Southbroom St James Academy

Southbroom St James Academy – Design and Technology Intent

What is Design and Technology?

Our design and technology curriculum will enable our children to master Design and Technology skills to such an extent that they can go on to have careers within Design and Technology and make use of design and technology effectively in their everyday lives.

Our children will be taught Design and Technology in a way that ensures progression of skills, and follows a sequence to build on previous learning. Our children will gain experience and skills of a wide range of formal elements of design and concepts of technology in a way that will enhance their learning opportunities, enabling them to use design and technology across a range of subjects to be creative and solve problems, ensuring they make progress.

How will the curriculum be delivered? Implementation.

As per our teaching and learning policy, the approach taken with all subjects is to ensure that memory is strengthened at all opportunities. As Kirschner, Sweller and Clarke (2006) stated: "Learning is a change in the long-term memory. If nothing has been changed in the long-term memory then nothing has been learned."

How do we ensure this in DT?

Our curriculum is underpinned by the National Curriculum and has been mapped to be progressive and build on prior learning. Through the use of high-quality resources, children will be given the opportunity to explore designing and making linked to real world contexts.

All teaching of DT should follow the design, make and evaluate cycle, with well-planned sequences of lessons immersing the children in the design and making process, from analysing the existing products, through to evaluating the finished version made by the children.

We work on the principle that all learners, with effort and excellent teaching, will meet expectations. Where possible and appropriate, links are made with other subjects and our wider curriculum themes and Christian values, encouraging deeper thinking and reflection.

The exact skills and technical knowledge to be learnt is set out for staff in detailed medium-term plans.

Curriculum Review (Impact):

The teaching of the use of tools, cooking equipment and sewing equipment is progressive, building year on year, ensuring that by the end of Key Stage 2, pupils have a full range of skills and understand how to use equipment safely. Their application of their new technical knowledge and skills is assessed through the product that pupils design and make as part of each unit of work. The impact of our DT curriculum is also reviewed through lesson drop-ins and pupil discussions.

Concepts in Design and Technology

Designers use four key concepts and these help to focus their understanding of their experience, a system of structure and how they learn and use these. Children are then able to build a schema of knowledge around these key themes. Key concepts shape the overarching enquiry for the spine of learning.

Teaching Enquiries

Year 3/4 A	**Digital world** Wearable technology	**Mechanical systems** Pneumatic toys	**Structures** Constructing a castle
Year 3/4 B	**Textiles** Fastenings	**Electrical systems** Torches	**Cooking and nutrition** Adapting a recipe
Year 5/6 A	**Digital world** Monitoring devices	**Mechanical systems** Pop-up book	**Structures** Bridges
Year 5/6 B	**Textiles** Waistcoats	**Electrical systems** Steady hand game	**Cooking and nutrition** Come dine with me

Key Concepts

Key concepts identify the content or focus areas of study at different times and come under the headings below:

	Designing	**Making**	**Evaluating**	**Technical Knowledge**
Content	• 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 • generate, develop, model and communicate their ideas through	• select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • select from and use a wider range of materials and components, including construction	• investigate and analyse a range of existing products • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • understand how key events and individuals in design and technology	• apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] • understand and use electrical systems in their

	discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design	materials, textiles and ingredients, according to their functional properties and aesthetic qualities	have helped shape the world	products [for example, series circuits incorporating switches, bulbs, buzzers and motors] • apply their understanding of computing to program, monitor and control their products.

Second Order Concepts

Second order concepts can be used across all aspects of the subject to organise the substantive knowledge and skills taught:

Structure and Function In order to fulfil users' needs, wants and purposes products need to work and function effectively.	**Audience and Purpose** Products are designed and made with an audience and purpose in mind. Products are designed to perform one or more defined tasks and are evaluated by their intended user against this. The purpose of a product is fulfilled when it meets a range of requirements, including technical, functional and aesthetic qualities.	**Design and Innovation** Design is the initial stage in the creation of a product where ideas are captured through notes and diagrams. Designers often produce several different versions of a design before beginning construction of a prototype. Innovation occurs as design, ideas, prototypes evolve based on identified strengths and weaknesses and in response to consumer and customer needs.

Progression in Substantive Knowledge in Design and Technology

Second Tier Concepts	End of Lower KS2	End of KS2
Designing		
Design and Innovation Design is the initial stage in the creation of a product where ideas are captured through notes and diagrams. Designers often produce several different versions of a design before beginning construction of a prototype. Innovation occurs as design, ideas, prototypes evolve based on identified strengths and weaknesses and in response to consumer and customer needs.	• gather information about the needs and wants of particular individuals and groups. • develop their own design criteria and use these to inform their ideas. • generate realistic ideas, focusing on the needs of the user • make design decisions that take account of the availability of resources	• 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. • generate innovative ideas, drawing on research • make design decisions, taking account of constraints such as time, resources and cost
Making		
Audience and Purpose Products are designed and made with an audience and purpose in mind. Products are designed to perform one or more defined tasks and are evaluated by their intended user against this. The purpose of a product is fulfilled when it meets a range of requirements, including technical, functional and aesthetic qualities.	• order the main stages of making • 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	• produce appropriate lists of tools, equipment and materials that they need • formulate step-by-step plans as a guide to making • 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
Evaluating		
Structure and Function In order to fulfil users' needs, wants and purposes products need to work and function effectively.	• refer to their design criteria as they design and make • use their design criteria to evaluate their completed products • 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	• 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 • 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
Technical Knowledge		
	• 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 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 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	• 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
Cooking and Nutrition		
Audience and Purpose Products are designed and made with an audience and purpose in mind. Products are designed to perform one or more defined tasks and are evaluated by their intended user against this. The purpose of a product is fulfilled when it meets a range of requirements, including technical, functional and aesthetic qualities.	• that a healthy diet is made up from a variety and balance of different food and drink, as depicted in The Eatwell plate • that to be active and healthy, food and drink are needed to provide energy for the body	• that seasons may affect the food available • how food is processed into ingredients that can be eaten or used in cooking • 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

Vocabulary

Vocabulary is an essential building block to enable children to access the curriculum; within design and technology teaching sequences we use explicitly planned vocabulary to teach tier 2 and 3 vocabulary to all children. Teachers ensure that all children understand the key vocabulary needed to access the learning, with careful scaffolding for children with SEND. To support their vocabulary acquisition, the etymology and morphology of key vocabulary is also taught explicitly in our spelling lessons throughout KS2.

Key Conceptual Vocabulary

Key conceptual vocabulary identified within the content or focus areas of study at different times under the headings below:

Year 3/4 A	**Digital world – Wearable technology** Analyse Annotate Concept Control Evaluate Function Initiate Program Simulator User	**Mechanical systems – Pneumatic toys** Exploded-diagram Function Input Linkage Mechanism Motion Net Output Pivot Pneumatic system Thumbnail sketch	**Structures – Constructing a castle** 2D shapes 3D shapes Castle Design criteria Evaluation Facade Feature Flag Net Recyclable Scoring Stable Strong Structure Tab Weak
Year 3/4 B	**Textiles – Fastenings** Aesthetic Assemble Book sleeve Design criteria Evaluation Fabric Fastening	**Electrical systems – Torches** Battery Bulb Buzzer Cell Conductor Copper Design criteria	**Cooking and nutrition – Adapting a recipe** Adapt Budget Combine Construct Cuboid Design

	Prototype Net Running-stitch Stencil Target audience Target customer Template	Electrical item Electricity Electronic item Insulator Series circuit Switch Test Torch Wire	Evaluate Fold Hygiene Ingredients Market research Sieve Sift Target audience Taste Texture
Year 5/6 A	**Digital world – Monitoring devices** Boolean Device Durable Monitoring device Sensor Synthetic Variable Versatile Water-resistant Workplan (CAD)	**Mechanical systems – Pop-up books** Aesthetic Computer-aided design (CAD) Caption Design Design brief Design criteria Exploded-diagram Function Input Linkage Mechanism Motion Output Pivots Prototype Sliders Structure Template	**Structures – Bridges** Accurate Arched bridge Beam bridge Compression Coping saw File Mark out Reinforce Sandpaper Set square or try square Shape Structure Suspension bridge Tenon saw Tension Truss bridge

Year 5/6 B	Textiles – Waistcoats	Electrical systems- steady hand game	Cooking and nutrition – Come dine with me
	Adapt Annotate Detail Fabric Fastening Knot Properties Running-stitch Seam Sew Shape Target audience Target customer Template Thread Unique Waistcoat Waterproof	Backboard Battery Bulb Buzzer Circuit Conductor Copper Function Insulator LED Magnetic field Net Pliers Prototype Series circuit Side view drawing Switch Test Top view drawing	Accompaniment Cookbook Cross-contamination Equipment Farm Flavour Imperative verb Ingredients Method Nationality Preparation Processed Reared Recipe Target audience Unit or measurement

Adaption for children with SEND

Following the expectations laid out by the SEN Code of Practise, adaptations are made for individuals who need something that is addition to or different from others in the class.

'Manufacturing is more than just putting parts together. It's coming up with ideas, testing principles and perfecting the engineering, as well as final assembly.'

-James Dyson-