Design and Technology – Year 4

Content- Electrical Systems- Simple Circuits and switches

Big Question: Why is the testing of a product important?

NC objectives - **areas of study**	End point of area of study	Vocabulary		
		Basic	Adventurous	Technical
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 relevant contexts. When designing and making, pupils should be taught to: -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. -Select from and use a wider range of tools and equipment to perform practical tasks accurately. -Select from and use a wider range of materials and components. Including construction materials and textiles. -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.	**<u>Electronics-</u>** Children will understand and use electrical systems in their products, such as series circuits, incorporating switches, bulbs and buzzers. They can apply their understanding of computing to program and control their products. They know and use technical vocabulary that is relevant to the project. Children have investigated and evaluated a number of existing battery-powered products. They have investigated a range of existing battery-powered products and where practical, they have disassembled them to find out how they work, the materials they have used and discussed the purpose and intended user. Children can make a variety of switches by using classroom materials- card, corrugated plastic, aluminium foil, paper fasteners and paper clips. Children understand how to avoid short circuits. They understand why electricity is dangerous and follow safety rules. **<u>Significance- Thomas Edison</u>** Links to Science unit of Light. Children to explore the impact Thomas Edison had on the development of light. (Look through progress of light through the ages- fire, candle, oil lantern etc) Research the different types of inventions and how he was able to successful create a lightbulb to produce light for a long period of time. Ensure children understand the challenges he faced and that he did not produce a product straight away but took time.	Switch, insulator, conductor, inventions	Control, fault, function, appealing, system, impact, disassemble, components, positive, negative	push-to-make switch, push-to-break-switch, user, prototype, design criteria, design brief, reclaimed materials, automatic, wire strippers.

-Understand how key events and individuals in design and technology have helped shape the world. -Understand and use electrical systems in their products. -They can apply their understanding of computing to programme, monitor and control their products.				

Knowledge

Substantive Knowledge

Electronics- Concept- Authenticity and Significance

Lesson 1:
LO: To know the impact Thomas Edison had on the development of light.
Vocabulary- function, inventions, impact
Significance- Thomas Edison
(Retrieval Science year 4- Unit light.)
Children to explore the impact Thomas Edison had on the development of light. (Look through progress of light through the ages- fire, candle, oil lantern etc) Research the different types of inventions and how he was able to successful create a lightbulb to produce light for a long period of time. Ensure children understand the challenges he faced and that he did not produce a product straight away but took time.
Discuss what a difference this has made on our lives.
Lesson 2:
LO: To know battery powered existing products.
Vocabulary- components, disassemble,
Discuss, investigate and, where practical, disassemble different examples of relevant battery-powered products, including those which are commercially available e.g. *Where and why they are used? How does the product work? What are its key features and components? How does the switch work? Is the*

Disciplinary Knowledge

Each lesson: Tell chn- Explain to the children that today we are going to be inventors and create our own light source product using simple circuits and switches. Children to create a product that is meaningful to them and can be used in relevant contexts. Identify design criteria and user of the products thinking about how it can be purposeful. When thinking about being an inventor, children need to understand that it is ok to make mistake and demonstrate perseverance and overcome challenges.

Throughout the unit, children will be able to draw upon other subject disciplines such as Mathematics, Science and Art. This will include the following:

Science – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
Computing – design and write using CAD.
Spoken language – asking questions to check understanding, develop technical vocabulary and build knowledge. Maintain attention and participate actively in collaborative conversations, staying on topic and initiating and responding to comments. Develop understanding through speculating, hypothesising, imagining and exploring ideas.
• **Art**– using and developing drawing skills.

product manually controlled or controlled by a computer? What materials have been used and why? How is it suited to its intended user and purpose? **<u>Lesson 3:</u>** **<u>LO: To know how to create simple circuits and switches.</u>** **<u>Vocabulary- Retrieval Science- short circuit, switches, secure connections</u>** Recap with the children how to make manually controlled, simple series circuits with batteries and different types of switches, bulbs and buzzers. Discuss which of the components in the circuit are input devices e.g. switches, and which are output devices e.g. bulbs and buzzers. Demonstrate how to find a fault in a simple circuit and correct it, giving pupils opportunities to practise. Remind children about the dangers of mains electricity. Ask the children to make a variety of switches by using simple classroom materials e.g. card, corrugated plastic, aluminium foil, paper fasteners and paper clips. Encourage children to make switches that operate in different ways e.g. when you press them, when you turn them, when you push them from side to side. Ask the children to test their switches in a simple series circuit. Teach children how to avoid making short circuits.  	Children to follow the four aspects of Design and Technology- research, design, make and evaluate whilst building upon technical knowledge to make their finished product.

Lesson 4: **LO: To know how to design an authentic light system using electrical systems.** **LO: To understand and use electrical systems in their product.** **Vocabulary- authentic, cross-sectional and exploded diagrams** Develop a design brief with the children within a context which is authentic and meaningful. Discuss with children the purpose of the battery-powered products that they will be designing and making and who they will be for. Ask the children to generate a range of ideas, encouraging realistic responses. Agree on design criteria that can be used to guide the development and evaluation of the children's products, including safety features. Using annotated sketches, cross-sectional and exploded diagrams, as appropriate, ask the children to develop, model and communicate their ideas. **Lesson 5:** **LO: To know how to use tools and equipment to cut, shape, join and finish with some accuracy.** **LO: To understand and use electrical systems in their product.** **Vocabulary-Retrieval of Science vocabulary** Children to consider the main stages of making and ensure children are testing circuits and product throughout to ensure it is meeting the design criteria. Children can include finishing techniques including using CAD to support with designs or pictures. Ensure children are drawing upon their knowledge of circuits from their Science learning and also previous lessons. **Lesson 6:**	

LO: To know how to test their final product to ensure it meets design criteria.

Vocabulary- Recap all vocabulary from unit

Evaluate throughout and the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed.

Feelings whilst reviewing and evaluating our created products.

Concepts

Functionality	Authenticity	Innovation	Significance
	• Carry out projects that are real and meaningful to them and others. • Work within a range of relevant contexts, ranging from domestic to industrial. • Work towards realistic and credible outcomes that can be evaluated in use. • Engage in activity that mirrors design and technology in the wider world. • Create products with a genuine purpose and for a real user. • Create products which need to work in some way in order to be successful.		

ASSESSMENT

KNOW MORE, REMEMBER MORE, DO MORE...

In this unit of learning, progress has been made when a learner knows more. This 'distance travelled' from the starting point is evidenced through them remembering more and doing more: in books, low stakes quizzes, retrieval, use of mind maps, answering the big question and being able to feel more confident about this unit.