

## **Medium Term Plan – Design Technology - Electrical systems – More complex switches and circuits**

### **N.C POS:**

- *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 and prototypes.*
- *Select from tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing] accurately.*
- *Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities.*
- *Investigate and analyse a range of existing products.*
- *Evaluate their ideas and products against their own design criteria.*
- *Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors].*

**Concept:** technology, impact, legacy, change, inventions innovation, application, cause and effect, light, homes, impact.

**Key Vocabulary:** series circuit, parallel circuit, names of switches and components, input device, output device, system, monitor, control, program, flowchart, function, innovative, design specification, design brief, user, purpose.

**Prior Learning:** Understanding of the essential characteristics of a series circuit and experience of creating a battery-powered, functional, electrical product. Initial experience of using computer control software and an interface box or a standalone box, e.g. writing and modifying a program to make a light flash on and off.

### **Core Knowledge- non-negotiable**

#### **Explore**

- Using research, discuss a range of relevant products that respond to changes in the environment using a computer control program such as automatic nightlights, alarm systems, security lighting e.g. Who have the products been designed for and for what purpose? How and why is a computer control program used to operate the products? What input devices, e.g. switches, and output devices, e.g. bulbs, have been used?
- Investigate electrical sensors such as light dependent resistors (LDRs) and a range of switches such as push-to-make switches, push-to-break switches, toggle switches, micro switches and reed switches. To gain an understanding of how they are operated by the user and how they work, ask the children to use each component to control a bulb in a simple circuit. Remind children about the dangers of mains electricity.

#### **Designing**

- Investigate famous inventors who developed ground-breaking electrical systems and components.
- Use research (using things such as questionnaires) to develop a design specification for a functional product that responds automatically to changes in the environment. Take account of constraints including time, resources and cost (utilize tables and graphs to represent data).

- Generate and develop innovative ideas and share and clarify these through discussion (such as 'steady-hand' game, greetings card with buzzer/bulb or alarm system).
- Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams.

### **Making**

- Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components such as wires, bulbs, card, buzzers etc.
- Competently select and accurately assemble materials, and securely connect electrical components to produce a reliable, functional product.
- Create and modify a flowchart or computer control program to enable an electrical product to work automatically in response to changes in the environment.

### **Evaluating**

- Continually evaluate and modify the working features of the product to match the initial design specification.
- Test the system to demonstrate its effectiveness for the intended user and purpose.

### **Wider Influences**

- Understand how electrical systems are used in toys and games (operation, 'steady-hand' game etc)
- Understand how alarm systems can keep different things safe (such as buildings).

### **Enduring Understanding**

- Use electrical systems in their products and understand how they work.
- Apply their understanding of a flowchart or computing to program, monitor and control their products.
- Know and use technical vocabulary relevant to the project.