

Design and Technology

Vision and Intent



Co-op Academy
Grange

Our Vision for Design and Technology at Co-op Academy Grange

Design and Technology is an inspiring, rigorous and practical subject. Using creativity and imagination, students design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of knowledge in the subjects of Engineering, Product Design, Food, and Textiles and draw on disciplines such as mathematics, science, engineering, computing and art. Students learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, students 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.

Our Intent for Design and Technology at Co-op Academy Grange

Our Curriculum – What do we want our subject Design Technology curriculum to be?

Within the Design and Technology department, students will be covering Food and Nutrition, Textiles, Engineering and Product Design. Our subject in KS3 works on a carousel of 4 subjects which are allocated 12 lessons each. Within the 4 subjects the students have success criteria available for each sheet and a milestone mark is used to provide students with individual feedback.

Within all these four disciplines students need to use research and exploration, such as the study of different cultures, to identify and understand user needs, they do this by:

- Identify and solve their own design problems and understand how to reformulate problems given to them.
- Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations.
- Use a variety of approaches for example, user-centred design and iterative design process, to generate Product ideas and avoid stereotypical responses.
- Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools.
- Select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture.
- Select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties.
- Analyse the work of past and present professionals and others to develop and broaden their understanding.
- Investigate new and emerging technologies, for example TinkerCad and 3D Printing.
- Test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups.
- Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists.

Technical Knowledge

Within our subject we are keen to know that students will:

- Understand and use the properties of materials and the performance of structural elements to achieve functioning solutions.
- Understand the effects materials, forces and design have on structures.
- Understand how more advanced mechanical systems used in their products enable changes in movement and force.
- Understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs].

- Apply computing and use electronics/robotics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers].
- Understand the impact of engineering on society and the environment.

Cooking and Nutrition

As part of their work with Food, students are taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in students 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 students to feed themselves and others affordably and well, now and in later life.

To demonstrate their understanding, we would like the students to ...

- Understand and apply the principles of nutrition and health.
- Cook a repertoire of predominantly savoury dishes so that they are able to feed themselves and others a healthy and varied diet.
- Become competent in a range of cooking techniques [for example, selecting and preparing ingredients; using utensils and electrical equipment; applying heat in different ways; using awareness of taste, texture and smell to decide how to season dishes and combine ingredients; adapting and using their own recipes].
- Understand the source, seasonality and characteristics of a broad range of ingredients.

Within Y7 Food students learn the basics of health and safety in the kitchen for example knife skills. They then put these skills that they have learnt into practice through a range of practical lessons in Y8 and Y9. Throughout each year they gradually build on their understanding, resulting in them independently creating well balanced meals. Within Food, we have 3 assessment sheets which we use to track students' knowledge. Each sheet has a success criteria. Students can use this as a guide to independently work through tasks. Within the Food curriculum, students are taught how to create healthy food on a budget. They are all so encouraged to think about the carbon footprint of their food and how they can consider the seasonality of food. All tasks are differentiated, encouraging the student to be independent at their level while being encouraged to complete more complex tasks. When completing practical's, students are given differentiated recipes which they read through independently while waiting for the register then read through with the teacher identifying any keywords or misconceptions.

At KS1 and KS2, students will have learnt about seasonal foods and eating healthy and may have completed some practical tasks. We ensure that when we start students in Y7 that we cover all the health and safety in the food room and build upon this knowledge in the first few lessons.

Literacy is a large part of Food, we spend a lot of time on vocabulary, the origin of words and how words are used in a sentence. Recipes are a great tool to use in assessment to encourage reading instructions clearly to be able to follow them to get their required outcome. Within the recipes that the students are given, they are encouraged to think about quantities and increasing and decreasing portion sizes when cooking. When they are creating these dishes, there are questions about how the recipe could be adapted or improved. When it comes to designing their own dish, Students are encouraged to adapt one of the meals and use an online package by Jenny Ridgewell so that they can work out the cost and nutritional value of their dish. Cross-curricular opportunities include maths, measurement, weight and budgeting.

Engineering and Product Design

The Cookie Cutter, Fidget Spinner and Tic-Tac-Toe projects cover the three stages of design, make and evaluate.

Y7 - 3D printing, isometric drawing and laser cutting.

Y8 - 3D printing with anthropometrics, wood and mechanisms.

Y9 - Orthographic drawing, wood joints, vac forming and pewter casting.

The projects in KS3 Engineering and Product Design focus on the three stages of design, make and evaluate. Within each year students use the CAD and CAM in different ways and incorporate more complex tasks each year building on their knowledge and using the technology in different ways. Throughout the three years students have the ability to embed their knowledge on TinkerCAD and 2D Design. In Y9 students focus less on 3D printing and more on orthographic drawing and being able to read drawings to British standards to prepare for a career and understand the importance of standards. All the projects are aimed to give students skills which could potentially lead them to a career within Engineering and Design.

Engineering and Product Design is taught to all students, the packages 2D Design and TinkerCAD provide a user-friendly environment in which complexity can be increased or decreased for each class depending on their ability. All lessons have been planned aiming to the top but can quite easily be adjusted for special educational needs. The Engineering and Product Design projects have been clearly thought out and planned procedurally to make sure that each year they are revisiting the knowledge that they have gained from the previous year and using that while applying it to a more complex project.

All the projects that students complete in KS3 are skilfully planned to give them a wider range of knowledge. The knowledge that they learn in KS3 and KS4 provides students with a clear understanding of the design process and why each stage is vital to get a successful outcome. Engineering and Product Design include a lot of numeracy; the class spends a lot of time thinking about measurements, scale and size which helps the students to use maths in a fun way which encourages them to learn. They also complete a literacy task each lesson where we discuss the origin of the word and where it comes from on a European map, this helps the student with their understanding of the world. Safety is very important in practical rooms. When machines, hand tools and equipment are to be used, health and safety training is put in place to make sure that the students are fully aware of the dangers and are given strict guidelines to prevent these from happening.

Textiles

The first lessons in textiles cover health and safety when hand sewing and machine stitching. Textiles focus on the design and development of a product, where students are encouraged to consider their effect on the environment. Throughout KS3 students are taught the skills that they need to become confident with pattern making, surface finishing, embellishments and construction. Students are encouraged to be independent and think outside the box by using all the knowledge that they have acquired and using it to make a unique product. From screen printing to heat transfer all abilities are catered for with specific help sheets and tutorials so that the students can follow them at their own pace

The students use numeracy every lesson - using tape measures and tailors chalk as a different medium. Literacy is included in every lesson to enable the student to embed the keywords they will need throughout the lesson. Safety is very important in textiles. When equipment is used students always start the lesson with an introduction to health and safety in the textiles room to make sure that the students are fully aware of the dangers. This consists of a written task where they identify the problem on the sheet and explain why it is a problem to mini tasks to teach general misconceptions.

What does it look like in the classroom? (Implementation) When students visit the Design and Technology department, they will experience a different type of lesson to most they have experienced in school - lessons are very hands-on and you are encouraged to get involved. We encourage the students to experiment with materials and that making mistake is a key way of learning. They will find staff who are highly knowledgeable and passionate about their subject and can push them to become Product and tentative. The lessons are fun and engaging with the end goal of preparing our students for life after Grange. We want our lessons to promote confidence, creativity, independence and originality.

What will the impact be? Students develop their creative and practical skills, as well as a greater understanding of the principles of design, such as problem-solving, creativity, and the environment. They will have a deeper understanding of the world and how they can actively make it a better place. In addition to enhancing learning, design and technology education also helps to develop critical thinking skills, problem-solving skills, and knowledge of materials, mechanisms, and electrical control.