

AREA OF LEARNING AND EXPERIENCE

Science and Technology



Vision and philosophy

- Science and technology are intrinsically linked, and includes design and technology, engineering, computer science, biology, chemistry and physics.
- Science and Technology demands a coherent framework for learning across traditional domains, reflecting real-world needs.
- The underlying concepts of science and computational thinking enable technological advancement.
- Science and Technology supports progression in and across subject specialisms, and prepares learners to use science and technology in their every day lives.

The rationale for change

- Boundaries of science and technology are continuously changing.
- Economic imperative – huge opportunities for learners.
- Need for learners to meet twenty-first century challenges and opportunities irrespective of career choice.
- Current learner preparation insufficient to meet needs.
- Need knowledge **and** skills – contextualised through experiences.
- Need creators of and through technology, not just competent users – hence conceptual understanding of computation.

How is it different?

- Computation is a new element for ages 3 to 16.
- Guided learner-led approaches and 'thematic' learning.
- Better balance between knowledge acquisition and skills development through real-world learning experiences.
- Likely to require a multidisciplinary approach.
- More seamless transitions – with greater clarity over prior learning and next steps.
- Outdoor learning to enhance the learning experience.
- Emphasis on the impacts of science and technology on learners' lives and the environment.

What Matters in Science and Technology

- Being curious and searching for answers helps further our understanding of the natural world and helps society progress.
- Design thinking and engineering are technical and creative endeavours intended to meet society's needs and wants.
- The world around us is full of living things which depend on each other for survival.
- Understanding the atomic nature of matter and how it shapes the world.
- Forces and energy determine the structure and dynamics of the universe.
- Computation applies algorithms to data in order to solve real-world problems.

How did we get here?

Approach

- Collaborative work and research to create and trial different ideas; substantial expert advice.
- Experiments with a thematic approach using traditional subjects in five broad what matters statements limited progression and opportunities for specialist study later on.
- Agreed approach is based on principles in 'Big Ideas of Science'.
- Agreed result is six interrelated what matters statements that are more accessible for all teachers, facilitating broad and specialist learning.

Evidence and expert input

Evidence and expert input in specific areas include the following.

- **Practitioners:** Pioneers and non-pioneers, regional consortia advisors, further education.
- **Big Ideas of Science and principles for progression:** Professor Wynne Harlen.
- **Big Ideas of Design and Technology:** Dr David Barlex and Torben Steeg.
- **Computational concepts:** Professor Crick, Professor Moller – Swansea University.
- **Science and Technology in Wales:** Professor Tucker/Learned Society of Wales.

Evidence and expert input

Evidence and expert input in specific areas include the following.

- **International curricula considered:** Estonia, Germany, Australia, New Zealand, USA, British Columbia, Singapore, Ontario, Finland and Scotland.
- **Expert advice and inputs:** Institute of Physics, Royal Society of Chemistry, Royal Society of Biology, Wellcome Trust, DATA, Estyn, higher education institutes (Cardiff Met, Cardiff, Swansea, Bangor, Glasgow, Stirling, University of Wales Trinity St David, Aberdeen), Engineering UK, Qualifications Wales.

Considerations for schools

- How will your leaders, practitioners and networks be able to prepare for the next phase of co-construction and provide meaningful feedback?
- What, if any, are the resourcing implications (national and local)?
- How could you approach whole-school and/or inter-departmental approaches to both:
 - knowing **about** the new curriculum?
 - understanding **how to do** the new curriculum?

Considerations for schools

- **Primary:** expectations for learning in this area of learning and experience may cause some staff initial concern. How will you plan to mitigate that? Will specific professional learning be needed?
- **Secondary:** expectation that learners will have access to subject-specialist teachers as they progress. How will you facilitate this in your school?
- Consider the breadth of the area of learning and experience and how you will manage the new computation element. What is needed to ensure the success of this?
- What are the resource implications for your school arising from this particular area of learning and experience?