

Welsh - Progression 2 Stage

Science and Technology Curriculum For Sustainability Complementing the Welsh Framework



This outline, grounded in the Welsh curriculum, provides a foundation for planning teaching, learning, and experiences that promote sustainability. It is designed to be flexible, allowing teachers to adapt the learning to meet the needs of their specific cohort. Co-creating learning experiences is encouraged, fostering collaboration between educators and students. This progression pathway aims to support teachers in their planning and implementation of sustainability-focused education.

Overarching Objectives for Progression Step 2:

- Encourage curiosity and engagement with the world.
- Develop critical thinking and problem-solving skills.
- Promote personal, social, and cultural development.
- Foster a sense of responsibility for personal health, well-being, and the environment.

The Curriculum of Wales

Expressive Arts	Health and Wellbeing	Humanities (including History, Geography, Religion, Values, and Ethics)	Languages, Literacy, and Communication (including Welsh and International Languages)	Mathematics and Numeracy	Science and Technology
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Expressive Arts Subject Areas: Music, Drama, Art, Dance, Film and Digital Media. Objectives: Develop creativity and imagination. Explore a range of media, techniques, and materials. Express ideas and feelings through different artistic forms. Begin to reflect on their own work and that of others.	Health and Well-being Subject Areas: Physical Health, Mental and Emotional Well-being, Relationships, Healthy Eating, Personal Safety. Objectives: Understand physical health and its connection to well-being. Develop emotional literacy and manage feelings. Learn about making healthy choices (diet, exercise). Build interpersonal skills to foster	Humanities Subject Areas: History, Geography, Religious Education, Business Studies, and Social Studies. Objectives: Understand past and present human experiences, locally and globally. Develop a sense of belonging and identity. Learn about sustainability and the impact of human actions on the planet. Begin to explore ethical questions and different belief systems.	Languages, Literacy and Communication Subject Areas: English, Welsh, Modern Foreign Languages, Literature, Oracy. Objectives: Develop competence in both Welsh and English. Explore the use of language for different purposes (e.g., storytelling, explaining, persuading). Learn to communicate effectively through speech and writing. Engage with a range of literary texts, including Welsh literature.	Mathematics and Numeracy Subject Areas: Number, Geometry, Algebra, Measurement, Data Handling. Objectives: Develop understanding of numbers, patterns, and shapes. Solve practical problems using basic mathematical techniques. Begin to understand and apply mathematical reasoning. Learn to use data to interpret the world around them.	Science and Technology Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology. Objectives: Begin to explore the natural world and understand simple scientific concepts. Engage with technology and develop basic computational thinking. Design, make, and evaluate simple products and systems. Explore sustainability through understanding energy and material use.
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The Sustainability Curriculum Headings

Understanding Sustainability (SUS1)	Environmental Awareness (SUS2)	Environmental Stewardship (SUS3)	Waste Management (SUS4)	Energy Conservation (SUS5)	Biodiversity and Ecosystems (SUS6)
Climate Change and Adaptation (SUS7)	Food and Agriculture (SUS8)	Water Conservation (SUS9)	Sustainable Transport and Urban Planning (SUS10)	Citizenship / Global Responsibility and Sustainable Development (SUS11)	Outdoor Learning and Connection to Nature (SUS12)

The Sustainability Curriculum Model linked to the Curriculum of Wales - Progression Step 2

Understanding
Sustainability

(SUS1)

Science and Technology

Science and Technology AOLE: Understanding Sustainability

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate plants, animals, and ecosystems, learning about their roles and the importance of biodiversity in a sustainable world.

Observe the impact of human actions on the environment, such as how litter affects wildlife or how composting can help plants grow, understanding basic cause-and-effect relationships in nature.

Engage with Technology and Develop Basic Computational Thinking

Use simple coding or digital tools to model eco-friendly practices, such as recycling routines or energy conservation scenarios.

Develop computational thinking by exploring how recycling apps or energy-saving devices work, encouraging curiosity about how technology can support sustainable living.

Design, Make, and Evaluate Simple Products and Systems

Create simple, sustainable products from recycled or natural materials and evaluate their usefulness, promoting a hands-on understanding of eco-friendly design.

Participate in projects to design and build models, such as wind turbines or rainwater collectors, understanding how technology can support sustainable resource management.

Explore Sustainability Through Understanding Energy and Material Use

Learn about renewable and non-renewable energy sources by comparing solar power and fossil fuels, gaining a basic understanding of sustainable energy.

Explore concepts of material waste by observing how long different materials (like paper, plastic) take to break down, recognising the importance of reducing and reusing resources.

Environmental Awareness

(SUS2)

Science and Technology

Science and Technology AOLE: Environmental Awareness

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Observe and describe local ecosystems, identifying plants, animals, and their habitats, to understand biodiversity and the importance of environmental balance.

Explore basic scientific concepts related to the environment, such as the water cycle, food chains, and ecosystems, to appreciate how these processes sustain life.

Engage with Technology and Develop Basic Computational Thinking

Use digital tools to gather data on local environmental conditions, such as weather patterns or water quality, developing skills in data collection and analysis.

Create simple programs or simulations that model environmental systems, such as the impact of pollution on ecosystems, encouraging computational thinking through environmental themes.

Design, Make, and Evaluate Simple Products and Systems

Design and create eco-friendly products or systems, such as a birdhouse using recycled materials, evaluating their effectiveness and sustainability in promoting local wildlife.

Work collaboratively on projects that address environmental challenges, such as designing a compost bin or a water-saving

device, fostering creativity and problem-solving skills.

Explore Sustainability Through Understanding Energy and Material Use

Investigate different sources of energy, discussing renewable versus non-renewable resources and their environmental impacts, promoting informed choices about energy use.

Learn about the lifecycle of materials, from production to disposal, and how sustainable practices, such as recycling and upcycling, contribute to environmental conservation.

Environmental Stewardship

(SUS3)

Science and Technology

Science and Technology AOLE: Earth Stewardship

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate local ecosystems and biodiversity, recognizing the interdependence of organisms and their environments to foster an appreciation for the natural world.

Conduct simple experiments to understand key scientific concepts related to Earth stewardship, such as the water cycle, plant growth, and the effects of pollution.

Engage with Technology and Develop Basic Computational Thinking

Utilise technology tools and software to collect, analyse, and present environmental data, such as using sensors to measure air quality or soil moisture.

Develop basic coding skills to create simple programs or applications that promote awareness of environmental issues, encouraging learners to think critically about technology's role in sustainability.

Design, Make, and Evaluate Simple Products and Systems

Collaborate on projects to design and create sustainable products or systems, such as compost bins or rainwater harvesting systems, emphasising the importance of resource efficiency.

Evaluate the effectiveness of designed products through testing and feedback, discussing improvements based on sustainability principles and user needs.

Explore Sustainability Through Understanding Energy and Material Use

Investigate different sources of energy and their impacts on the environment, encouraging learners to consider renewable options like solar, wind, and hydro energy.

Examine the life cycle of materials used in everyday products, discussing the importance of recycling and reusing resources to reduce waste and environmental impact.

Overarching Objectives for Progression Step 2:

Encourage Curiosity and Engagement with the World

Foster a spirit of inquiry by encouraging learners to ask questions about their environment and seek answers through observation, research, and experimentation.

Develop Critical Thinking and Problem-Solving Skills

Challenge learners to approach environmental issues creatively, using scientific reasoning and data analysis to devise solutions that promote Earth stewardship.

Promote Personal, Social, and Cultural Development

Discuss the impact of cultural practices on sustainability and environmental health, encouraging learners to reflect on their role in their communities and the global context.

Foster a Sense of Responsibility for Personal Health, Well-being, and the Environment

Encourage learners to make informed choices regarding their health and the environment, promoting habits that support both personal well-being and sustainability.

Waste Management

(SUS4)

Science and Technology

Science and Technology AOLE: Waste Management and Circular Earth Resources

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate the impact of waste on local ecosystems, exploring concepts such as decomposition and nutrient cycling to understand how materials interact within the environment.

Study the biological processes involved in composting and recycling, emphasising the roles of microorganisms and natural cycles in waste management.

Engage with Technology and Develop Basic Computational Thinking

Use technology tools to model waste management scenarios, such as simulating the lifecycle of materials in a circular economy using simple coding platforms.

Introduce learners to data collection techniques (e.g., surveys on waste habits) and analysis tools (e.g., spreadsheets) to interpret waste management data effectively.

Design, Make, and Evaluate Simple Products and Systems

Challenge learners to design products made from recycled materials, encouraging creativity and innovation in repurposing waste.

Evaluate the effectiveness of existing recycling systems and propose improvements or alternatives, fostering critical thinking and problem-solving skills in design and technology.

Explore Sustainability Through Understanding Energy and Material Use

Investigate the energy costs associated with waste management, such as the energy required for recycling processes versus landfill disposal, to understand the importance of reducing waste.

Discuss the materials used in everyday products, exploring their environmental impact and the benefits of choosing sustainable options in product design and manufacturing.

Energy Conservation (SUS5)

Science and Technology

Science and Technology AOLE: Energy Conservation and Alternative Energy

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Introduce learners to different sources of energy, such as solar, wind, and fossil fuels, and discuss their effects on the natural world.

Study the basics of energy transfer and conservation through simple experiments, helping learners understand concepts like renewable and non-renewable energy.

Engage with Technology and Develop Basic Computational Thinking

Use technology to monitor and visualise energy usage in everyday activities, encouraging learners to consider ways to reduce energy consumption.

Explore basic computational models that simulate energy generation, such as how solar panels work or the operation of a wind turbine, developing foundational skills in coding and logic.

Design, Make, and Evaluate Simple Products and Systems

Challenge learners to design and create simple models of renewable energy systems, such as a small wind turbine or a solar-powered device, encouraging hands-on exploration and creativity.

Evaluate the efficiency of their models or explore how these systems are used in real-life scenarios to conserve energy, fostering critical thinking and design evaluation skills.

Explore Sustainability Through Understanding Energy and Material Use

Introduce the concept of energy efficiency and discuss practical ways to conserve energy, both in school and at home.

Examine how material choices impact energy use, encouraging learners to think about the environmental benefits of using sustainable materials and alternative energy sources in products and infrastructure.

Biodiversity and Ecosystems (SUS6)

Science and Technology

Science and Technology AOLE: Biodiversity and Ecosystems

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate local ecosystems and identify various plant and animal species, understanding their roles and interactions within the environment.

Explore basic scientific concepts related to biodiversity, such as habitats, food chains, and the interdependence of living organisms.

Engage with Technology and Develop Basic Computational Thinking

Use technology (e.g., tablets, computers) to research and gather information about local biodiversity, including the use of apps and online databases for species identification.

Develop computational thinking skills by using simple programming tools or coding activities to simulate ecosystems and understand how changes in one part of the system affect others.

Design, Make, and Evaluate Simple Products and Systems

Create models of ecosystems using recycled materials, highlighting the interconnections among organisms and their environments.

Design and evaluate simple conservation projects (e.g., bird feeders, insect hotels) that promote biodiversity in the local area, assessing their effectiveness and impact on local wildlife.

Explore Sustainability Through Understanding Energy and Material Use

Investigate the impact of human activities on biodiversity and ecosystems, focusing on sustainability practices that protect natural resources (e.g., recycling, reducing waste).

Analyse energy use within ecosystems, exploring concepts such as food webs and energy transfer, to understand how energy flows through an environment and the importance of conserving energy.

Climate Change and Adaptation

(SUS7)

Science and Technology

Science and Technology AOLE: Climate Change and Adaptation

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate the impact of climate change on local and global ecosystems, identifying observable changes in weather patterns, plant growth, and animal behaviour.

Understand basic scientific concepts related to climate change, such as greenhouse gases, the water cycle, and the effects of temperature changes on biodiversity.

Engage with Technology and Develop Basic Computational Thinking

Use digital tools and simulations to model climate change scenarios and their potential effects on different environments, promoting understanding of data analysis and predictions.

Develop computational thinking skills by programming simple applications or games that demonstrate climate change adaptation strategies (e.g., urban planning for flooding).

Design, Make, and Evaluate Simple Products and Systems

Create prototypes or models of climate adaptation solutions (e.g., rain gardens, flood barriers, or energy-efficient buildings) that address specific challenges posed by climate change in Wales.

Evaluate the effectiveness of these designs through testing and feedback, considering factors such as sustainability, cost, and practicality.

Explore Sustainability Through Understanding Energy and Material Use

Investigate how different energy sources (renewable vs. non-renewable) contribute to climate change, discussing the importance of reducing carbon footprints and enhancing energy efficiency.

Explore sustainable practices in material use, such as recycling and waste reduction, and their role in mitigating climate change effects on the environment.

Food and Agriculture

(SUS8)

Science and Technology

Objective:

Learners will explore how food systems in Wales—including farming, aquaculture, and agroforestry—interact with natural

processes and technology. They will begin to understand the science behind plant and animal growth, the energy and materials used in producing food, and how we can design systems to support sustainable food production. Through practical investigation, simple modelling, and basic design work, learners will explore how food production connects people, nature, and science.

Curriculum for Wales – Science and Technology Objectives Addressed:

- **Begin to explore the natural world and understand simple scientific concepts** – by observing and investigating how plants, animals, water, and soil contribute to food production.
 - **Engage with technology and develop basic computational thinking** – by using simple coding, sensors, or data collection tools to monitor growing conditions or food journeys.
 - **Design, make, and evaluate simple products and systems** – by developing small-scale food-growing systems, packaging prototypes, or irrigation devices.
 - **Explore sustainability through understanding energy and material use** – by learning about energy input in food production and how to reduce waste through efficient design.
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Global Framework Links:

SDGs:

- **SDG 2: Zero Hunger** – understanding where food comes from and how science supports secure food systems.
- **SDG 12: Responsible Consumption and Production** – applying science and design to reduce waste and protect resources.
- **SDG 13: Climate Action** – exploring how food production contributes to and can mitigate climate change through sustainable practices.

UNCRC Rights:

- **Article 24** – Right to nutritious food and information about health and the environment.
- **Article 29** – Education should help children respect the natural world and prepare for a sustainable future.

UNRMS Principles:

- Promote understanding of **natural resource cycles** in food systems (land, water, biomass).
- Encourage early skills in **resource management, low-impact technology, and sustainable innovation.**
- Foster **systems thinking** that connects biology, energy use, materials science, and human needs.

Examples by Subject Area:

- **Biology:**
Investigate how plants grow in different conditions (light, water, soil types) and compare this to how shellfish are farmed in Welsh coastal waters. Observe food chains and pollination in agroforestry settings.
- **Chemistry:**
Explore soil composition and water quality in farming and aquaculture. Investigate natural fertilisers versus chemical ones and test how substances change during cooking, composting, or fermentation.
- **Physics:**
Examine energy transfer in food production (e.g. solar energy for growing plants, energy use in transport). Explore water movement in irrigation and how structures are built to withstand outdoor conditions.
- **Computer Science:**
Use simple coding or digital tools (e.g. micro:bits or spreadsheets) to track food temperature, record weather patterns for crops, or model the stages in food journeys.

Design and Technology:

Design and make a small model farm, vertical garden, or aquaponics system using recycled materials. Evaluate how the design supports plant growth, uses energy efficiently, or reduces waste.

Water Conservation

(SUS9)

Science and Technology

Science and Technology AOLE: Food and Agriculture

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate the growth cycles of plants and the conditions necessary for healthy agriculture, connecting biological concepts to local and global food production.

Understand the role of ecosystems in food production, such as the importance of pollinators and soil health, and how these relate to biodiversity and sustainability goals.

Engage with Technology and Develop Basic Computational Thinking

Use technology tools, such as sensors or software applications, to monitor environmental conditions affecting agricultural practices, fostering a connection between technology and real-world applications in food systems.

Explore coding and programming basics by creating simple models or simulations related to agricultural processes, such as plant growth or resource management, to enhance computational thinking skills.

Design, Make, and Evaluate Simple Products and Systems

Design and build simple systems for sustainable agriculture, such as a small garden or hydroponic system, applying principles of design and technology to solve practical problems.

Evaluate the effectiveness of different farming techniques or technologies in promoting sustainability, encouraging critical thinking about innovation in food production.

Explore Sustainability Through Understanding Energy and Material Use

Investigate the energy requirements and material inputs of various food production methods, discussing the implications for sustainability and the environment.

Learn about the circular economy in food and agriculture by exploring concepts such as waste reduction, composting, and

resource recycling, and assess their impact on local and global sustainability goals.

Sustainable Transport and Urban Planning
(SUS10)

Science and Technology

Science and Technology AOLE: Sustainable Transport, Urban Planning, and Building

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Investigate the environmental impact of different modes of transport (e.g., walking, cycling, electric vehicles) on air quality and ecosystems, emphasising the relationship between transportation and environmental health.

Explore the principles of sustainable urban planning by examining how natural systems (like green spaces and waterways) can be integrated into city designs to enhance biodiversity and improve community well-being.

Engage with Technology and Develop Basic Computational Thinking

Use digital tools and simulations to model urban environments, analysing how various transport systems interact and the potential effects on sustainability and energy use.

Apply basic coding skills to develop simple apps or tools that promote sustainable transport options (e.g., route planners for walking or cycling), fostering computational thinking in real-world contexts.

Design, Make, and Evaluate Simple Products and Systems

Design and prototype sustainable transport solutions (such as bike racks, pedestrian pathways, or eco-friendly vehicle models) using principles of design and technology.

Evaluate existing urban designs in local communities to assess their sustainability and propose improvements, encouraging critical analysis of urban planning decisions.

Explore Sustainability Through Understanding Energy and Material Use

Investigate the materials used in sustainable building practices (e.g., recycled materials, energy-efficient designs) and their role in reducing the carbon footprint of urban development.

Analyse energy consumption in different transport systems and urban infrastructures, exploring how sustainable practices can contribute to achieving global SDGs related to climate action, sustainable cities, and responsible consumption.

Citizenship / Global Responsibility and Sustainable Development (SUS11)

Science and Technology

Science and Technology AOLE: Citizenship, Global Responsibility, and Sustainable Development

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Observe and describe natural systems and cycles, such as the water cycle or plant growth, to understand biodiversity and the interdependence of ecosystems.

Recognize the importance of natural resources, exploring where everyday materials come from and their impact on the environment when used sustainably or unsustainably.

Engage with Technology and Develop Basic Computational Thinking

Use basic digital tools to collect and analyse information about environmental topics, such as air quality or recycling rates, fostering an understanding of how data informs sustainable actions.

Practice problem-solving through simple computational activities, such as creating algorithms to sort recyclable materials, fostering critical thinking about resource use and waste management.

Design, Make, and Evaluate Simple Products and Systems

Plan and create simple, sustainable projects (e.g., a small compost bin or a rainwater collector) to explore how design choices impact environmental health and resource conservation.

Evaluate materials and methods for projects, considering aspects like durability, recyclability, and environmental impact, to promote thoughtful use of resources.

Explore Sustainability Through Understanding Energy and Material Use

Experiment with renewable energy sources, such as solar or wind, through hands-on activities, helping learners understand alternative options for energy in daily life.

Investigate how materials are used and reused in everyday products, fostering awareness of concepts like recycling, upcycling, and waste reduction within the circular economy

Outdoor Learning and Connection to Nature (SUS12)

Science and Technology

Science and Technology AOLE: Outdoor Learning, Connectedness with Nature, and Sensory Exploration

Subject Areas: Biology, Chemistry, Physics, Computer Science, Design and Technology

Learning Objectives:

Begin to Explore the Natural World and Understand Simple Scientific Concepts

Observe seasonal changes, plant growth, and animal behaviours through outdoor exploration, developing a basic understanding of biodiversity and ecosystems.

Use senses to explore and describe natural materials (e.g., textures of leaves, sounds of birds, smells of flowers), enhancing sensory awareness and appreciation for nature.

Engage with Technology and Develop Basic Computational Thinking

Use simple digital tools, such as cameras or audio recorders, to document natural observations, building a connection between technology and environmental awareness.

Collect and categorise information from nature walks (e.g., types of plants or weather conditions) to develop basic skills in data gathering and pattern recognition.

Design, Make, and Evaluate Simple Products and Systems

Create nature-inspired projects (e.g., bird feeders, mini-gardens) that support local wildlife, fostering a sense of responsibility for the environment.

Test and evaluate materials found outdoors (e.g., using sticks, rocks, and leaves to build structures), developing an understanding of material properties and resilience.

Explore Sustainability Through Understanding Energy and Material Use

Investigate energy cycles in nature (e.g., sunlight for plant growth), introducing learners to renewable energy concepts.

Explore natural and human-made materials, considering how they impact the environment, and encouraging choices that support sustainability and conservation

