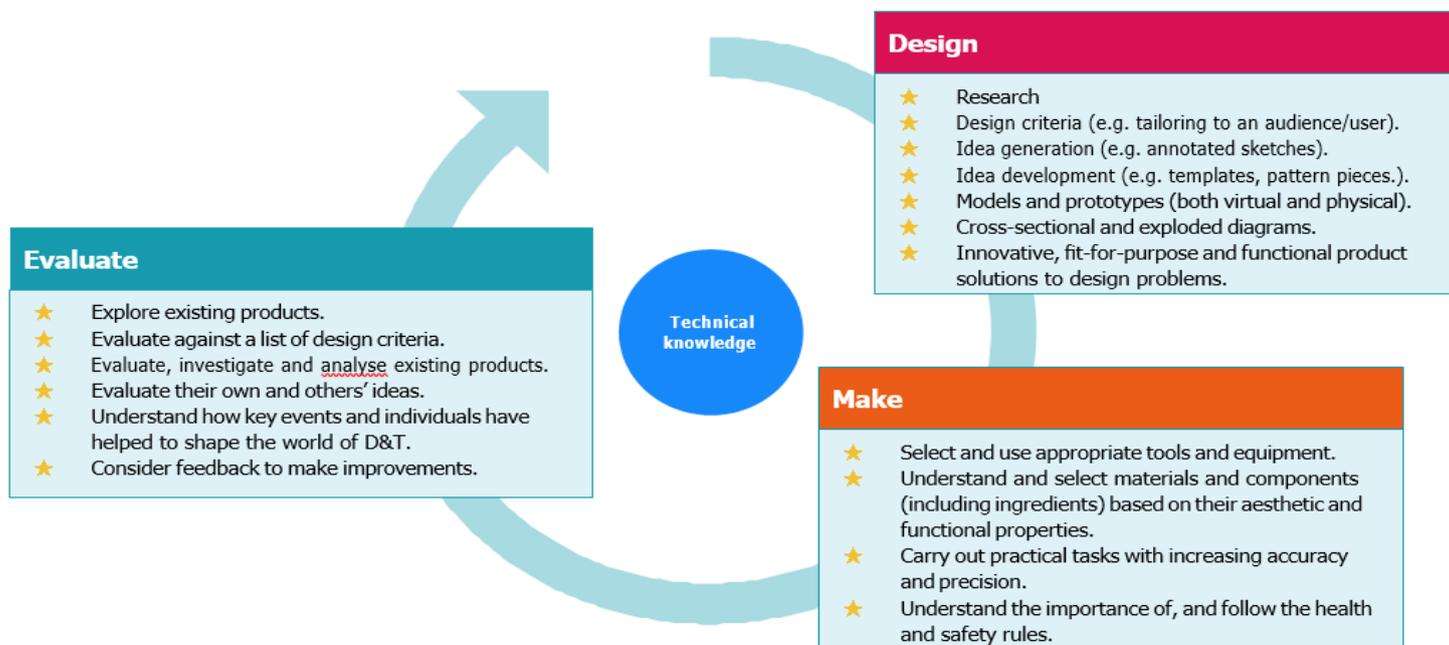
The National Curriculum Programme of Study sets out what should be taught in design and technology in key stages 1 and 2. Key learning objectives are organised into designing, making, evaluating and technical knowledge. Our long term plans (Appendix 1), incorporate the Kapow Primary Design and Technology Scheme of work, which has been divided into five key areas.

These ensure the following:



- One unit of learning is taught per term cover all – keys areas across a key stage.
- Wherever possible, links are made with learning in other subjects.
- Two mechanism projects are taught within key stage 1-one on sliders and levers, and the other on wheels and axles. This ensures necessary prior learning for mechanical systems in key stage 2 when pupils learn about levers and linkages, and gears and pulleys.
- The requirements for cooking and nutrition are built into food units.

The Design and technology National Curriculum outlines the three main stages of the design process: design, make and evaluate. Each Kapow Primary unit follows these stages, to form a full project. Each stage of the design process is underpinned by technical knowledge which encompasses the contextual, historical and technical understanding, required for each strand.



1. Activities which involve investigating and evaluating existing products, so that pupils can find out about D & T in the wider world.
2. Focused tasks which involve pupils developing particular aspects of knowledge and skills.
3. Designing and making activities in which pupils design and make 'something' for 'somebody' for 'some reason'

### Cross Curricular Links

Skills learned in design and technology also help with learning across the curriculum. Pupils' understanding in science is often linked to design and technology projects. For instance, pupils in Year 4 study electricity in science and within the same term, apply their learning to design and make night lights. In Year 1, pupils link Christmas to their food topic and design and make Christmas puddings as gifts to take home. Pupils in Year 2 will design and make moon buggies linked to their topic of 'Space' whilst in Year 1, pupils will design and make a home for Barnaby Bear as part of their 'Hot and Cold' topic. We also endeavour to ensure that pupils experience STEM activities throughout the year. In addition to a dedicated STEM week, pupils in Year 5 and 6 will incorporate coding into their design and technology learning.

### Progression and Assessment in D & T

In order to ensure progression across the key stages, we use the 'Projects on a Page' scheme of learning from the D & T Association. For each planner, National Curriculum coverage is detailed, as well as key learning that sets out what pupils have previously learnt in earlier topics and how they will build upon previous learning. In addition to these planners, a progression framework (Appendix 2) details age-related expectations so that staff are able to gain a better understanding of what is expected within KS1, Lower KS2 and Upper Key Stage 2, thereby helping to maximise progress in D & T.

Examples of progression across the key stages:

- **Designing**  
In KS1, pupils should be able to clearly state what their product is for. In KS2, pupils will develop design specification to guide their thinking.
- **Making**  
Pupils in KS1 will select from a range of materials and components according to their characteristics. Across KS2, pupils should be able to select tools and equipment suitable for the task.
- **Evaluating**  
When considering their design ideas, pupils in KS1 should refer to what the product is intended to do, who it will be for and how it will work. In KS2, pupils will evaluate their ideas and products against their original design specification
- **Technical vocabulary**  
In KS1, pupils will learn about the movement of simple mechanisms, such as levers, sliders, wheels and axles. In KS2, pupils will progress to knowing how these systems create movement.

A cumulative approach to progression ensures that learning is revisited throughout the key stages and that knowledge, understanding or skills is used in a more sophisticated way. As projects are taught, teachers will assess pupils against the key objectives, being mindful of those pupils whose progress is markedly different from the expectations outlined in each project planner. This enables teachers to identify which pupils need further support or challenge. At the end of each unit, using the assessment criteria statements (Appendix 2), pupils will be assessed as having either met the expectations or working towards the expectations.

### **Health and Safety**

We ensure that practice in D & T is healthy, safe and hygienic. Children will be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task. Risk assessments for D & T are carried out. In food technology we identify, prior to planning, whether there are any children who are not permitted to taste or handle any food ingredients or products.

## Appendix 1

### Plan Overview

Year group	Autumn	Spring	Summer
1	Structures: Stable structures	Cooking and nutrition: Smoothies	Mechanisms: Wheels and axles
2	Structures: A chair for a bear	Textiles: Pouches	Cooking and nutrition: Balanced diet
3	Mechanical systems: Pneumatic toys	Cooking and nutrition: Eating seasonally	Structures: Constructing a castle
4	Electrical systems: Torches	Digital world: Mindful moments timer	Textiles: Fastenings
5	Structure: Bridges	Cooking and nutrition: Developing a recipe	Mechanical systems: Gears and pulleys
6	Electrical systems: Steady hand game	Digital world: Navigating the world	Textiles: Bags

## Year 1

<b>Autumn</b>	<p><u>Structures: Stable structures</u></p> <p>6 lessons</p> <p>Exploring how structures can be made more stable with a wide base and extra weight added to the base, the children will apply these skills in designing and making a stable pencil pot for a Year 1 pupil.</p>
<b>Spring</b>	<p><u>Cooking and nutrition: Smoothies</u></p> <p>7 lessons</p> <p>Cutting and juicing fruits and vegetables to create a smoothie that meets a design brief, this unit gives the children opportunities to develop food preparation skills with an increased focus on taste testing and ingredient choices.</p>
<b>Summer</b>	<p><u>Mechanisms: Wheels and axles</u></p> <p>6 lessons</p> <p>Exploring how a wheel's shape, smoothness and attachment affect movement, the children learn how to use a wheel, axle and axle holder to create the mechanism for a pull-along toy.</p>

## Year 2

<b>Autumn</b>	<p><u>Structures: A chair for a bear</u></p> <p>6 lessons</p> <p>Exploring how to strengthen materials, the children will make a strong chair for a bear.</p>
<b>Spring</b>	<p><u>Textiles: Pouches</u></p> <p>5 lessons</p> <p>Learn how to sew a running stitch ready to design, make and decorate a pouch using a template.</p>
<b>Summer</b>	<p><u>Cooking and nutrition: Balanced diet</u></p> <p>7 lessons</p> <p>Learning about the importance of a balanced diet and using that knowledge to create a tasty wrap, this unit includes new lessons with both teacher and pupil videos.</p>

## Year 3

<b>Autumn</b>	<p><u>Mechanical systems: Pneumatic toys</u></p> <p>6 lessons</p> <p>Exploring pneumatic systems, the children will apply their understanding to design and create a pneumatic toy using different types of diagrams.</p>
<b>Spring</b>	<p><u>Cooking and nutrition: Eating seasonally</u></p> <p>7 lessons</p> <p>Learning about seasonal foods and creating a seasonal food tart, this unit provides new lessons with teacher and pupil videos to develop the children's food preparation skills.</p>
<b>Summer</b>	<p><u>Structures: Constructing a castle</u></p> <p>5 lessons</p> <p>Identifying the key features of castles, using this knowledge to design and make castle structures from recycled materials.</p>

## Year 4

<b>Autumn</b>	<p><u>Electrical systems: Torches</u></p> <p>5 lessons</p> <p>Identify the difference between electrical and electronic products. Evaluate a range of existing torches and their features, then develop a new functional torch design.</p>
<b>Spring</b>	<p><u>Digital world: Mindful moments timer</u></p> <p>7 lessons</p> <p>Exploring the concept of mindfulness and writing design criteria to develop a programmed product for timing a mindful moment, this unit includes new teacher and pupil videos, with an increased focus on evaluation and the use of a virtual Micro:bit.</p>
<b>Summer</b>	<p><u>Textiles: Fastenings</u></p> <p>5 lessons</p> <p>Analyse and evaluate a range of existing fastenings, then devise a list of design criteria to design, generate templates and make a fabric book sleeve. Exploring shell structures, the children investigate how they are strengthened to protect or contain, then apply this knowledge to design and construct their own helmets.</p>

## Year 5

<b>Autumn</b>	<p><u>Structure: Bridges</u></p> <p>5 lessons</p> <p>Testing and analysing different bridges to determine their strength and stability. Exploring material properties and sources, before marking, sawing and assembling a wooden truss bridge.</p>
<b>Spring</b>	<p><u>Cooking and nutrition: Developing a recipe</u></p> <p>7 lessons</p> <p>Learning a simple bolognese recipe and adapting it to improve nutritional content, this unit provides new lessons with teacher and pupil videos to develop the children's food preparation skills.</p>
<b>Summer</b>	<p><u>Mechanical systems: Gears and pulleys</u></p> <p>6 lessons</p> <p>Exploring the history, mechanics and uses of gears and pulleys, children apply their understanding to make a gear and a pulley system and design an eco-bike that harnesses the energy from an exercise bike to do work.</p>

## Year 6

<b>Autumn 1</b>	<p><u>Electrical systems: Steady hand game</u></p> <p>5 lessons</p> <p>Understand what is meant by fit for purpose design and form follows function. Design and develop a steady hand game using a series circuit, including housing and backboard.</p>
<b>Spring 1</b>	<p><u>Digital world: Navigating the world</u></p> <p>6 lessons</p> <p>Design and program a navigation tool to produce a multifunctional device for trekkers using CAD 3D modelling software. Pitch and explain the product to a guest panel.</p>
<b>Summer 1</b>	<p><u>Textiles: Bags</u></p> <p>6 lessons</p> <p>Exploring pattern pieces in textiles, the children investigate how fabric shapes are used to create products while designing and making their own bags.</p>

## Appendix 2 – Year 5 Assessment Sheet

	Structures	Mechanisms	Electrical Systems	Cooking and Nutrition	Textiles
Design	<p>Designing a stable structure that is able to support weight</p> <p>Creating frame structure with focus on triangulation</p>	<p>Designing a pop- up book which uses a mixture of structures and mechanisms</p> <p>Naming each mechanism, input and output accurately</p> <p>Storyboarding ideas for a book</p>	<p>Designing an electronic greetings card with a simple electrical control circuit</p> <p>Creating a labelled design showing positive and negative parts in relation to the LED and the battery</p>	<p>Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients</p> <p>Writing an amended method for a recipe to incorporate the relevant changes to ingredients</p> <p>Designing appealing packaging to reflect a recipe</p>	<p>Designing a stuffed toy considering the main component shapes required and creating an appropriate template</p> <p>Considering proportions of individual components</p>
Make	<p>Making a range of different shaped beam bridges</p> <p>Using triangles to create truss bridges that span a given distance and supports a load</p> <p>Building a wooden bridge structure</p> <p>Independently measuring and marking wood accurately</p> <p>Selecting appropriate tools and equipment for particular tasks</p> <p>Using the correct techniques to saw safely</p> <p>Identifying where a structure needs reinforcement and using card corners for support</p>	<p>Following a design brief to make a pop-up book, neatly and with focus on accuracy</p> <p>Making mechanisms and/ or structures using sliders, pivots and folds to produce movement</p> <p>Using layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result</p>	<p>Making a working circuit</p> <p>Creating an electronics greeting card, referring to a design criteria</p> <p>Mapping out where different components of the circuit will go</p>	<p>Cutting and preparing vegetables safely</p> <p>Using equipment safely, including knives, hot pans and hobs</p> <p>Knowing how to avoid cross-contamination</p> <p>Following a step by step method carefully to make a recipe</p>	<p>Creating a 3D stuffed toy from a 2D design</p> <p>Measuring, marking and cutting fabric accurately and independently</p> <p>Creating strong and secure blanket stitches when joining fabric</p> <p>Using applique to attach pieces of fabric decoration</p>

Evaluate	<p>Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary</p> <p>Suggesting points for improvements for own bridges and those designed by others</p>	<p>Evaluating the work of others and receiving feedback on own work</p> <p>Suggesting points for improvement</p>	<p>Evaluating a completed product against the original design sheet and looking at modifications that could be made to improve the reliability or aesthetics of it or to incorporate another type of electronic device, eg: buzzer</p>	<p>Identifying the nutritional differences between different products and recipes</p> <p>Identifying and describing healthy benefits of food groups</p>	<p>Testing and evaluating an end product and giving point for further improvements</p>
Technical Knowledge	<p>Exploring how to create a strong beam</p> <p>Identifying arch and beam bridges and understanding the terms: compression and tension</p> <p>Identifying stronger and weaker structures</p> <p>Finding different ways to reinforce structures</p> <p>Understanding how triangles can be used to reinforce bridges</p> <p>Articulating the difference between beam, arch, truss and suspension bridges</p>	<p>Knowing that an input is the motion used to start a mechanism</p> <p>Knowing that output is the motion that happens as a result of starting the input</p> <p>Knowing that mechanisms control movement</p> <p>Describing mechanisms that can be used to change one kind of motion into another</p>	<p>Learning the key components used to create a functioning circuit</p> <p>Learning that graphite is a conductor and can be used as part of a circuit</p> <p>Learning the difference between series and parallel circuits</p> <p>Understanding that breaks in a circuit will stop it from working</p>	<p>Understanding where food comes from - learning that beef is from cattle and how beef is reared and processed</p> <p>Understanding what constitutes a balanced diet</p> <p>Learning to adapt a recipe to make it healthier</p> <p>Comparing two adapted recipes using a nutritional calculator and then identifying the healthier option</p>	<p>Learning to sew blanket stitch to join fabric</p> <p>Applying blanket stitch so the space between the stitches are even and regular</p> <p>Threading needles independently</p>

Working towards expectations	Working at expectations