Design and technology curriculum vision

Our design and technology curriculum aims to help pupils use their creativity and imagination to design and make products that solve problems within a variety of contexts. Pupils will learn how to design products that consider their own and others' needs, wants and values.
Pupils will see how design and technology draws on disciplines such as mathematics, science, engineering, computing and art.
Our curriculum will help pupils evaluate past and present design and technology and develop a critical understanding of its impact on daily life and the wider world.

The Birley Academy Design and Technology curriculum has been developed to ensure that all pupils:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

The aim of the Design Technology curriculum at Birley:
Is to direct, facilitate and support the development of pupil creativity, competence and confidence in a range of innovative and technical disciplines.

The 3 fundamental ideas upon which our DT curriculum at Birley is based:
To Explore
- Best practice
- Materials and processes

To Experience
- A wide variety of skills, techniques and problem solving opportunities. The making/manufacture of quality products fit for an intended purpose/user.

To Express
- Ideas, solutions, developments, compromise, analysis and evaluation.

"Life is a mountain of solvable problems, and I enjoy that." - James Dyson

Design of the design and technology curriculum

Throughout the curriculum concepts are built upon over time and regularly re-visited, but with increasing complexity over time. The curriculum is the progression model. This structure ensures that pupils are able to internalise key concepts and use them in ever-more sophisticated ways towards ambitious curriculum end points. It is not only subject content, but also disciplinary knowledge which are built into the curriculum in this way. Pupils learn not only substantive design and technology knowledge but how this knowledge has come into being and how it has been developed over time, how it has impacted the world and developments throughout history and how it can support a wide range of future career choices.

Our aims aligned with the National Curriculum:

The national curriculum for design and technology aims to ensure that all pupils:
- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others

Design Technology in Key stage 3

Through a variety of creative and practical activities, pupils 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 domestic and local contexts [for example, the
home, health, leisure and culture], and industrial contexts [for example, engineering, manufacturing, construction, food, energy, agriculture (including horticulture) and fashion].

When designing and making, pupils should be taught to:

Design
- use research and exploration, such as the study of different cultures, to identify and understand user needs
- 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, biomimicry and user-centred design], to generate creative 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

Make
- 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

Evaluate
- analyse the work of past and present professionals and others to develop and broaden their understanding
- investigate new and emerging technologies
- 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
- understand and use the properties of materials and the performance of structural elements to achieve functioning solutions
- 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 the use of digital media to creative and manufacturing products (this includes the use of software programmes such as TinkerCad, Skratch and Photoshop).

Delivery of the Design Technology curriculum

The curriculum is delivered through expertly crafted learning sequences. Teachers use carefully selected pedagogy that best supports pupils to learn, explore and revisit knowledge. This includes a focus on the following structures:

Order of units: In Year 7, Year 8 and Year 9 pupils undertake 2 Design Technology disciplines on a rotation over half the year. Pupils spend approximately 9 weeks in each discipline before moving to the next. The disciplines covered in Design Technology are Resistant Materials and Graphics. In Y7 and Y8 they have double 1 hour 40 minute lesson in the subject every week. In Y9 pupils have double lessons (2 hours) once a fortnight.

Selection of topics at KS3: The National Curriculum sets the framework for our KS3 curriculum. The curriculum is structured to layer knowledge, skills and understanding of equipment, software, techniques and processes across the disciplines. While specific mediums and technical knowledge might be diverse between disciplines the knowledge and understanding gained is cross fertilised through the design, make and evaluate process.

Assessment: Pupils are given a wide range of opportunities to apply and demonstrate their knowledge, understanding and manufacturing skills in a variety of materials and media. Pupils are required to generate solutions in an innovative and 'hands on' way in which they develop, practice and demonstrate manufacturing unique to each discipline but with skills transferable across the curriculum. Feedback is provided on a regular basis both to the class and on an individual basis. There are 3 assessments that take place over the discipline term/rotation. Two of the assessments are directly linked to an understanding and demonstration of skills (practical outcomes) and a third to knowledge about process, technique and equipment (a theory test) ADP assessment.

Links with KS2: We have shaped our curriculum to take into account the curriculum at primary school. Much of what is taught at KS2 are introductory principles of the design, make and evaluation process. We have designed our curriculum to take into account pupils understanding of these principles and their basic ICT training with a consideration for their limited practical skills which are often craft based in paper and card.

Preparation for KS5: We have shaped the discipline choices and the skills taught by our department curriculum aim which is "to direct, facilitate and support the development of pupil creativity, competence and confidence in a range of innovative and technical disciplines". This is with the desire that pupils end KS3 with a love for the subjects and skills and knowledge transferable and applicable to everyday life. In addition the curriculum will have laid a firm foundation upon which pupils can build if they take the subjects on offer at GCSE and beyond. These subjects include Resistant Materials, Graphics, Engineering Design and Creative iMedia. Many courses in Design, Construction, Engineering and iMedia at KS5 will look for the skills and understanding developed.

Knowledge retrieval and retention: Sharp start activities take place at the start of each lesson to ensure overlearning of key information. The ADP assessments includes knowledge questions from current and previous disciplines, including previous school years. Pupils also have access to a Knowledge organiser for each discipline which they are encouraged to refer to and revise from. The knowledge contained directly links to what has been delivered in lessons and is found in assessments.

Clubs and/or intervention: We offer pupils access to a KS3 DT club where they access engaging activities linked to CAD/CAM, Programming, Electronics and Resistant Materials.

Parental/Carer support: Parents and carers can see their children's learning through the knowledge organisers and practical outcomes going home at the end of each term. How pupils are progressing will be fed back through subject reports (levels) and Parents evening feedback.

Helpful sources of information: BBC bite size. Technology pupil.com. DT Knowledge Organisers.

Adapting the curriculum for SEND

We aim to ensure that all our pupils who are disadvantaged or have any special educational needs and/or disabilities (SEND) have access to a carefully planned curriculum. Our curriculum aims to provide pupils with SEND with explicit systematic teaching and rehearsal of knowledge. We also ensure that these pupils have the time they need to study important subject content in design and technology. We aim to ensure that all our pupils who are disadvantaged or have any special educational needs and/or disabilities (SEND) have access to the same carefully planned curriculum as their peers. Our curriculum aims to provide pupils with SEND with explicit systematic teaching and rehearsal of knowledge. We also ensure that these pupils have the time they need to study important subject content in Food.

We know that successful teaching is successful for all pupils regardless of background or prior attainment. To that end the curriculum is adapted to suit all learners in the following ways:

- Learner confidence is built by making lessons accessible and offering all pupils the opportunity for success. The curriculum creates opportunities for learners to feel 'like a Designer and Manufacturer"
- Lessons begin with specific knowledge retrieval activities to return to and embed fundamental ideas
- Live modelling (demonstrations) are used often to explicitly narrate expert thought and practice that pupils can replicate
- Links between ideas are made explicit so that learners can build and strengthen their schema
- Practical work is not completed without a solid grounding in theory and/or demonstration by an expert
- Scaffolds are provided to support oracy and literacy activities with a plan in place to reduce reliance on these scaffolds over time
- Further activities that aid retention and quick recall of spaced content are embedded within every lesson

L.E.A.D. Academy Trust

Our vision
Through outstanding leadership we, at the L.E.A.D. Academy Trust, will provide the highest quality education to enable every pupil to realise their full potential.

Our principles
To achieve our vision we prioritise the four core principles for which our name stands:

Lead - *to show the way; to be first or foremost*
In every aspect of life the ability to lead is essential. Strong leadership is the key to the success of our schools. We will develop leadership skills in everyone who attends one of them, ensuring the development of pupils as leaders of their own learning.

Empower - *to give power to; to enable*
At L.E.A.D. Academy schools pupils are empowered to have high aspirations for their futures. We nurture and challenge pupils to take responsibility, make decisions and work together so they grow into confident and resilient young people.

Achieve - *to accomplish; to get or attain by effort*
We believe in achievement in its broadest sense and that enjoyment of learning is crucial to success. We continually look for and reward achievement in every individual in our schools. We also know that a strong command of English and maths is vital as a foundation for the whole curriculum and prioritise learning in these core subjects.

Drive - *to cause and guide progress; to impel forward*
We will provide the very best education and training for every individual in our schools and will ensure that this is delivered. We value excellent teaching, underpinned by high quality professional development and will constantly move forwards, using and instigating the best ideas and practice.
We also understand that children need to be motivated if they are to succeed in life and we will provide a stimulating curriculum and environment which will prepare them for their futures with confidence and determination.

Glossary of key terms

Word	Meaning
Learning	A lasting change in long-term memory
Substantive knowledge	Established facts (content)
Disciplinary knowledge	Methods that establish the substantive facts (skills)
Conceptual knowledge	Knowledge of concepts, theories, principles, models etc. "Know that…"
Procedural knowledge	Knowledge of how to perform specific tasks "Know how to…"
Conditional knowledge	Knowing when and why to use conceptual and/or procedural knowledge
Discipline (Disciplinary)	A branch of knowledge e.g. Mathematics, Geography, Drama etc
Sequenced	Arranged in a particular order to aid learning
Spaced	Knowledge repeated at certain intervals to aid learning
Misconceptions	A view or opinion that is incorrect based on faulty understanding
Modelling	The process of learning by copying the behavior of an expert
Literacy	The ability to read or write effectively within a specific discipline
Oracy	The ability to express oneself effectively within a specific discipline
Pedagogy	The method and practice of teaching. The 'how' of the classroom
Schema	A cognitive framework of knowledge that helps us interpret new information