

ACE Design Technology Curriculum

Intent

At Altrincham CE Primary School, we aim to provide children with a DT education that is relevant in our rapidly changing world. We want to encourage our children to become problem solvers who can work creatively on a shared project. We believe that high-quality DT lessons will inspire children to think independently, innovatively and develop creative, procedural and technical understanding. Our DT curriculum provides children with opportunities to research, represent their ideas, explore and investigate, develop their ideas, make a product and evaluate their work. Children will be exposed to a wide range of media including textiles, food and woodwork; through this, children will develop their skills, a rich technical vocabulary and resilience.

We set this learning in the context of our Christian, church school heritage. We want to equip our children with not only the minimum statutory requirements of the Design Technology National Curriculum but to prepare them for the opportunities, responsibilities and experiences of later life. Through the evaluation of past and present design and technology, we want our children to develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

Purpose (Why it is taught)

As Designers and Technologists, we do not just stop at our curiosity of how things work but instead look at how we can **think creatively** to **problem solve** and make products even better. At Altrincham CE Primary School, we have an understanding of the **diversity** of the world and the importance of exposing our pupils to a wide range of products that can **inspire their curiosity and creativity**, as well as the **thought-processes** involved in creating such products. Through this exposure, children take on the role of **developer, evaluator** and that of a **critique**, exploring how products can be **developed or adapted** for different users as well as **creating and testing prototypes** to give purpose to projects. Children need a **hands on approach** that also gives access to other areas of the curriculum such as **Mathematics, Science, Engineering, Computing and Art**. Skills and techniques developed through Design and Technology are of great importance in our ever-changing technological world to ensure that children are equipped for the next stages in their lives.

Aims (desired outcomes)

At Altrincham CE Primary School, Design Technology should be fully inclusive of every child, fulfil the requirements of the National Curriculum for Design Technology, provide a broad and balanced cross-curriculum offer which ensures the progressive development of knowledge and skills.

- An **excellent attitude** to learning and **independent working**.
- Significant levels of **originality** and the willingness to take **creative risks** to **produce innovative ideas and prototypes**.
- The ability to **use time efficiently** and **work constructively and productively** with others.
- **Knowledge** and **proficiency** in creative and practical activities.
- The ability to carry out **thorough research**, show **initiative** and **ask questions** to develop an exceptionally **detailed knowledge** of users' needs.
- The ability to act as **responsible designers and makers**, **working ethically**, using finite materials carefully and **working safely**.
- A **thorough knowledge** of which tools, equipment and materials to use to make their products.
- The ability to **apply mathematical knowledge**.
- The ability to **manage risks** exceptionally well to manufacture products **safely and hygienically**.
- A **passion** for the subject and **knowledge** of, up-to-date technological processes and innovations in materials, products and systems and their contribution to society.
- Develop **imaginative thinking** in children and to enable them to **talk about what they like and dislike** when designing and making things.
- Enable children to **talk about how things work**, and to **draw and model their ideas**.
- **Explore computing** as a means of design.
- Encourage children to be **analytical and critical** when they are considering and analysing products
- Foster **enjoyment, satisfaction and purpose** in designing and making things
- Understand key Design Technology **threshold concepts**.

These are the big ideas that underpin this subject:

- **Master practical techniques** – Developing the skills needed to make high-quality products.
- **Take inspiration from design** – Appreciating the design process that has influenced the products we use in everyday life.
- **Design, make, evaluate and improve** – Developing the process of design thinking and seeing design as an iterative process.*

* *The word 'iterate' means to repeat. This is an important part of the discipline of design. We aim to model to pupils through guided designs which use the following iterative process: **THINK, MAKE, REPEAT, BREAK, REPEAT.***

These threshold concepts ensure coverage of the key Design Technology concepts laid down in the National Curriculum.

The Design Technology curriculum at ACE is carefully planned and structured to ensure that current learning is linked to previous learning and the school's approaches are informed by current pedagogy.

We use Milestones to inform our assessment.

Milestones are the goals the children are aiming for and this is how they equate to the different year groups across school:

<u>Milestone 1</u>	<u>Years 1 and 2</u>
<u>Milestone 2</u>	<u>Years 3 and 4</u>
<u>Milestone 3</u>	<u>Years 5 and 6</u>

Each unit of learning has a knowledge web. Knowledge webs present topics around the threshold concepts (big ideas) in Design Technology by using relevant knowledge categories.

The knowledge categories are:

- Technical knowledge
- Practical knowledge
- Design inspiration
- Design process

Design Technology is taught in blocks throughout the year (2 per milestone annually), so that children achieve depth in their learning. Teachers have identified the key knowledge and skills of each topic and consideration has been given to ensure progression and continuity across topics throughout each year group across the school. Topics and skills are 'interleaved' so that children revisit skills and knowledge in different contexts and are able to make links which result in 'big picture' learning and 'sticky knowledge'.

Each unit of work has a series of POP tasks. POP is an acronym of Proof of Progress. POP tasks further deepen learning and understanding by gradually changing the nature. The POP tasks appear at appropriate points in the sequence of each topic and are categorised using the bronze, silver and gold colours. **Basic tasks** involve learning the fundamentals, step by step; **advancing tasks** involve practice with the goal of practical fluency and technical understanding; **deep tasks** bring together all aspects of technical and practical knowledge within the design-and-make process. Each topic covers all three types of tasks and pupils progress through each topic from basic to deep.

Our Design Technology curriculum is deliberately rich in practical knowledge. This requires practice and what we call '*finger fluency*': in much the same way as a fluent reader requires automatic recall of phonic knowledge, designers need automatic recall of technical and practical knowledge to successfully realise their designs. For example, if pupils know, and are fluent in applying how to cut and join square-section wood when forming a truss then their bridge designs will reflect this practical knowledge.

Cross curricular outcomes in Design Technology are specifically planned for, with strong links between the Art and Design, Science, Computing and Mathematics curriculum enabling further contextual learning.

Planning is informed by and aligned with the National Curriculum. In addition, staff have access to The Essentials Curriculum (Chris Quigley) plans and resources, however, teachers lesson design is not limited by this and is informed by national agencies, including the Design Technology Association, of which the school is a member. Consideration is given to how mastery will be taught, learnt and demonstrated within each topic whilst ensuring the joy of this subject area through exploration, experimentation, risk taking and creativity, as well as how learners will be supported in line with the school's commitment to inclusion. Outcomes of work are regularly monitored to ensure that they reflect a sound understanding of the key identified knowledge and skills.

In the Early Years Foundation Stage (Nursery and Reception), Design and Technology is taught through the areas of learning known as 'Expressive Arts and Design', in which children are supported to explore and play with a wide range of media and materials. They are also provided with opportunities and encouragement to share their thoughts, ideas and feelings through a variety of activities, including Design and Technology.

Threshold Concepts (the big ideas we want our children to learn that tie together the subject topics into a meaningful long term learning structure).

Progression of Threshold Concepts in Design Technology

	<u>Master Practical techniques</u>	<u>Take Inspiration from Design</u>	<u>Design, Make, Evaluate and Improve</u>
Milestone 1 Years 1 and 2	<p>Materials Cut materials safely using tools provided Measure and Mark out to the nearest centimetre Demonstrate a range of cutting and shaping techniques E.g. tearing, cutting, folding and curling Demonstrate a range of joining techniques (such as gluing or combining materials to strengthen</p> <p>Structures Practise gluing materials to make and strengthen products</p> <p>Mechanisms Create products using slider mechanisms</p> <p>Food and Nutrition Cut, peel and grate ingredients safely and hygienically Measure or weigh using cups or electronic scales Assemble and cook ingredients</p>	<p>Explore objects and designs to identify likes and dislikes Suggest improvements to existing designs Explore how products have been created</p>	<p>Design products that have a clear purpose and intended user Make products, refining the design as work progresses</p>
Milestone 2 Years 3 and 4	<p>Materials Cut materials accurately and safely by selecting appropriate tools Measure and mark out to the nearest millimetre</p>	<p>Identify some of the great designers in all areas of study to generate ideas for designs Improve upon existing designs, giving reasons for choices Disassemble products to understand how they work</p>	<p>Design with purpose by identifying opportunities to design Make products by working efficiently E.g. by carefully selecting materials Refine work and techniques as work progresses, continually evaluating the product design</p>

	<p>Apply appropriate cutting and shaping techniques that include cuts within the perimeter of the material (e.g. slots or cut outs) Select appropriate joining techniques</p> <p>Electrics and Computing Create products with series and parallel circuits.</p> <p>Mechanisms Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product involving pneumatics.</p> <p>Structures Choose suitable techniques to construct products or to repair items Strengthen materials using suitable techniques</p> <p>Food and Nutrition Prepare ingredients hygienically using appropriate utensils Measure ingredients accurately to the nearest gram Follow a recipe Assemble and cook ingredients</p>		
<p>Milestone 3 Years 5 and 6</p>	<p>Materials Cut materials with precision and refine the finish with appropriate tools (such as sanding wood after cutting or using a more precise scissor cut after roughly cutting out a shape).</p> <p>Electronics and Computing Write code to control and monitor models or products</p> <p>Structures Develop a range of practical skills to create products such as cutting, drilling and screwing, nailing, gluing, filing and sanding.</p> <p>Mechanisms Use innovative combinations of electronics (or computing) and mechanics in product designs.</p> <p>Food and Nutrition</p>	<p>Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices Create innovative designs that improve upon existing products so as to suggest improvements to the user experience</p>	<p>Design with the user in mind, motivated by the service a product will offer (rather than simply for product) Make products through stages of prototypes, making continual refinements Ensure products have a high quality finish, using art skills where appropriate Use prototypes, cross sectional diagrams and computer aided designs to represent designs.</p>

	<p>Understand the importance of correct storage and handling of ingredients (using knowledge of microorganisms)</p> <p>Measure accurately and calculate ratios of ingredients to scale up or down from a recipe</p> <p>Demonstrate a range of baking and cooking techniques</p> <p>Create and refine recipes, including ingredients, methods, cooking times and temperatures.</p>		
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Design Technology Units of Work

<u>Year A</u>			
	Milestone 1: Year 1 and Year 2	Milestone 2: Year 3 and Year 4	Milestone 3: Year 5 and Year 6
<u>Project 1</u>	1.3 - Frame Structures	2.6 – Frame Structures	3.5 - Frame Structures
<u>Project 2</u>	1.8 - Portable Snacks	2.8 – Vegetable Soup	3.8 - Food Throughout the Year

<u>Year B</u>			
	Milestone 1: Year 1 and Year 2	Milestone 2: Year 3 and Year 4	Milestone 3: Year 5 and Year 6
<u>Project 1</u>	1.6 – Lever Mechanisms	2.4 - Linked Levers	3.7 - Cams
<u>Project 2</u>	1.7 – Wheel & Axle Mechanisms	2.3 – Paper Circuits	3.3 Electronic Motors

KNOWLEDGE

(known information)

EYFS

In EYFS children are supported to **explore** and **play** with a wide range of **media** and **materials**, as well as providing opportunities and encouragement for sharing their **thoughts, ideas**, and **feelings** through a variety of activities in art, music, movement, dance, role-play, and **design and technology**.

During the Early Years Foundation Stage, the essential building blocks of children's design and technology capability are established. There are many opportunities for carrying out D&T-related activities in all areas of learning in the EYFS.

By the end of the EYFS, most children should be able to:

- Construct with a purpose in mind, using a variety of resources
- Use simple tools and techniques competently and appropriately
- Build and construct with a wide range of objects, selecting appropriate resources and adapting their work when necessary
- Select the tools and techniques they need to shape, assemble and join materials they are using

D&T-related activities in the EYFS should be appropriate to the developmental stage of the children. Activities should look quite different from those carried out in KS1. Effective practice in the EYFS has the following characteristics:

- Designing does not necessarily entail drawing
- Designing can mean using hand gestures, arranging and re-arranging materials and components, talking and listening
- Designing is usually intuitive
- The designing and making process is fluid
- Sometimes practical skills are taught directly
- Children have frequent opportunities to develop practical skills with a range of materials
- Children have frequent opportunities to explore construction kits

- Children have frequent opportunities to explore existing products
- Activities are appropriate to children's prior experience
- Activities can be adult or child led

Key Stage 1

Children are taught about:

- Design
- Designing purposeful, functional, appealing products for themselves and other users based on design criteria
- Generating, developing, modelling and communicating their ideas through talking, drawing,
- Templates, mock-ups and, where appropriate, information and communication technology
- Making, selecting from and using a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]
- Selecting from and using a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics
- Evaluating, exploring and evaluating a range of existing products
- Evaluating their ideas and products against design criteria
- Technical knowledge
- Building structures, exploring how they can be made stronger, stiffer and more stable
- Exploring and using mechanisms [for example, levers, sliders, wheels and axles], in their products
- Using the basic principles of a healthy and varied diet to prepare dishes
- Understand where food comes from

Key Stage 2

Children are taught about:

- Using research and developing design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- Developing, modelling and communicating their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design
- Selecting from and using a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately
- Selecting from and using a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities
- Investigating and analysing a range of existing products
- Evaluating their ideas and products against their own design criteria and considering the views of others to improve their work
- Understanding how key events and individuals in design and technology have helped shape the world
- Applying their understanding of how to strengthen, stiffen and reinforce more complex structures
- Understanding and using mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- Understanding and using electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- Applying their understanding of computing to program, monitor and control their products.
- Understanding and applying the principles of a healthy and varied diet
- Preparing and cooking a variety of predominantly savoury dishes using a range of cooking techniques
- Understanding seasonality, and knowing where and how a variety of ingredients are grown, reared, caught and processed

Implementation

It is our belief that pupils should be taught in the best way possible according to up to date pedagogical thinking. High quality, inclusive teaching (IQFT) is an essential component of our curriculum framework model so that our 'irresistible' curriculum intent translates into outstanding teaching at the point of implementation.

The following constructs may be used to teach design technology at ACE, these are suggestions but are not exhaustive.

<u>IQFT</u>	<u>Subject Specific</u>
<p>Planning Learning Opportunities</p> <ul style="list-style-type: none">• Carefully planned, well-structured and paced lessons.• Making strong cross-curricular links when appropriate.• Clearly defined Learning Objectives and Tasks, shared with pupils at the beginning of each lesson. These are known as 'Ls' and 'Ts' at ACE.• Each Learning Objective is differentiated on a number of levels so that children gradually develop skills, knowledge and application of knowledge. These are known as 'Chilli- Challenges' at ACE.	<p>As DT is a STEM subject (Science, Technology, Engineering and Mathematics), many of the inspirations explored are taken from these disciplines.</p> <ul style="list-style-type: none">• Use of 'hooks', wow moments, first hand experiences• Outdoor learning opportunities e.g. opportunities to cook in Forest School• Visits/ Trips – these may be virtual ones e.g. to local museums or exhibitions• Visitors to talk about first hand experiences e.g. local designers, architects and chefs• Use of stories and non-fiction texts e.g. to learn about designers and their methods• History- artefacts, paintings, drawings, designs and designers across time
<p>High Expectations</p> <ul style="list-style-type: none">• Children at ACE are expected to be RISK-TAKERS and choose their own level of challenge. Thereby taking control of their own learning.• Children understand that they need to challenge themselves in order to learn and that this will require them to work outside of their comfort zone and show RESILIENCE. At ACE, we talk about being in the 'Learning Pit' and 'Wobbling'.• Resource boxes and Table packs develop INDEPENDENCE, support and deepen leaning.• Positive relationships between adults and pupils, using praise and positive reinforcement so that children feel valued and inspired to achieve their best.• Setting high standards and expectations for behaviour.	

- Computing – CAD, Control apps/software,
- Religious Education – Cultural events and food.

Engagement and Enhancement

- Pupils **demonstrating their learning** in a variety of forms, with a focus on enjoying the journey that comes from **DEEP THINKING, LEARNING** and **PROBLEM SOLVING**.
- **Imaginative and creative approaches** to ensure lessons are interesting and stimulating.
- Varied **teaching styles**.
- Use of **ICT** to enhance learning experiences

Learning Environment

- Classrooms are bright, vibrant and **alive with learning**, following our 'communication friendly' guidelines.
- Displaying **self-help working walls** to promote independence and perseverance
- Examples of **WAGOLs (What a good one looks like)** and high quality pupils' work.

Feedback

- Use continuous **Assessment for Learning** to make ongoing judgements of pupils
- **Teach at the Point of Learning (TaPoL)** to be responsive to children's needs.
- Give **timely feedback** during the lesson.
- Enabling pupils to **respond to feedback** (self, peer, adult) in an age appropriate way. Pupils at ACE in Year 1 (Summer Term onwards) and Years 2-6, will have opportunities to edit, improve and correct their learning outcomes. For example, pupils will make changes to their work. At ACE, this is known as **'Purple Polishing'**.

Impact

Design technology is monitored by the subject leader throughout all year groups using a variety of strategies such as work and book scrutiny, lesson observations, staff discussions and pupil interviews. Feedback is given to teachers so that they can continually review and improve their practice. School leaders use the information to see if the children have developed the correct skills and knowledge for their milestone, making good progress from their starting points.

As a result of a well-structured and planned curriculum, pupils will understand design and technology as a process of plan, make and evaluate and they will understand, and be able to discuss, the relevance to their everyday lives.

Assessment

Design technology is assessed through teacher judgement and monitored by the subject leader and Senior Leadership Team. Proof of Progress Tasks, the final piece/outcome and pupil voice supports teachers in making accurate judgements of what the children know.

Vocabulary

At Altrincham CE we are committed to delivering a vocabulary rich curriculum for all our pupils. Research evidences that pupils with the most extensive vocabulary have:

- Better reasoning, inference and pragmatic skills
- Academic success and employment
- Better mental health in adulthood

Through our 'irresistible' curriculum framework, children are systematically taught a range of academic and technical vocabulary so that they can articulate complex ideas and deepen their understanding.

Milestone 1

Think. Make. Break. Repeat. Product. Purpose. User. Inspiration. Features. Prototype. Labelled Diagram. Materials. Techniques. Beam. Column. Slab. Automatically. Fluency. Accurate. Rear. Guide Bridge. Rotating. Horizontal. Vertical. Diagonal

Milestone 2

Annotate. Device. App-enabled. Respond. Pneumatic. Compressed. Pressure. Hydraulic. Piston. Hollow cylinder. Reciprocating. Variety. Contain. Conjunction. External. Aspects. Component parts. Coordinates. Assemble. Nutrients. Pulses. Wholegrain. Bacteria, Preserve. Refrigerated

Milestone 3

Artificial Intelligence. Sensor. Component. Detect. Perfect. Ellipse. Parabola. Circumference. Mechanical Advantage. Physicist. Gear Train. Interlock. Mitre Gear

