

St Michael's CE (VA) Junior School **Design and Technology Curriculum**

What we teach....

At St Michael's, our Design and Technology curriculum fulfils the requirements of the National Curriculum and is designed to be fully inclusive, ambitious and inspiring, enabling every child to flourish as a creative thinker, designer and problem solver. We provide a broad, balanced and progressive curriculum that develops children's knowledge, technical skills and creativity through purposeful designing, making and evaluating.

Our curriculum has been carefully designed to be adaptable and personalised, building upon the experiences, interests and backgrounds of our children. Through engaging, real-life contexts and meaningful design challenges, children are encouraged to be curious, ask questions, take risks and develop innovative solutions to problems. Every child is supported and challenged to think critically, work independently and collaboratively, and become confident in making informed design decisions.

Knowledge is made 'sticky' through carefully sequenced learning, regular opportunities to retrieve prior knowledge and repeated opportunities to practise, apply and embed skills in a range of different contexts. Technical knowledge and practical skills are revisited and refined throughout the curriculum, allowing children to build confidence and mastery as they progress through the school. High-quality resources encourage pupils to think intelligently about design choices, materials, structures and mechanisms, enabling them to deepen their understanding rather than simply complete a task.

Children develop competence and confidence in selecting and using a wide range of materials, tools, equipment and techniques safely and effectively. They learn to investigate existing products, exploring why they have been designed in particular ways and evaluating how well they meet the needs of the user. This knowledge enables children to design and make products that are fit for purpose, considering functionality, aesthetics, sustainability and the needs, wants and values of themselves and others.

The ongoing process of designing, making, testing and evaluating lies at the heart of our curriculum. Children are encouraged to reflect critically on their work, identify improvements and understand that refining ideas is an essential part of the design process.

They evaluate both their own products and those of others using increasingly sophisticated subject-specific vocabulary, developing confidence in discussing and justifying their decisions.

Design and Technology provides meaningful opportunities for children to apply and connect knowledge from across the curriculum, particularly in Mathematics, Science, Computing and Art. Where appropriate, projects are linked to wider curriculum topics, giving learning purpose, relevance and authenticity while helping children make meaningful connections across subjects.

By the time children leave St Michael's, they will have developed the knowledge, technical understanding and practical skills needed to become confident designers and makers. They will be curious, resilient and reflective learners who are able to think creatively, solve real-world problems and appreciate the impact that design and technology has on everyday life and the wider world.

How we teach...

Teachers mostly use Kapow Primary to plan high quality lessons in year group teams; lessons are carefully planned for progression and depth. Kapow Primary's Design and Technology scheme has a clear progression of skills and knowledge within the five strands (Design, Make, Evaluate, Technical Knowledge and Cooking and Nutrition) across each year group. Design and Technology is usually taught in blocks; this allows children to master the skills and techniques that they are learning. Through Kapow Primary's Design and Technology scheme, children respond to briefs and scenarios that require consideration of the needs of others, developing their skills in the five key areas:

- Mechanisms
- Structures
- Textiles
- Cooking and Nutrition
- Electrical systems

Where possible, design and technology skills that the children are taught will be applied to products based on their cross-curricular topic. We take every opportunity to develop links with outside agencies and experts, including the local high school, in

order to enrich our design and technology provision. Children's finished products are proudly displayed in classrooms and communal areas around the school.

What the children learn....

Due to the progressive nature of the curriculum, where appropriate, children will be able to incorporate prior learning (both from Design and Technology lessons, as well as other curriculum subject areas). Children will develop a love of Design and Technology and their confidence and self-esteem within the subject means they will participate in lessons with enthusiasm. Progression in Design and Technology will be assessed through the pupils' sketch books, which pass with the child to the next year group, displays and photographic evidence. Furthermore, the children have a knowledge organiser for each unit, which they are able to add to throughout their learning journey. Our children show competences in improving their resilience and perseverance by continually evaluating and improving their work. Teachers use information gathered from assessment to inform future lessons, ensuring that the children are supported and challenged appropriately. The subject leader analyses data on a termly basis to inform and address any trends. Further information is gathered through questionnaires and monitoring activities. A level of ability and attitude to Design and Technology is recorded on the child's annual report to parents.

National Curriculum Objectives for KS2 Design and Technology

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 [for example, the home, school, leisure, culture, enterprise, industry and the wider environment]. When designing and making, children should be taught to:

Design:

- 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 discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

Make:

- 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 materials, textiles and ingredients, according to their functional properties and aesthetic qualities

Evaluate:

- 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 have helped shape the world Technical knowledge
- 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 products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- apply their understanding of computing to program, monitor and control their products.

Cooking and nutrition

As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in pupils will also open a door to one of the great expressions of human creativity. Learning how to cook is a crucial life skill that enables pupils to feed themselves and others affordably and well, now and in later life. Pupils should be taught to:

- understand and apply the principles of a healthy and varied diet
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques
- understand seasonality and know where and how a variety of ingredients are grown, reared, caught and processed.

	Strands:	Key Stage 2				
		Year 2	Year 3	Year 4	Year 5	Year 6

Design	Structures	• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products		• Design a stable product structure that is aesthetically pleasing and selecting materials to create a desired effect • Build frame structures designed to support weight	• Design a stable structure that is able to support weight • Create frame structure with focus on triangulation	
	Mechanisms	• Create products using lever and winding mechanisms	• Explore and investigate how levers and pulley systems work. • Identify the key components of a lever and pulley mechanism. • Generate and develop ideas for a product that uses a		• Design a product which uses a mixture of structures and mechanisms • Name each mechanism, input and output accurately	

			lever and pulley system. • Create labelled sketches and diagrams to communicate design ideas. • Select appropriate materials, tools and components for the intended mechanism. • Consider how the mechanism will move and function when developing a design. • Use design criteria to guide the development of a functional product.		• Storyboard ideas for a product	
	Electrical	• To diagnose faults in battery operated		• Design a product, giving consideration to the target audience and		• Design a product - identify and name the

		devices (such as low battery, water damage or battery terminal damage)		create both design and success criteria focusing on features of individual design ideas		components required • Draw a design from three different perspectives • Generate ideas through sketching and discussion • Model ideas through prototypes • Understand the purpose of products, including what is meant by 'fit for purpose' and 'form over function'
	Cooking and Nutrition	• Cut, peel or grate ingredients	• Create a healthy and nutritious recipe using seasonal	• Design an edible product within a given budget,	• Adapt a traditional recipe, understanding	• Write a recipe, explaining the key

		safely and hygienically, measure or weigh using measuring cups/spoons and electronic scales, assemble or cook ingredients	ingredients, considering the taste, texture, smell and appearance of the dish	drawing upon previous taste testing	that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients • Write an amended method for a recipe to incorporate the relevant changes to ingredients • Design appealing packaging to reflect a recipe	steps, method and ingredients • Include facts and drawings from research undertaken
	Textiles	• Shape textiles using templates, join textiles using a running	• Design and making a template from an existing product and applying individual design criteria			• Design a product in accordance with specification linked to set of design criteria to

		stitch, colour and decorate textiles using a number of techniques (such as dying, adding sequins or printing)				fit a specific theme • Annotate designs
Knowledge	A design criteria is there to help designers focus their ideas and test the success of them. To annotate or label is to add notes to explain your plan or design. Cross-sectional diagrams are line graphs that show a sideways view of a landscape. Modelling refers to the technique of representing an object in a miniature form using clay or wax. Artists and designers often record ideas they have for artworks and designs. They will note down observations as they go so they can analyse and evaluate the effectiveness of the work produced. Evaluation is an opportunity to: • discuss their development and final work • help others understand what they were trying to achieve • explain their successes and weaknesses • demonstrate their knowledge and understanding of art and design					

Make	Structures	• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products		• Create a range of different shaped frame structures • Make a variety of free-standing frame structures of different shapes and sizes • Select appropriate materials to build a strong structure and for the cladding • Reinforce corners to strengthen a structure • Create a design in accordance with a plan	• Make a range of different shaped beams • Use triangles to span a given distance and supports a load • Build a structure independently measuring • Select appropriate tools and equipment for particular tasks • Identify where a structure needs reinforcement and using card corners for support	

				• Learn to create different textural effects with materials	• Explain why selecting appropriating materials is an important part of the design process	
	Mechanisms	• Create products using lever and winding mechanisms	• Use tools and materials safely and accurately to construct a lever mechanism. • Use tools and materials safely and accurately to construct a pulley system. • Follow a design to assemble and join components securely. • Measure, mark, cut and assemble materials with increasing accuracy and precision.		• Follow a design brief to make a product, neatly and with focus on accuracy • Make mechanisms and/or structures using sliders, pivots and folds to produce movement • Use layers and spacers to hide the workings of mechanical parts for an	

			• Test mechanisms during construction and make adjustments where necessary. • Combine mechanical components to create a working product. • Use appropriate joining techniques to ensure mechanisms move effectively. • Use the correct techniques to saw safely • Understand basic wood functional properties		aesthetically pleasing result	
	Electrical	• To diagnose faults in battery		• Make a product with a working		• Construct a stable base for a product

		operated devices (such as low battery, water damage or battery terminal damage)		electrical circuit and switch • Use appropriate equipment to cut and attach materials • Assemble a product according to the design and success criteria		• Accurately cut, fold and assemble a net • Decorate the base of the game to a high- quality finish • Make and test a circuit • Incorporate a circuit into a base
	Cooking and Nutrition	• Cut, peel or grate ingredients safely and hygienically, measure or weigh using measuring cups/spoons and electronic scales, assemble or	• Know how to prepare themselves and a workspace to cook safely in, learning the basic rules to avoid food contamination • Follow the instructions within a recipe	• Follow a baking recipe • Cook safely, following basic hygiene rules • Adapt a recipe	• Cut and prepare vegetables safely • Use equipment safely, including knives • Know how to avoid cross-contamination	• Follow a recipe, including using the correct quantities of each ingredient • Adapt a recipe based on research • Work to a given timescale

		cook ingredients			• Follow a step by step method carefully to make a recipe	• Work safely and hygienically with independence
	Textiles	• Shape textiles using templates, join textiles using a running stitch, colour and decorate textiles using a number of techniques (such as dying, adding sequins or printing)	• Follow a design-criteria • Select and cut fabrics with ease using fabric scissors • Sew using cross stitch to join fabric • Decorate fabric using appliqué • Complete design ideas with stuffing and sewing the edges			• Using a template when pinning panels onto fabric • Mark and cut fabric accurately, in accordance with a design • Sew a strong running stitch, making small, neat stitches and following the edge • Tie strong knots • Decorate a waistcoat - attaching objects using thread and

						adding a secure fastening
Knowledge	A structure is something that has been made and put together which can stand steadily on its own. Triangles make stronger structures. Scoring is the process of scratching a line with a sharp object into card to make it easier to bend. Accuracy means the shape, size and pattern are correct and neat, without any mistakes. A coping saw is a saw with a narrow D-shaped metal blade, used for cutting curves in wood. A tenon saw is a saw with a flat blade, used for cutting wood in straight lines or angles. Fabric is a natural or man-made woven or knitted material, that is made from plant fibres, animal fur or synthetic material. Sew means to join or fasten by stitches made using a needle and thread. Weave is the process of passing threads or strips over and under each other. Cross stitch is a two-stitch style of sewing which forms a cross pattern. Running stitch is a simple style of sewing in a straight line with no overlapping. Fastening is a closing an opening detail on clothing such as buttons, zips and press studs. To decorate means adding details to a design to improve its appearance. Appliqué is a type of textiles work where small pieces of cloth are sewn or stuck in a pattern onto a larger piece Knit is to form a fabric or garment by interlacing yarn or thread in connected loops with needles (knitting needles). Remind children it is important to leave at least a 1cm boarder to allow space for a seam. They could mark this on using chalk. A seam is a line along two edges of cloth that are joined or sewn together.					
Evaluate	Structures	• Use materials to			• Adapt and improve own	

		practise drilling, screwing, gluing and nailing materials to make and strengthen products		• Evaluate structures made by the class • Describe what characteristics of a design and construction made it the most effective • Consider effective and ineffective designs	product structure by identifying points of weakness and reinforcing them as necessary	
	Mechanisms	• Create products using lever and winding mechanisms	• Using the views of others to improve designs • Testing and modifying the outcome, suggesting improvements • Explain how the mechanism works		• Evaluate the work of others and receiving feedback on own work • Suggest points for improvement	

			and how effectively it performs its intended function. • Identify what worked well and what could be improved. • Evaluate the strength, movement and stability of the finished product. • Suggest modifications that could improve the function or appearance of the product.			
	Electrical	• To diagnose faults in battery operated devices (such as low		• Evaluate electrical products • Test and evaluate the success of a final product and taking inspiration		• Test own and others final products, identifying what went well and making

		battery, water damage or battery terminal damage)		from the work of peers		suggestions for improvement • Gathering images and information about existing products • Analysing a selection of existing products
	Cooking and Nutrition	• Cut, peel or grate ingredients safely and hygienically, measure or weigh using measuring cups/spoons and electronic scales, assemble or cook ingredients	• Establish and use design criteria to help test and review dishes • Describe the benefits of seasonal fruits and vegetables and the impact on the environment • Suggest points for improvement	• Evaluate a recipe, considering: taste, smell, texture and appearance • Describe the impact of the budget on the selection of ingredients • Evaluate and comparing a range of products	• Identify the nutritional differences between different products and recipes • Identify and describing healthy benefits of food groups	• Evaluate a recipe, considering: taste, smell, texture and origin of the food group • Taste test and score final products • Suggest and write up points of improvements in productions

				• Suggest modifications		• Evaluate health and safety in production to minimise cross contamination
	Textiles	• Shape textiles using templates, join textiles using a running stitch, colour and decorate textiles using a number of techniques (such as dying, adding sequins or printing)	• Evaluate an end product and thinking of other ways in which to create similar items			• Evaluate work continually as it is created Must consider - • Decide how many of the criteria should be met for the product to be considered successful • Suggest modifications for improvement • Test and evaluate an end product and

						giving point for further improvements
Knowledge	To modify is to change something to improve it. Evaluation is when you look at the good and bad points about something, then think about how you could improve it. Evaluation is an opportunity to: • discuss their development and final work • help others understand what they were trying to achieve • explain their successes and weaknesses • demonstrate their knowledge and understanding of art and design					
Technical knowledge	Structures	• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products		• Learn about their products purpose • Build on prior knowledge of net structures and broaden knowledge of frame structures • Learn that architects consider light, shadow and	• Explore how to create a product and understand the terms compression and tension • Identify stronger and weaker structures	

				patterns when designing • Implement frame and shell structure knowledge • Consider effective and ineffective designs	• Find different ways to reinforce structures • Understand how triangles can be used to reinforce their product • Articulate the difference between beam, arch, truss and suspension bridges	
	Mechanisms	• Create products using lever and winding mechanisms	• Mechanisms can create, change or control movement. • A lever is a rigid bar that pivots around a fulcrum. • The position of the fulcrum affects the movement and force of a lever.		• Know that an input is the motion used to start a mechanism • Know that output is the motion that happens as a	

			• A pulley uses a wheel and cord to lift, lower or move a load. • Mechanisms need to be securely fixed and correctly aligned to work effectively. • Different mechanisms can be selected to achieve a specific movement or function.		result of starting the input • Know that mechanisms control movement • Describe mechanisms that can be used to change one kind of motion into another	
	Electrical	• To diagnose faults in battery operated devices (such as low battery, water damage or battery		• Learn how electrical items work • Identify electrical products • Learn what electrical conductors and insulators are		• Learn that batteries contain acid, which can be dangerous if they leak • Identify and name the circuit components in a product

		terminal damage)		• Understand that a battery contains stored electricity and can be used to power products • Identify the features of a product • Understand how a product works		
	Cooking and Nutrition	• Cut, peel or grate ingredients safely and hygienically, measure or weigh using measuring cups/spoons and electronic scales, assemble or	Begin to understand seasonality and know where an ingredient is grown. • Learn that climate affects food growth • Work with cooking equipment safely and hygienically	• Understand the impact of the cost and importance of budgeting while planning ingredients • Understand the environmental impact on future product and cost of production	Begin to understand seasonality and know where an ingredient is grown or reared and begin to apply the principles to a healthy and varied diet. Prepare a variety of predominantly	• Learn how to research a recipe by ingredient • Record the relevant ingredients and equipment needed for a recipe • Understand the combinations of food that will

		cook ingredients • Learn that imported foods travel from far away and this can negatively impact the environment • Learn that vegetables and fruit grow in certain seasons • Learn that each fruit and vegetable give us nutritional benefits • Learn to use, store and clean a knife safely		savoury dishes using a range of cooking techniques. • Understand where food comes from – learning that beef is from cattle and how beef is reared and processed • Understand what constitutes a balanced diet • Learn to adapt a recipe to make it healthier • Compare two adapted recipes using a nutritional calculator and	complement one another • Understand where food comes from, describing the process of 'Farm to Fork' for a given ingredient
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					then identifying the healthier option	
	Textiles	• Shape textiles using templates, join textiles using a running stitch, colour and decorate textiles using a number of techniques (such as dying, adding sequins or printing)	• Thread needles with greater independence • Tie knots with greater independence • Sew cross stitch and appliqué • Understand the need to count the thread on a piece of even weave fabric in each direction to create uniform size and appearance • Understand that fabrics can be layered for affect			• Learn different decorative stitches • Application and outcome of the individual technique • Sew accurately with even regularity of stitches

Knowledge	Reinforce means to make a structure or material stronger, especially by adding another material or element to it. A mechanism is a system of parts working together. A pulley is a wheel that is designed to support movement and change of direction. Gears are a simple machine with teeth that increase the force needed to push or pull something. A buzzer is a component which makes a loud noise as electricity passes through it. A lever is a machine consisting of a beam that is pivoted at a fixed hinge. Levers can be joined together to form linkages. Linkages change the direction of motion and the amount of force, A cam is a rotating or sliding piece in a mechanism. It changes rotary motion to linear motion. A circuit is a collection of components which make an electrical system. Nutrition is the study of food and how it works in your body. Nutrition includes all the stuff that's in your food, such as vitamins, protein, fat, and more. It's important to eat a variety of foods, including fruits, vegetables, dairy products, and grains, so you have what you need to grow and be healthy. Understand the principles of basic food hygiene – cleaning hands and surfaces before preparing food, hair tied back, not touching face Understand what cross-contamination is – how bacteria spreads. It happens when liquid from raw meats or germs from unclean objects touch cooked or ready-to-eat foods. Know the purpose of different utensils and learn when to use the appropriate utensil or equipment Learn and use safe and appropriate techniques for the task (e.g. claw grip or bridge hold) Understand the concept of seasonality – that different foods grow better at different times of the year Seasonal food is a food that can be harvested and is ready to eat in a particular season. Seasons of the year are spring, summer, autumn and winter. Recipe is a set of instructions for making or preparing a food item or dish. Ingredients are the items that make up a mixture e.g. the foods that make up a recipe. Exported means a product or produce, such as fruit and vegetables are sent to another country.
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	Imported is when products or produce, such as fruit and vegetables, are brought into the country. Understand the verbs associated with food preparation (peel, chop, grate, slice) - to peel is to remove an outer layer - to chop is to cut something into pieces with repeated sharp blows of a knife - to grate is to reduce food to small shreds by rubbing it on a grater - to slice is to cut something into a wedge shaped piece - to dice is to finely chop something which is consistent in size and neat in appearance. Kneading is the process of using your hands to develop dough into a smooth, elastic ball. You will press, fold and stretch the dough. This is an important part in making bread.
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N.B. skills have been taken from Kapow Primary scheme.

Bold taken from Chris Quigley

How to support Design & Technology

Cognition and Learning	"According to Ofsted, pupils with SEN make better progress in DT than in most other subjects" • Allow the child to "own" the finished result by not completing the task for them. However, for certain children, support may require you to carry out part of the task following the pupil's instructions. • Is there a PowerPoint or You tube video to link to the subject to make it less abstract? Is it possible to link the subject with anything from their own experience to make the unit of work more relevant to them? • Provide labels and keywords to help pupils recognise and spell the names of important pieces of equipment etc. • Ensure SEND children are seated in an appropriate position in the classroom to maximise their ability to engage with the lesson fully. Move children temporarily if necessary so they have every opportunity to engage.
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	• Planning can be problematic so provide a variety of methods to record ideas (whiteboard, mind map, talking it through with LSA etc.). • Break tasks down into manageable chunks and visually display progress with a tick column. • Careful consideration of grouping. Does the child need to work with others to achieve the outcome? Should you move the child to maximise the experience? • Use a camera to record the stages of the process to aid memory.
Communication and Interaction	• Consider taking notes for the child or getting printouts of the visuals used to reinforce the task set. • Provide visual step by step instructions to follow as required. This could also take the form of flow charts. • Demonstrate 1:1 or in a small group so the child can see exactly and closely what they have to do. • Pre teaching of topic vocabulary (glue gun, dowling etc.) is important for understanding. • Give child thinking time when asking questions about the subject. • Questioning is important to extend, check and reinforce their knowledge of the subject.
Social, Emotional and Mental Health	• Ensure all the resources are available to prevent anxiety. • Implement brain breaks and lessen task time. Can the activity be extended for certain children to achieve success? Could you finish something with a child at another time? Open ended activities will allow a child to feel more successful. • Watch carefully for trigger points to avoid spoilt work. • Be aware of the timings for the lesson so you can give pre warnings of finish times etc. • You may need to re – teach aspects of the lesson at different paces to accommodate specific learning speeds and be aware of and consider each child's attention span. • Regularly revisit, encourage, question and praise to ensure on track with task.
Sensory and Physical Difficulties	• Consider the use of ear defenders for focussed tasks to cut down on distractions. • Children with physical disabilities need extended time to complete tasks. • Spend some time before a lesson teaching a child how to use equipment correctly. • Ensure use of all the allocated equipment for a visually/hearing impaired child. Ensure a hearing impaired child has fully charged hearing aids and is actually wearing them! • Preparation of resources beforehand is very important (enlarged copies/resources on coloured paper etc.). • Health and Safety – be aware of issues with scissors, saws, glue guns etc.

	• Adapted safety equipment for sensory issues • Awareness of loud and sudden noise. • Be aware that some children with sensory issues may not be able to participate fully in all activities. Does every child need to do exactly the same activity if the same outcome can be achieved? Maybe adapt the task as you go along. (Liaise with teacher as necessary or the teacher may provide a parallel activity to enable them to work towards the same planning objective.
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