Alexander Hosea Curriculum **Curriculum map** **Subject – Design and Technology**

Year Groups
Year 3

Aspect of D&T
Electrical systems
Focus
Simple programming and control

What could children design, make and evaluate?
illuminated sign noise-making toy vehicle
nightlight display lighting
other – specify

Project title
Design, make and evaluate a _____ (product) for _____ (user) for _____ (purpose)

Intended users
themselves younger children older children
teenagers parents shoppers friends
school general public other – specify

Purpose of products
hobbies and interests utility pleasure
advertising comfort illumination
other – specify

19. Health and safety
Pupils should be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task. Risk assessments should be carried out prior to undertaking this project.

16. Possible resources
microcontroller or a standalone control box or an interface box

collection of battery-powered, manually-controlled and programmable electrical products

different switches including toggle, push-to-make, push-to-break

plastic packaging, card, corrugated plastic, reclaimed materials, finishing media

output devices including buzzers, bulbs, bulb holders, LEDs, zinc carbon or zinc chloride batteries, battery holders, wire, automatic wire strippers right/left handed scissors, PVA glue, cutting mats

17. Key vocabulary
series circuit, fault, connection, toggle switch, push-to-make switch, push-to-break switch, battery, battery holder, light emitting diode (LED), bulb, bulb holder, USB cable, wire, insulator, conductor, crocodile clip

control, program, system, input device, output device, process

user, purpose, function, prototype, design criteria, innovative, appealing, design brief

3. Key learning in design and technology

Prior learning
- Constructed a simple series electrical circuit, using bulbs, batteries, switches and buzzers.
- Cut and joined a variety of construction materials, such as wood, card, plastic, reclaimed materials and glue.

Designing
- Gather information about users' needs and wants, and develop design criteria to inform the design of products that are fit for purpose.
- Generate, develop, model and communicate realistic ideas through discussion and, as appropriate, annotated sketches, cross-sectional and exploded diagrams.

Making
- Order the main stages of making.
- Select from and use tools and equipment to cut, shape, join and finish with some accuracy.
- Connect simple electrical components and a battery in a series circuit to achieve a functional outcome.
- Program a standalone control box, microcontroller or interface box to enhance the way the product works.

Evaluating
- Investigate and analyse a range of existing battery-powered products, including pre-programmed and programmable products.
- Evaluate their ideas and products against their own design criteria and identify the strengths and areas for improvement in their work.

Technical knowledge and understanding
- Understand and use computing to program and control products containing electrical systems, such as series circuits incorporating switches, bulbs and buzzers.
- Know and use technical vocabulary relevant to the project.

10. Investigative and Evaluative Activities (IEAs)
- Discuss, investigate and, where practical and safe, disassemble different examples of relevant battery-powered products, including some programmable and programmed commercially available products e.g. *Where and why the products are used? How do they work? What are the key features and components? How does the switch work? Is the product manually controlled or controlled by a computer? If it is controlled by a computer how does that improve the way the product works? What materials have been used and why? How is it suited to its intended user and purpose?*
- Ask children to investigate examples of switches, including those which are commercially available, which work in different ways e.g. push-to-make, push-to-break, toggle switch. Let the children use them in simple circuits e.g. *How might different types of switches be useful in different types of products? How might different output devices be used?*
- Remind children about the dangers of mains electricity.

11. Related learning in other subjects
- **Science** – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
- **Spoken language** – participate in discussion and evaluation of battery-powered, programmable products. Ask relevant questions to extend knowledge and understanding. Build their technical vocabulary.

12. Focused Tasks (FTs)
- Recap with the children how to make manually controlled, simple series circuits with batteries and different types of switches, bulbs, motors and buzzers. Discuss which of the components in the circuit are input devices e.g. switches, and which are output devices e.g. bulbs, motors and buzzers.
- Demonstrate how to find a fault in a simple circuit and correct it, giving pupils opportunities to practise.
- Demonstrate and ask children to practise the use of a simple computer control program using an interface box, microcontroller or standalone control box to control output devices, e.g. bulbs and buzzers, using a repeating sequence of instructions.
- 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.

13. Related learning in other subjects
- **Science** – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
- **Computing** – design, write and debug programs that accomplish specific goals, including controlling physical systems.
- **Spoken language** – asking questions to check understanding, develop technical vocabulary and build knowledge.

14. Design, Make and Evaluate Assignment (DMEA)
- Develop a design brief with the children within a context which is authentic and meaningful.
- Discuss with children the purpose of the battery-powered, programmable products that they will be designing and making and how they will work more effectively for the intended user than those that are manually controlled. Consider who they will be for and how they address a problem or need.
- 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.
- Ask the children to consider the main stages in making and testing before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IEAs and FTs.
- Have the children write, test and debug programs that will control the electrical product they have made for a clearly defined purpose e.g. bulb on a nightlight switching off after a period of time when the user has gone to sleep or LEDs flashing on and off to illuminate a sign in a shop window.
- Evaluate throughout and the final products against the intended purpose and, where safe and practical, with the intended user, drawing on the design criteria previously agreed.

15. Related learning in other subjects
- **Spoken language** – 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.
- **Science** – know how to construct simple series circuits and have a basic understanding of conductors, insulators and open and closed switches.
- **Computing** – design, write and debug programs that accomplish specific goals, including controlling physical systems.

Cultural Capital

Visits and visitors Visits linked to projects	Experiences and events
Key Texts	Links https://www.data.org.uk/resource-shop/primary/7-to-9-years/torches-lamps-and-lanterns/ https://www.data.org.uk/resource-shop/primary/7-to-9-years/night-lights-links-to-literacy-yr3/
Community events and links	Global issues
Famous People	Life Skills Problem solving Perseverance Creativity