Big Question

AoLE: Science and Technology	Subject: Product Design	Year: 7

Big Question / Aim / Objective / Concept	Vision (Proposed outcome) / Purpose of curriculum	Prior knowledge / Learners previous knowledge
How can people manage the environment sustainably?	In this unit, pupils develop an understanding of wood and the importance of a sustainable environment through designing and making a handheld game. The unit will offer them to find out how to look after the environment that they live in and how to be more sustainable. The game will be based on a theme of the pupils choice but must be made from different types of wood, plastic and a ball bearing. During the project the pupils will work out their ideas with precision, taking into account how the product will be used, who will use it, the processes that will be used during manufacture and the product's aesthetic appearance. They will enhance their understanding of designing and developing their practical skills. The pupils will also explore CAD / CAM using the programs 2D Design and TinkerCAD. The pupils' challenge will be to design and make a handheld game. The game will consist of 2 sides. Side 1 - will be a maze game where the pupils will design a maze (route) for a small ball bearing to follow. Side 2 - will be a simple puzzle that will be housed by a wall made from mitre joints	Sustainability. The environment that we live in. Different raw materials . Where wood comes from. Recycling.

What does progression look like in this 'Big Question'?

Progression Indicator	Description of learning (What matters statements)	Student evidence of progression (Blooms) / Knowledge
Excelling	I can use prototyping as a link between my designing and making. I can consider how my design proposals will solve problems and how this may affect the environment. I can recognise that our planet provides natural materials and can explain why they may have been processed to make them useful. I can make design decisions, using my knowledge of materials and existing products, and suggest design improvements.	Distinguish the different properties of materials and how they affect the world we live in. Interpret, evaluate and analyse the circular economy effectively and explain how it has a positive effect on the environment. Construct, create and develop a high quality product with accuracy. Evaluate and compare initial ideas with annotation and suggest improvements for designs. Analyse and compare the different types of wood stating the different properties.
Advancing	I can explore and describe the properties of materials and justify their uses. I can creatively respond to the needs and wants of the user, based on the context and on the information collected. I can take into account the impact my making may have on the environment. I can select and safely use appropriate tools, materials and equipment to construct purposeful outcomes.	Define the term carbon footprint by identifying how to reduce the carbon footprint of products. Evaluate how my own choices affect the environment and how to be sustainable. Compare the different ways to apply a finish to a product, justifying what finish to use. Critique how the carbon footprint of a product can be altered. State the name of tools, along with their functions, in the workshop that I will be using for the manufacture of my handheld game. Sketch and annotate different initial ideas that would be suitable for purpose. Summarise the properties of different woods.
Securing	I can recognise that what I do, and the things I use, can have an impact on my environment and on living things. I can identify things in the environment which may be harmful and can act to reduce	State how my own choices affect the environment. Identify the importance of the need to recycle materials. Define the term carbon footprint.

	the risks to myself and others. I can produce designs to communicate my ideas in response to particular contexts. I can safely use a range of tools, materials and equipment to construct for a variety of reasons. I can follow instructions to build and control a physical device.	State the name of tools in the workshop that I will be using for the manufacture of my handheld game. Explain why we finish a product in paint. Outline what sustainability is. Sketch and label different initial ideas. State the names of different types of wood.
Beginning	I can safely use simple tools, materials and equipment to construct and deconstruct. I can explore the properties of materials and choose different materials for a particular use. I am beginning to follow a sequence of instructions.	Identify how to recycle materials to save the environment. Outline the different ways to apply a finish to a product. Recognise the different tools in the workshop. Sketch different initial ideas. Recognise that there are different types of wood.

Authentic learning experiences (Local / National / International)	Skills (Literacy / Numeracy / DCF) / Cross Curricular links
Learning experiences: Students to design and manufacture a handheld game. The game will have two sides. One side will be a ball bearing maze game with the other a puzzle. Pupils will use CAD and CAM in the manufacture of the game. They will use a CNC Router to manufacture their 'maze'. Students will research wood joints and will manufacture a mitre joint for the game. Pupils will develop knowledge of the terms 'sustainability' and 'carbon footprint' and how this will benefit the world that we live in. Students will research the different wood types (hardwood, softwood and manufactured boards). They will understand that the different woods have different properties and will be more suitable to manufacture certain products from. **National links:** The carbon footprint of Wales and the UK. **International links:** The negative effect that certain countries have on the world and its environments. .	**Cross Curricular links:** Science - How different materials and processes affect the environment. Art - Sketching and Two point perspective drawing. Geography - Understanding of environmental geography and how humans can affect their surroundings in a positive and negative way. **Numeracy:** Angles in real life products. Manufacture a mitre joint (a mitre joint is 45 degrees). Measurements - how to correctly use a steel rule and converting lengths (cm to mm). **Literacy:** Describe and explain using connectives to structure reasoning. Read statements linked to sustainability and carbon footprint. Extended writing formalising sentences and structuring paragraphs. Pupils use connectives to explain their reasoning. Summarise information. Write a basic specification using sentence structure. Use connectives to produce extended writing on the circular economy in a chronological order. Learn key vocabulary in Product Design and how to use them to construct sentences using the frayer model. **DCF:** Using CAD and CAM. How to create designs using CAD (2D Design and TinkerCAD) to draw. How to vectorise images. CAM - CNC Router.

Assessment (How will we know that students have learnt what we taught them?)	
Formative assessment: Describe the different wood types. Compare the different woods. Describe what the circular economy is. Explain what sustainability is and how this can help the environment. Teacher circulating (live marking). Q&A discussions on various topics including carbon footprint. Match key terms to definitions/examples through the frayer model. Peer/self-assessment tasks. Creative sketching tasks - initial ideas, development of ideas and two point perspective technical drawing.	**Summative assessment:** Design and manufacture a handheld game. Accuracy during the manufacture, focusing on the mitre joint and standard of finish (painting) of the handheld game. Development and quality of initial ideas. Quality of technical drawing - two point perspective. Baseline assessment - about materials and processes. Compose and construct an extended piece of writing to answer the question 'What is the circular economy?''

Evaluation (To be completed 2024)		
Strengths	Areas for Development	Pupil Voice