Progression in Design and Technology – Sheering C. of E. Primary School

'Technology makes possibilities. Design makes solutions.'
John Maeda

INTENT

Design and Technology is a fascinating subject that allows children to engage and improve their practical and design skills. Our curriculum allows children to learn how to make a range of products that could be used in their everyday lives or their local community, to learn how to evaluate their work, to use observation, to think critically when planning their designs and to learn how to use a range of tools for construction.

Key Features and Expectations

Key Features:

- Each class has access to a kitchen specifically designed to support food and nutrition lessons
- 2 strands of Design and Technology taught (food and nutrition and product focus)
- Key vocabulary is highlighted and explicitly taught within the lesson
- Recapping of prior knowledge and reference to previously taught skills
- Pre and post learning tasks or enquiry questions
- Extra-curricular Needlework, STEM and Lego Club held weekly
- Children apply practical elements within weekly Explorer lesson

Expectations:

- At least one food and nutrition unit per year and at least one product focus per year
- Children referred to as 'designers' and 'chefs'
- Each lesson has the long date and a WALT written or labelled in their topic books/Art & DT Folders/Foundation Subject book. Headings: Design, Make, Evaluate with illustrations or photographic evidence of products
- Class or individual research to develop design briefs and specifications
- Utilise exciting resources and tools some of which are loaned from the Essex Library Service e.g. books and artefacts to enhance pupils understanding of products during different periods
- Product photos displayed in the classroom during DT units
- Discussions to analyse products, develop cultural capital and promote evaluations of work
- Using the term 'key design and technology vocabulary' when introducing new terminology
- Termly assessments identifying whether children have met, are working towards or are exceeding the expected standard, this is then used to inform future planning

IMPACT

Design and Technology learning is loved by teachers and pupils across school. Teachers have high expectations and Design and Technology provides children with an opportunity to link their learning to other subjects across the curriculum such as Science and Maths. All children use technical vocabulary accurately and pupils are expected to know, apply and understand the technical knowledge and skills specified. Children improve their enquiry skills and inquisitiveness about the world around them, and their impact through planning, making and evaluating based on design criteria and specifications. Children will become more confident in analysing their work and giving their opinion on their own and others designs. Children show competences in improving their resilience and perseverance by continually evaluating and improving their work. All children in school can speak confidently about their design and technology work and their skills.

EYFS links:

Expressive Arts and Design

In Reception

- Return to and build on their previous learning, refining ideas and developing their ability to represent them
- Create collaboratively sharing ideas, resources and skills

Physical Development

In Reception

- Develop their small motor skills so that they can use a range of tools competently, safely and confidently - suggested tools: pencils for drawing and writing, paintbrushes, scissors, knives, forks and spoons

Creating with Materials ELG

- Safely use and explore a variety of materials, tools and techniques
- Share their creations, explaining the process they have used; - Make use of props and materials when role playing characters in narratives and stories

Fine Motor Skills ELG

- Use a range of small tools, including scissors, paint brushes and cutlery

	KS 1 Cycle A	KS 1 Cycle B	Lower KS2 Cycle A	Lower KS2 Cycle B	Upper KS2 Cycle A	Upper KS2 Cycle B
MAIN PRODUCT FOCUS	(Graphic design – focus on books) A whole class moving book for a Y1/2 child	A push or pull wheeled toy	(Textile design) A textile container with a fastener e.g. a pencil case, phone case, iPad case, bag	(Graphic design and electrical engineering) A table-top game incorporating an electrical system	(Mechanical engineering) a moving toy car (incorporating a mechanical system)	(Civil engineering - collaborative project) A bridge (made from limited materials)
	DT WILL ALSO BE TAUGHT, PRACTISED AND APPLIED THROUGH ADDITIONAL INTENTIONALLY PLANNED OPPORTUNITIES ACROSS THE CURRICULUM					

	By the end of KS1 children should be able to:	By the end of Lower KS2 children should be able to:	By the end of Upper KS2 children should be able to:
TECHNICAL KNOWLEDGE	- Know a **mechanism** is something that creates movement in a product - Know a **wheel** and **axle** is an example of a **mechanism** - Know an **axle** is a rod that goes through the centre of a wheel to keep it in place and help it turn around - Know a **wheel** can **r**otate **freely** on an axle - Know a **wheel** can be **fixed** to, and turn with, an axle - Know if a product is **stable** it is unlikely to topple over when pushed, pulled or moved - Know if a product is **unstable** it is likely to topple over when pushed, pulled or moved - **Know** some of the mechanisms that create movement in a moving book e.g. lever, hinge etc - Know a **lever** is a rigid bar which moves around a pivot - Know a **pivot** is a fixed part that holds a lever in place as it turns - Know a **slider** is a rigid bar which moves backwards and forwards along a straight line. Unlike a lever, a slider does not have a pivot point - Know a **slot** is **t**he hole through which a lever or slider is placed - Know a **flap** has only one side fixed to another object (making a hinge) - Know a **hinge** is a mechanism that connects two objects but allows movement - Know **strengthen** means to make something stronger - Know **stiffen** means to make something more difficult to bend by making it stronger - Know the thickness of a material affects its **strength** and **stiffness**	- Know a **seam** is a line of stitching that creates a join between pieces of fabric (the closer the stitches the stronger the seam) - Know a **seam allowance** is extra fabric allowed when joining textiles together – it makes the seam stronger because it stops the stitches coming undone - Know a **fastening** is something used to keep a product securely closed e.g. a zip, button, eyelet, Velcro - Know that a single fabric shape can be used to make a 3D textiles product - Know a **series circuit** is an electrical system where all of the current flows through each part of the circuit - Know the components of a series circuit e.g. switches, bulbs, buzzers - Can create a series circuit - Know **corrugating** is a technique used to stiffen and strengthen card e.g. a piece of paper or card is zig-zagged though folding, and stuck between 2 layers of card - Know **laminating** is a technique used to stiffen and strengthen card, e.g. glue together several layers of card	- Know a **frame structure** is a rigid structure like a skeleton that supports e.g. a building, bridge, tunnel, tent - Know a bridge is a **frame structure** - Know types of bridges e.g.: **beam bridge (**horizontal beam/s supported at each end); **arch bridge** (has an arch that is supported at each end); **truss bridge** (lots of triangles joined together and is supported at each end) - Know the **deck** is the flat surface of a bridge that pedestrians and vehicles travel on - Know a **beam** is a length of materials that spans a gap or supports a structure - Know a **pier** is a part of a bridge – a vertical post - know **piers** support the deck of a bridge so it does not collapse when there is a heavy load - Know triangles are used to strengthen bridges because they are a very strong and stable shape - Know in engineering, when triangles are joined together it is called a **truss** - Know an **arch** is a part of a bridge that is curved at the top and supported on either side - **Arches** are used in bridges because they help the load to spread out instead of pushing down so the bridge does not collapse - Know a **mechanical system** is a set of related parts or components used to create movement - Know a **pulley** is a grooved wheel over which a drive belt can run - Know a **gear** is a wheel with teeth around its circumference - Know a **shell structure is** a hollow structure with a thin outer covering - Know **CAD** is computer aided design - Know computing can be used to program, monitor and control products

	By the end of KS1 children should be able to:	By the end of Lower KS2 children should be able to:	By the end of Upper KS2 children should be able to:
APPLICATION OF TECHNICAL SKILLS	- Use construction kits to make products that are stable - Use construction kits to make products with wheel and axle mechanisms with: • wheels that rotate freely on the axle • wheels that are fixed to and turn with the axle - Use e.g. dowelling, cotton reels and card to make wheel and axle mechanisms with: • make wheels that rotate freely on an axle - Make wheels that are fixed to, and turn with, an axle - Use paper and card of different thicknesses, and paper fasteners to create mechanisms that will move in a straight line, backwards and forwards, and in a curve, including: • levers • sliders • slots • pivots • flaps (i.e. with a hinge) - Strengthen and stiffen paper and card through folding and gluing layers	- Use close running stitches to create a seam - Use a seam allowance - Use a secure fastening to join two pieces of fabric/open and close a textile product e.g. a button, eyelet, Velcro - Stiffen and strengthen card through: • corrugating • laminating - Create series circuits using e.g. switches, bulbs, buzzers and motors - Use symbols to draw series circuits	- Create a frame structure - Strengthen a frame structure using: • triangulation • arches • pillars • diagonal struts - Change rotational speed through the use of pulleys or gears - Connect and transfer movement between two pulleys using a drive belt. - Apply understanding of computing to program, monitor and control their products - Create a shell structure using CAD

	By the end of KS1 children will be able to:	By the end of Lower KS2 children will be able to:	By the end of Upper KS2 children will be able to:
	Work confidently within a range of contexts e.g. imaginary, story-based, home, school etc.	Work confidently within a range of contexts e.g. school, culture, leisure, enterprise, industry, wider environment etc	
DESIGN - understanding contexts, users and purposes; generating, developing, modelling and communicating ideas	- Know the **design criteria** are the things a product must have and be able to do Describe: • the product that is being designed • what it is for/where it will be used • who it is for • how the product will work • the features the product will have • what the product will be made from • how the product will be made suitable for the user - Interpret simple design criteria to help develop their ideas so that products are purposeful, functional and appealing - Generate design ideas by drawing on their own experiences and knowledge/research about existing products to help come up with ideas - Develop and communicate design ideas by talking and begin to develop design ideas by drawing - Model ideas by making templates - Know a **template** is a shape made from a strong material (e.g. plastic or thick card) that you draw around. It helps you get the exact shape you need before cutting it out - Use computing to develop and communicate their ideas - Review design ideas based on feedback from others	Describe: • the purpose of the product that is being designed (who/what for and where to be used) • the materials their product will be made from • the features the product will have • how particular parts of their products work • how the product will appeal to intended users - Gather information about the needs and wants of particular individuals and groups - Interpret design criteria to help develop their ideas so that products are purposeful, functional and appealing - Generate realistic ideas focusing on the needs of the user - Make design decisions that take account the availability of resources - Generate, develop, model and communicate their ideas through: • discussion • annotated sketches • a simple pattern - Refer to the design criteria as they design - Review and rework ideas considering the views of others - Know a **pattern** is a paper template used for textiles - Know an **annotated sketch** is a combination of notes and labelled drawings	Describe: • The purpose of the product that is being designed (who/what for and where to be used) • The materials their product will be made from • The features the product will have • How their product that will appeal to intended users • How particular parts of their products work - Carry out research, using survey, questionnaires and internet to inform a design specification - Identify the needs, wants and preferences of particular individuals and groups - Know a **design specification** is a detailed list of things a product needs to have and be able to do - Interpret design specification to inform their ideas/design so that products are purposeful, functional and appealing - Generate innovative ideas, drawing on research - Make design decisions, taking account of constraints such as resources/time - Develop and communicate design ideas (with increasing professionalism) through: • annotated sketches • cross-sectional diagrams • oral and digital presentations • exploded diagrams • computer-aided design (CAD) - Review and rework ideas considering the views of others - Evaluate design ideas against a specification - Know a **cross-sectional diagram** shows what the inside of something looks like after a cut has been made across it - Know an **exploded diagram** shows how a product can be assembled and how the separate parts fit together

	By the end of KS1 children will be able to:	By the end of Lower KS2 children will be able to:	By the end of Upper KS2 children will be able to:
MAKE: planning to make	- Select from a range of tools and equipment, explaining their choices - Select from a range of materials and components (including different thicknesses of paper and card) according to their characteristics	- 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 textiles and other components suitable for the task - Explain their choice of materials and components according to their qualities - Order the main stages of making	- 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 - Produce appropriate lists of tools, equipment and materials that they need - Formulate simple step-by-step plans as a guide to making

	By the end of KS1 children will be able to:	By the end of Lower KS2 children will be able to:	By the end of Upper KS2 children will be able to:
MAKE: practical skills and techniques when making	- Follow procedures for safety - Use construction materials and kits to make products - Fold paper and card - Use scissors to cut along straight and curved lines drawn on paper, card and textiles - Use textiles to make products - Join textiles using PVA glue/spreaders - Use finishing techniques, including those from art and design *(e.g. coloured pens, paint, glitter)* - Use paper and card of different thicknesses - Use a template to mark out card - Use scissors to shape paper and card by cutting along drawn straight and curved lines - Fold paper and card with increasing accuracy (matching corner to corner) - Join a range of paper and card using: • PVA glue and a spreader • different types of tape • paper clips • split pins • stapler [with supervision] - Use computing devices to finish products - Use techniques from art and design to finish products (e.g. paint, pastels, felt pens)	- Follow procedures for safety - Use a range of textiles - Mark out textiles using a pattern and chalk (so it does not leave a permanent mark) - Cut and shape textiles using scissors and pinking shears (to stop fabric from fraying) with some accuracy - Use a single fabric shape to make a 3D textiles product - Join textiles using a seam and seam allowance with a simple running stitch - Join a fastener to textiles by stitching or gluing - Use appliqué (stitching/ gluing patches on to fabric to provide decoration) to finish a product - Use a range of card of different sizes and thicknesses - Measure and mark out card using a ruler - Cut card accurately with scissors using marking out as a guide - Cut card accurately with a paper trimmer using marking out as a guide - Fold card accurately - Apply a range of finishing techniques including use of computing devices - Join a range of materials using: • PVA glue and a spreader • different types of tape • paper clips • stapler	- Follow procedures for safety - Use a wider range of materials and components - Accurately measure, mark out, cut and shape a range of materials and components - Accurately assemble, join and combine materials and components - Cut a range of materials accurately and safely to a marked line - Apply a range of finishing techniques for their products - Demonstrate resourcefulness when tackling practical problems - Use a junior hacksaw and bench-hook under supervision - Join two pieces of wood using: • a basic butt joint (connecting two pieces of wood to each other at a corner, typically 90 degrees). • a miter butt joint (joining two pieces of wood with the ends cut at a 45-degree angle). - Use a glue-gun under supervision - Use techniques that involve a number of steps - Accurately apply a range of finishing techniques - Demonstrate resourcefulness when tackling practical problems

	By the end of KS1 children will be able to:		By the end of Lower KS2 children will be able to:	By the end of Upper KS2 children will be able to:
EVALUATE OWN PRODUCTS	- Make simple judgements about their products and ideas against design criteria - Suggest how their products could be improved		- Identify the strengths and areas for development in their ideas and products - Consider the views of others to improve their work - Use the design criteria to evaluate their completed products	- Identify the strengths and areas for development in their ideas and products - Consider the views of others to improve their work - Test and evaluate their product against design specification
Key Vocabulary	<u>EYFS</u> - Draw, ideas, build, make, like, dislike, better, worse, equipment, move, join, prepare.	<u>KS1</u> - Wheel, axel, stable, unstable, lever, pivot, slider, flap, hinge, strengthen, stiffen, template.	- Requirements, prototype, seam, seam allowance, fastening, series circuit, corrugating, laminating, pattern, annotated sketch, function, target audience, brief.	- Design specification, frame structure, beam bridge, arch bridge, deck, beam, pier, truss, arch, mechanical system, pulley, gear, shell structure, CAD, design specification, diagram, exploded diagram.

Food and Nutrition

	By the end of KS1 children will be able to:	By the end of Lower KS2 children will be able to:	By the end of Upper KS2 children will be able to:
PRODUCT FOCUS	Cooking and nutrition: healthy sandwiches/wraps for self	Cooking and nutrition: healthy snack bars for others in school	Cooking and nutrition: plan and cook a healthy meal on a budget for guests
Where food comes from	- Know that all food comes from plants or animals - Know that all food has to be farmed, grown elsewhere, reared or caught	- Know that food in the UK, Europe and the wider world is: • grown (e.g. tomatoes, wheat and potatoes) • reared (e.g. pigs, chickens and cattle) • caught (e.g. fish) - Know that food ingredients can be fresh, pre-cooked and processed	- Know that seasons may affect the food available - Know how food is processed into ingredients that can be eaten or used in cooking

	By the end of KS1 children will be able to:		By the end of Lower KS2 children will be able to:	By the end of Upper KS2 children will be able to:
Food preparation, cooking and nutrition	- Work safely and hygienically - Name and sort foods into the five groups in the Eatwell Plate - Know that everyone should eat at least five portions of fruit and vegetables every day - Know how to prepare simple dishes safely and hygienically without using heat sources - Use a range of food ingredients - Spread, cut, peel and grate a range of ingredients using a range of tools and equipment (knife, peeler, grater) - Know that food ingredients should be assembled according to their characteristics		- Follow procedures for hygiene and safety, including the use of a heat source where appropriate - Know how to prepare and cook a variety of predominantly savoury dishes - Use a range of tools and techniques e.g. for peeling, chopping, slicing, grating, mixing, and baking - Know that a healthy diet is made up from a variety and balance of different food and drink, as depicted in the Eatwell Plate - Combine a range of ingredients to create a healthy dish - Use kitchen scales to weigh ingredients appropriately - Know that to be active and healthy, food and drink are needed to provide energy for the body	- Follow procedures for hygiene and safety, including the use of a heat source where appropriate - Know how to prepare and cook a variety of predominantly savoury dishes - Select and prepare a dish for a particular purpose, taking into account seasonality and healthy eating principles - Use a range of tools and techniques e.g. for peeling, chopping, slicing, grating, mixing, and baking - Know that a recipe can be adapted by adding or substituting one or more ingredients - Know that different food and drinks contain different substances – nutrients, water and fibre – that are needed for health
Key Vocabulary	<u>EYFS</u> - Safety, hygiene, healthy, senses (smell, taste, see, touch, hear).	<u>KS1</u> - Farmed, grown, caught, reared, food groups.	- Fresh, pre-cooked, processed, savoury, utensils, benefit, drawback.	- Seasonal, nutrients, hazard, cross-contamination.

KS1	Cycle A Autumn	Cycle B Autumn	Cycle A Spring	Cycle B Spring	Cycle A Summer	Cycle B Summer
	GFoL	Explorers	UK/Kenya	Polar Region	Seaside	Toys
Suggested DT link		Cooking and nutrition: healthy sandwiches/ wraps for self	(Graphic design – focus on books) A whole class moving book for a Y1/2 child		Cooking and nutrition: healthy sandwiches/ wraps for self	A push or pull wheeled toy

LKS2	Cycle A Autumn	Cycle B Autumn	Cycle A Spring	Cycle B Spring	Cycle A Summer	Cycle B Summer
	Stone Age	Roman Empire	Comparisons with Spain	Volcanoes	Ancient Egypt	Ancient Greece
Suggested DT link	(Textile design) A textile container with a fastener e.g. a pencil case, phone case, iPad case, bag	Cooking and nutrition: healthy snack bars for others in school	Cooking and nutrition: healthy snack bars for others in school			(Graphic design and electrical engineering) A table-top game incorporating an electrical system

LUKS2	Cycle A Autumn	Cycle B Autumn	Cycle A Spring	Cycle B Spring	Cycle A Summer	Cycle B Summer
	WW2	Victorians	North America	Eco-warriors	Vikings	Mayans
Suggested DT link	(Mechanical engineering) a moving toy car (incorporating a mechanical system)		Cooking and nutrition: plan and cook a healthy meal on a budget for guests	Cooking and nutrition: plan and cook a healthy meal on a budget for guests		(Civil engineering - collaborative project) A bridge (made from limited materials) Making chocolate