Shenley ACADEMY

LONG TERM PLAN 2020-21

Long Term Plan – Design and Technology

Why study Design and Technology?

Studying Design and Technology (D&T) requires pupils to design and make products that solve real and relevant problems within a variety of contexts, (food, textiles, and product design), considering their own and others' needs, wants, and values.

Pupils will explore contextual concepts such as innovative design, sustainability, healthy meals, to learn a broad range of procedural knowledge. Pupils will use designing, prototyping, testing and evaluation to create a variety of products. Through these four main strands pupils will be able to apply knowledge to produce practical outcomes, to embed deeper learning and retain knowledge longer.

D&T also involves pupils to draw on disciplines such as mathematics, science, engineering, computing, and art to come to innovative solutions to design problems. Through research and evaluation, they develop a critical understanding of D&T and its impact on daily life and the wider world. In D&T pupils will learn to be confident and independent designers. To create high quality, functional products that look professional in their finish and instil a sense of pride and ownership in all students.

The skills learnt in D&T will be vital in later life. For example, knowing how to cook and feed themselves and their families. Knowing how to solve problems such as how to assemble products, fix objects such as bikes, repair clothes etc. Students will also be articulate through debates, the issues around pollution and mass production of products and know the impact that it is having on the environment and their own futures.

Aims

Our D&T curriculum is developed to build students' progress from year to year rather than term to term. This is because pupils rotate each term to three D&T subjects' areas, Food, Textiles, and Product Design. This is so the learning can be synchronized in an effective way to meet all the aims of the national curriculum across the D&T areas.

The main aims of D&T are split into four main areas

- Designing- this involves communication of ideas in a variety of ways to fulfil a brief and specification. For example, quick sketches, technical drawings, recipe ideas and adaptations, schematic drawings, and modelling.
- Making – this encompasses all practical skills and processes needed to make a product, such as following health and safety, using specialist equipment, using hand equipment/ tools, using templates/lay plans etc.
- Knowledge- this covers a wide range of knowledge the pupils use when they are making the products such as materials, ingredients, properties of materials, sustainability of materials/ ingredients, names and uses of machinery and tools, stages of manufacturing processes and drawing, technical knowledge such as electronics and mechanisms.
- Evaluation –this incorporates students reflecting on their practical work throughout the making process and understanding how their work can be adapted to ensure quality, meeting user needs or other such constraints. Pupils evaluate their own product against a brief and specification to give essential points for redesign.

Assessment for all D&T disciplines will have a set mark for their practical work. Students will be given marks for each component completed, rather than the final product. Pupils will be marked against a set criterion

for each component based on the knowledge learnt and how they have applied it. This allows for interim marking and quicker feedback to the pupils to improve as they complete the tasks. The pupils will sit a 30-minute assessment; testing pupils on the knowledge they have learnt relating to the project. Pupils will be given a set of questions based on both practical applications, for example, put the stages of inserting a zip in the correct order, and knowledge of material names and their properties.

Long Term Plan -Product Design

In year 7 pupils will be given contextual problem and a pre-made solution. Pupils will understand that designers use a contextual problem to start off research and a range of ideas to decide on a solution, which is usually a product of sorts. Pupils will then investigate what a good product looks like, and then apply this to the manufacture of a pre-planned simple product.

Pupils will be taught the names and uses of tools, equipment, and machinery so they understand what tools are needed to make a simple product. PPE is also introduced; pupils will learn the names of different PPE as well as be able to recognise the different symbols which tell them when and where to wear PPE.
Pupils will understand the hazards associated with each tool and machine, so they can independently choose the correct PPE when making. Pupils will be introduced to new skills and processes that allow them to manufacture such as marking out, cutting, and finishing. Pupils will learn how to quality assure each stage of making to correct their mistakes and understand, for example, if they do not measure correctly, what the implications might be?
Pupils will be taught knowledge of woods. They will learn the names uses and properties, so pupils understand why wood is used to make products, for example, why wood is used in musical instruments.
In year 7 pupils will need a level of support to operate machinery such as the drill and band facer

In year 8 pupils will interpret context of Biomimicry to write their own design brief and come up with a range of designs ideas for a photo-frame. Pupils will be taught to avoid design fixation and explore natural shapes to influence design ideas.
Pupils will be expected to remember the names through recapping of tools and machinery and use them more independently. Health and safety will be recapped, and PPE re-explored.
Pupils will be taught about different manufacturing processes associated with batch and mass production and the efficient working of them and how this relates to the environment. Pupils will use this information to make a Computer Aided Design (CAD) and Manufacture (CAM) created product.
Pupils will be taught how to use 2d design and the laser cutter and use knowledge learnt to understand the advantages of making a product using CAD and CAM.
Pupils will learn in depth about Plastics to understand why plastics are often used in CAD and CAM produced products. Pupils will know the names, uses and properties of plastics, and the impact they have on the environment. Pupils will be able to select the correct plastics to make a trophy knowing its strengths and weaknesses.

In year 9 pupils will be expected to interpret a context and write their own brief and specification based on a problem to solve. Pupils will focus on learning more technical knowledge of mechanisms and electronic components. This will be to widen their knowledge and understand that most products are machines and that they can be broken down into systems.
Pupils will use this knowledge to make a moving bug which uses the use of mechanism and electronic components. Pupils will know what a system is, what the names and uses of different mechanisms are such as CAMS, Pulleys, etc. Know the names and uses of electronic components such as LED, diodes, capacitor, etc. Understand how micro-controllers work and about input and output components.

Pupils will use this knowledge to form a range of ideas that meet a specification.
To manufacture a prototype of their best idea pupils will be introduced to the iterative design process of modelling, testing, evaluation, to understand what problems might occur and how a product can be adapted and improved.
The pupils will know how to use card and know that it is a suitable material to use for modelling. Pupils will further knowledge of testing products using feedback. By using the unpinning technical knowledge of mechanisms and

	Designing What makes a good product?	Making How are products manufactured?	Knowledge What knowledge do I need to make a product?	Evaluation How and why are products tested before they are mass produced?
Project Year 7	Boom box – Pupils will make an amplifier from wood. Pupils will go through a basic design process to be able to make a simple product from wood.			
Skills and knowledge	Pupils will be introduced To a context- Sound? Pupils will be given a brief and product to manufacture Pupils will understand the main points of a good design such as Durability, Manufacture, Size and Safety. Know the requirements of designing a good product such as function, reliability, repairability, etc.	Learn the following practical skills**.** **Preparation**; marking out of materials, measuring, converting cm to mm, quality checks such as visual checks **Cutting**; accuracy, holding the saw correctly **Drilling;** clamping wood into place, checking, PPE, setting up drill, space awareness, risk assessments **Shaping and forming**; use of the sanding machines, including risk assessments, cross, and draw filing using files **Adhesives:** How to glue and clamp wood correctly using wood glue. **Finishes:** how to use different grades of sandpapers, application of varnish, including risk factors.	Woods: Categories name and uses, properties (hardwoods, softwoods) Manufactured boards Names, uses, properties (Chipboard, Medium Density Fibreboard, Plywood) Hand Tools; names and uses (tenon saw, coping saw, files, glass paper) Machinery; names and uses (drill, sander) Health and safety: PPE practical procedures, general health and safety rules, the workshop signs their meanings and locations.	Testing products based on a specification: weight, size, shape, functionality, material used etc. Be able to write up results for evaluation (graphs, tables, images, paragraphs)
Project Year 8	Trophy- Pupils will use more industrial methods of making to produce a Trophy made from woods and plastics.			
Skills and Knowledge	Interpret a design brief and specification to design a range of ideas Draw a range of quick sketch ideas in isometric; page	Learn and develop the following practical skills**.** **CAD/CAM:** Be able to use **2d design** and learn the skills; contouring, rendering, vectoring, mirror, shapes, lines, red and black lines, Know how to use the **laser cutter**; set up, health and	Know about Biomimicry: how it is used in designing, natural influences/patterns designer names and be (Be able to design a range of ideas using biomimicry as a design influence.)	Be able to evaluate their own products against a specification; on function, materials used, sizes, manufacturing processes

	layout, using set square to draw basic grids, drawing letters, drawing circles, Use shading in light and dark tones to make a drawing appear more 3d.	safety, settings. **Preparation:** Know how to use templates to mark out; card templates, improve accuracy, less mistakes. *Link to industrial methods*. **Cutting;** cutting inner sections of woods using coping saws developing skills **Standard Components:** joining wood using screws, hinges **Drilling:** To drill pilot holes, why they are needed, the step by step process. **Shaping and forming;** use the sanding machine to round off shapes accurately. Use files cross and draw filing to smooth any intricate or inner pieces of wood. **Adhesives;** how to use and apply Tensol cement and Epoxy safely, **Finishes;** develop skills of wood finishes. Know how use and apply wood wax, safely.	Learn about computer aided design and manufactures; advantages, disadvantages, use in industry Know the general advantages and disadvantages of CAD Know the general disadvantages of CAM Know about plastics; categories name and uses, properties (thermosetting and thermoplastic)	Pupils to write up in paragraphs; point, evidence, explain to write a detailed evaluation against the specification
Project Year 9	Moving bug toy- pupils will introduce moving and electrical parts into products.			
Skills and knowledge	Design a mould shape to vacuum form	Learn and develop the following practical skills**.** **Circuit assembly:** order of components, LEDS must go after resistors, positive and negative components, how to follow circuit diagrams. **Vacuum forming:** the stages of vacuum forming, plastics used, health and safety considerations	Pupils will learn about electrical components; names, uses, symbols (resistors, LED's, wire, battery, diodes) e.g. Resistors restrict the flow of electricity, so components do not get overloaded and blow out. Pupils will now about integrated chips and 555 timers' circuits Pupils will learn about mechanisms; names, uses (pulleys, gears, cams, lever, linkages, springs) e.g. Cams convert rotary motion into reciprocation motion	Pupils will suggest modifications to improve a product

Long Term Plan –Textiles

In year 7 pupils will learn the basics of designing and making a textiles product and how to create a product considering simple user wants and needs. They will explore a specific constraint, such as using anthropometric and ergonomic data to work out what size a product should be, to ensure the product is fit for purpose.

Pupils will learn the name, uses, categories and properties of key materials used to manufacture their product, natural and synthetic fabrics. Pupils will know how to communicate their own ideas through quick sketching techniques.

Pupils will learn the fundamental practical skills for textiles and will know how to thread up a sewing machine, how to hand sew and follow a basic lay plan to manufacture a simple textile product (ear pod case).

Pupils will know how to recognise mistakes when sewing and quality assure each process when making the individual components for their products to create the best possible outcome. Pupils will learn how to write final evaluation. Pupils will assess what the products strengths are by rating it against the specification points such as aesthetics, functionality, etc, to determine areas of improvements.

In year 8 pupils will build on the skills learnt in year 7, to develop skills using the sewing machine, construction order and following lay plans with more independence to create a functional product (pencil case).

Pupils will also learn about new processes and techniques such as the heat press, applique, fringing, and how to create button-holes. Pupils will know about wider uses of materials uses, including composites, and understand how their properties relate to product functions, for instance, how to make a brand new composite material by heat pressing old plastic bags, and the new properties that this creates.

They will learn and consider the environmental impact of plastic. Pupils will write a design brief based on the requirements of the outcome and this in turn will then be used to evaluate their product through user testing, consideration of the environment and self-evaluation; thereby dually expanding on their evaluative skills and methods.

In year 9 pupils will be expected to select and research a specific user, the user's needs, and use this to formulate a specification with individualised constraint and requirements. They will research the work of past and present professionals. They will then use this specification to create a basis for their design ideas (for a drawstring bag), and later to evaluate against it.

Pupils will draw out ideas using sketches and develop this skill by rendering to show fabric selections and technical details such as pockets, etc. Pupils will have excellent knowledge of how to use the sewing machine, and be able to choose their own tools, equipment, and machinery to manufacture their outcome to resolve a design constraint.

Pupil's practical skills will be extended to design a personalised lay plan for pockets on their drawstring bag and to follow more complex pattern language on lay plans, such as seam allowance, gathering, pockets, etc.

Pupils will write an in-depth evaluation based on the original specification points. Pupils will discuss each point such as function and through own tests conducted report what worked well in terms of functionality and what could to be improved. For example, the zip does close and keep the earphones in the case, however after a few used the zip gets stuck. I could use a different fastening such as Velcro. Pupils would use the knowledge learnt in the theory and practical lessons to suggest different improvements.

	Designing	Making	Knowledge	Evaluation
Project Year 7	EarPods case -pupils will be introduced to using a sewing machine and learn key construction techniques such as hemming, inserting a zip and seams. They will follow a lay plan to assemble their product and learn about fabric properties, categories and uses.			
Skill and knowledge	Pupils will communicate their ideas through quick sketching and annotation. Pupils will use ergonomic factors to influence their design. Pupils will learn what a design brief and specification. Pupils will know the points of a specification and focus on a few key points such as user, aesthetics, materials and environment.	**Sewing machine;** gain a basic understanding of how to use a sewing machine. How to switch on, use the foot, set the speed etc. **Construction:** know basic construction techniques such as seam and hem. Know how to follow and understand basic pattern layouts. **Fastenings:** how to insert a zip. Sewing techniques.	Pupils will understand the difference between natural and synthetic fabrics. (natural comes from animal sources and man-made comes from chemical synthesis). Pupils will know parts of the sewing machine, bobbin, turning wheel etc, Pupils will know the different types of textiles tools used-fabric scissors, thread etc. Pupils will know the fabric names, uses and properties Pupils will know about patterns; how they are used, Pupils will know about fastenings; zips, Velcro, press stud. Pupils will know about health and safety procedures	Pupils to write an evaluation of the final product. Pupils will know the successful points of the product and the improvements needed. Pupils will focus on two points from the specification (function and appearance).
Project Year 8	Pencil case- pupils will design and make a pencil case out of recycled plastic. They will use a combination of decorative and technical skills (applique, weaving, seam, hem, pattern layout and inserting a zip) to create their pencil case. They will learn about the environmental journey and impact of plastic.			
Skill and knowledge	Pupils will know how to follow pattern layouts and make simple adaptations through quality assurance. Pupils will know the different forms of research (primary, surveys,	**Sewing machine;** set up and use the sewing machine competently to sew different materials, sew intricate shapes and patterns. **Construction:** Pupils will know how to use, draft, and sew a multiple piece lay	Understand the environmental impact of plastic on the environment. Including the lifecycle of plastics, sourcing, uses, waste disposal, impact to the earth. Pupils will know the sequencing making of a practical outcome and be	Pupils will know how to evaluate a product based on its lifecycle and suggest how it could be designed to be more environmentally friendly. Pupils will know how

	questionnaires, etc. secondary, market research reports, newspapers etc.) Pupils will know to carry out research to inform a specification. Pupils will know how to write their own design brief based on their research and specification	plan. Pupils learn key decorative textiles techniques (pleating, weaving, fringing and applique) to construct main parts of the pencil case. **Standard components:** how to insert a zip. **Surface finishes:** know how to use the heat press, safely to laminate and add surface patterns to fabrics.	able to write a manufacturing specification. Pupils will know how different textiles are composed together make then suited to different purposes, such as elastane is used with other fabrics to make it stretchy etc. Pupils will know about the different decorative techniques; pleating etc.	to test each other's products against a set of criteria such as functionality, user needs, etc. and record information in tables, graphs, etc.
Project Year 9	Drawstring bag – pupils will learn how to resolve a problem through user centred design. This will include key research and evaluative skills to fully understand user needs with an emphasis on improving their cultural capital. They will design and make a sports bag with specific pockets/features to appeal to a specific user and sport. The skills will extend their technical knowledge and application through construction and planning techniques.			
Skill and knowledge	Pupils use research and exploration, such as the study of different cultures (sports and users), to identify and understand user needs Pupils will develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations. Pupils will research design professionals and incorporate their finding into their specification.	**Hand sewing:** Pupils will sew loose threads from the sewing machine to ensure quality. **Sewing machine;** set up and use the sewing machine independently to sew difficult materials such as nylon. **Construction:** Pupils will know how to use, draft and sew a more complicated lay plan which includes pockets. Pupils to cut and sew together main parts of the bag and pockets. **Standard components:** how to add on press studs, Velcro, buttons and toggles **Surface finishes:** know how to use the heat press, safely to create an independent artwork to go on the	Pupils will know how to create their own pattern layout for their bag by working out sizes from function and user needs. Pupils will know about fabrics that have been modified to improve their characteristics for aesthetical and/or functional purposes. Such as flame-retardant materials.	Pupils will analyse the work of past and present professionals and others to develop and broaden their understanding. Pupils will evaluate and refine their ideas and products against a specification, considering the views of intended users and other interested groups.

		bag.		

Long Term Plan –Food In year 7 pupils will be introduced to the Eatwell Plate and know it is one of the UK government's healthy eating strategies. Pupils will understand that an intake of the right amount of nutrients can achieve a balanced diet. The students will know about hygiene and safety when preparing and serving food. Pupils will understand the meaning of the 4C's (Cleaning, Cooking, Chilling, Cross-contamination) and be competent in the practice of them, during practical lessons.
Pupils will acquire fundamental cooking skills such as knife skills, through a series of practical lessons. Pupils will prepare and cook a variety of recipes ranging from fruit salad to a cold pasta salad. In the process they will be applying knowledge of hygiene and safety, the Eatwell Plate, and key nutrients in food. They will also appreciate where food comes from and the importance of using food when in season.

In year 8 pupils will build on the skills learned in year 7, to develop into creating more complex dishes. Pupils will plan and prepare meals for families and individuals with special dietary needs e.g. vegetarians. Pupils will be able to use knowledge to understand the function of ingredients such as carrots contain vitamin A, that aids strong bones and a healthy nervous system. Pupils will continue to learn about Food hygiene and safety, from year 7 and examine the specific roles that bacteria play in food spoilage and food poisoning. Students will draw on their knowledge from science lessons to answer questions about factors that cause bacteria to multiply; what are pathogens; high risk foods; common pathogens such as salmonella and listeria; how they affect the body and how they react to different temperatures. Pupils will use and apply knowledge and skills of food preparation and nutrition to solve health and lifestyle problems.
Pupils will know about Macro and Micro-nutrients and their functions in the body such as the effects of deficiency. Pupils will analyse dishes using sensory testing and self-evaluation.

In year 9 pupils will learn about the science behind food production. Pupils will explore how food is cooked and heat transference Pupils will know how food is cooked and how is heat transferred. They will know that food is cooked by radiation, conduction and convection. Pupils will know what types of Bacteria causes food spoilage and poisoning. The names, food it usually it occurs in and symptoms it causes. Pupils will know the Food science behind cooking processes such as protein denature, coagulation, gluten formation, raising agents, shortening. Pupils will know what the purpose of Gluten in pasta by making ravioli pasta. Pupils will also learn to boil, shape, mix ingredients together. Pupils will know how gelatinisation thickens up a sauce by making a roux sauce for a macaroni and cheese recipe. Pupils will learn how to boil, grill, grate, simmer, ingredients to make a macaroni cheese. Pupils will know what is shortening by making a short crust pastry, Pupils will know how to make pies by shaping pastry. Pupils will know why bread rises by using yeast to make bread. Pupils will know how to knead and shape bread. Pupils will know how to research and create own time plan for a Quiche. Pupils know the steps of making a quiche and understand how to re organise them to be more efficient. Pupils will know how to make a Quiche using a time plan, using own ingredients for the filling. Pupils will know how to Rank and Rate food using sensory characteristics to suggest improvements.

	Designing	Making	Knowledge	Evaluation
Project Year 7	Health meals and snacks: Pupils will learn about the Eatwell Guide as one of the UK government's healthy eating strategies and how together with nutrients that can achieve a balanced diet. The			

	students will also learn about hygiene and safety while preparing and serving food in the food preparation area. They will also learn how to prepare a variety of simple dishes ranging from fruit salad to making a cold pasta salad.			
Skills and knowledge	Pupils will know how to arrange practical dishes to make them look aesthetically pleasing. Such as cutting the fruit to all the same size and arrange colours. Pupils will know how to do a simple time plan	**General practical skills:** weigh and measure: accurate measurements of liquids and solids to know the difference between grams and ml. **Knife techniques;** bridge technique. Dice and cut into even sized pieces. **Use of cooker:** baking, boiling **Use of equipment:** blenders, food processors **Preparing fruit and Vegetables:** how to segment fruit, juice fruit and prepare garnishes whilst demonstrating the technical skills of controlling enzymic browning. **Dough:** rubbing in method shaping and use glaze finishes (egg wash)	Pupils will know the Eat Well Plate. The different sections and portion amounts. Pupils will know the functions and sources of nutrients found in foods such as fruits and vegetables Pupils will know all the Health, Hygiene and Safety which covers the 4Cs of food hygiene Pupils will know about seasonality and the months that certain fruits and vegetables are available, e.g. Strawberries are available May, June, July.	Pupils will learn a range of sensory words to help them describe their food outcomes. Pupils will know and understand how to rate food on a sensory scale and draw a conclusion.
Project Year 8	Food for Families: In year 8 pupils will build up on practical skills to prepare and cook a wider range of dishes. Pupils will learn about macro and micronutrients focusing on meeting the dietary needs of specialist groups such as vegans, vegetarian, religious groups etc. Pupils will learn about the			
Skills and knowledge	Pupils will know how to improve a ready-made tomato sauce by adding in herbs, spices etc. Pupils will know how to dovetail a time plan Pupils will know how to adapt recipes and time plans, to meet the needs of e.g. vegan using Quorn Chicken	**General practical skills:** taste and season during the cooking process. (add salt, pepper, herbs, spices) Use garnishes and decorative techniques. Will use visual check to check for readiness. **Preparing fruit and Vegetables:** peeling, chopping, **Knife techniques:** vegetable carving. **Use of the cooker hob and oven:** grilling, baking, boiling pasta to the right al dente. **Cooking techniques:** dry heat methods using the hob, dry frying. **Sauce making;** reduction	Pupils will learn about the different macronutrients and micronutrients. How they are different, use and functions on the body. Pupils will learn about biological raising agents the use of yeast in bread making.	Pupils will extend on key sensory words to build a wider vocabulary. Pupils will be able to create their own sensory charts.

		sauce to concentrate flavour. **Use of the cooker:** boiling pasta to right al dente.		
Project Year 9	Food Science: In year 9 students will continue to explore Food Hygiene including the effects of enzymatic on food spoilage and food waste. Pupils will know ow food is cooked and heat transference. Pupils will learn how to explore different food science processes such as gelatinisation, yeast raising agents.			
Skills and knowledge	Pupils will know how to adapt recipe to make own idea, prepare time plan for own idea. Pupils will explore a variety of savoury fillings for a quiche	**General practical skills:** select and adjust cooking times to suit the ingredients. Use a temperature probe to check whether an ingredient/recipe is ready. **Dough:** short crust pastry, pastry shapes **Preparing fruit and Vegetables;** grate, peel, de skin, de seed, shape, blend **Knife techniques:** slice, chopping, dicing **Cooking techniques;** Steaming, boiling, and simmering **Sauce making;** starch based: roux sauce, **Dough:** Shaping of breads and pastries: rolls, knots and twist and pleat,	Pupils will know about high risk foods such as chicken and how they can spread bacteria such as salmonella. Pupils will learn the science behind food, rising agents, protein denature, shortening, gelatinisation	Pupils will be able to evaluate recipes to justify adaptions Pupils will be able to rate test food