



Llywodraeth Cymru
Welsh Government

Response to the Estyn thematic report on Science and Design and Technology at Key Stage 2

Mae'r ddogfen yma hefyd ar gael yn Gymraeg.
This document is also available in Welsh.

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Report title:

Science and Design and Technology at Key Stage 2.

Report details

Estyn was asked to review standards, provision and leadership in the National Curriculum subjects of science and design and technology at Key Stage 2 in primary schools in Wales.

Summary of main findings

The key findings of the report are that:

Science

By the end of Key Stage 2, many pupils have developed a sound understanding of basic science concepts and of the nature of science. A strong feature in many schools is pupils' understanding of the need for a healthy diet and regular exercise for good health. Where standards are strongest, pupils develop a good understanding of concepts such as gravity and magnetism, and use scientific terms precisely.

Both boys and girls achieve similarly well and nearly all undertake scientific work equally enthusiastically. Nearly all pupils understand the importance of undertaking investigations carefully and of controlling variables, but only a minority understand the need to repeat enquiries and record multiple readings. Many pupils explain their scientific enquiries, predictions and results using scientific terminology. Many pupils develop their thinking skills well in science, for example when thinking about cause and effect.

Many pupils use and develop their literacy, numeracy and ICT skills well in science lessons. For example, they use their numeracy skills to measure accurately using standard units and use database software to allow them to record and analyse their findings. Though, when presenting results, too many do not know which chart to use for different data types.

The difference in achievement between pupils eligible for free school meals and their peers in science at the end of key stage 2 remains too wide and the gap continues to grow at level 5.

Design and Technology

A majority of pupils in Key Stage 2 design and make simple products by combining their designing and making skills. They are creative in their design and technology work across a broad range of topics. Many illustrate designs using simply-labelled sketches, though too few include accurate measurements.

In a majority of schools, pupils understand many of the design and technology curriculum components, such as food and materials. However, in too many schools, pupils' understanding of 'systems and control' is weak.

Provision

Most schools have comprehensive plans to ensure that pupils have access to a broad and balanced science curriculum. Many schools allocate a suitable amount to time, however a few have not implemented previous recommendations of at least 2 hours per week for science.

In many schools, the quality of teaching is good in science. Many teachers plan activities that focus well on developing pupils' science skills, but a minority do not challenge more able pupils enough. In only a minority of schools do teachers provide opportunities for pupils to consider how they could improve or assess their own or their peers' learning.

A majority of schools provide an interesting design technology curriculum, that at least half do not teach all areas consistently.

Leadership and management

Most school leaders undertake an appropriate range of self-evaluation activities to monitor standards and provision in science. However, a minority do not identify shortcomings in science robustly enough. When monitoring the quality of teaching in science, leaders too often focus on generic aspects of teaching, and actions to improve science particularly are rarely identified.

Many schools recognise weaknesses in standards and provision for design technology, with only a few undertaking robust monitoring and/or putting suitable improvement plans in place.

There are currently too few opportunities for teachers to develop their expertise in science and design technology – with the availability of provision from Consortia being variable across Wales.

Recommendation 1

Schools should make sure that science lessons challenge all pupils, particularly the more able, and reduce the achievement gap between pupils eligible for free school meals and their peers.

Welsh Government Response

Accept

The Welsh Government is committed to ensuring that children and young people reach their full potential in education regardless of their background or circumstances. Our vision is for all of our children and young people to enjoy teaching and learning that inspires them to succeed, in an inclusive learning environment which respects and values cultural diversity. Our work to raise standards in the teaching and learning of science and technology subjects will be led through our new National Network for Excellence in Science and Technology (NNEST), which will work with Pioneer Schools, regional Education Consortia, higher education and other key partners to ensure that STEM professional learning is linked to the new curriculum.

In collaboration with the National Association for Able Children in Education (NACE) Cymru, we have produced resources to support More Able and Talented (MAT) learners - *Meeting the Challenge: Quality Standards in Education for More Able and Talented Pupils*. These resources were distributed to all schools and local authorities and provided advice on meeting the educational needs of MAT learners.

Development of the Quality Standards has enabled Welsh Government to put in place a consistent approach to meeting the needs of MAT learners as well as providing a mechanism for schools, authorities and the Welsh Government to monitor progress.

The Welsh Government and NACE Cymru has also developed a training pack to support schools in providing high-quality, stretching, learning experiences for MAT learners. It has been issued to all schools in Wales and is available on the Learning Wales website

We administer the Pupil Development Grant (PDG) to support the delivery of effective interventions to improve the educational attainment of learners who are eligible for free school meals and who are looked after by the local authority. Over £90 million will be invested through the PDG in 2017-18 to help close the attainment gap of disadvantaged children, and to help ensure equality of opportunity within education. A substantial amount of this funding,

some £85 million, to support learners eligible for free school meals is made available to schools and early years settings, which are best placed to support the needs of their learners, including through interventions in science if necessary.

Recommendation 2

Schools should make sure that pupils have opportunities to learn about all areas of the design and technology curriculum, particularly ‘systems and control’.

Welsh Government Response

Accept

The current Key Stage 2 programme of study for Design and Technology sets out that pupils should be given opportunities to develop their skills in a broad range of areas, including ‘systems and control’ (such as constructing simple mechanisms to produce different types of movement).

In line with the vision set out in *A Curriculum for Wales: A Curriculum for Life*, we are undertaking an intensive programme of reform to enhance all areas of the curriculum supporting children and young people aged 3-16. Central to this is work on the new Science and Technology Area of Learning and Experience (AoLE), which embraces science subjects and Design and Technology.

The work with Pioneer Schools on curriculum design is also reflected in our STEM in Education and Training Delivery Plan for Wales, which commits us to a range of actions to develop fit-for-purpose STEM curricula.

Recommendation 3

Schools should ensure that assessment helps pupils know what they need to do to improve.

Welsh Government Response

Accept

The National Curriculum subject orders for Science and for Design and Technology set out that learners of all abilities should have access to

appropriate assessment and accreditation. Guidance on this is set out in relevant Welsh Government curriculum documentation.

The Welsh Government is committed to ensuring that future arrangements give priority to using assessment as a means to inform better teaching and learning. Details of content and implementation of the new arrangements will be decided through dialogue with the education workforce, but the central focus of assessment in the future will be to ensure learners understand how they are performing and what they need to do next in order to progress.

There will be a renewed emphasis on Assessment for Learning as a natural and integral feature of learning and teaching, and a move away from gathering information about the performance of children and young people on a school-by-school basis for accountability purposes.

We have increased funding to support a programme of work to improve the quality of teacher assessment. The programme will build on the work of the assessment and progression Pioneer schools and make links with professional learning Pioneer schools to ensure synergy with Assessment for Learning activity. The programme will also include the formative use of tracking information within the classroom to modify practice and promote learning throughout the school, effective marking, planning, peer and self-assessment.

Recommendation 4

Schools should ensure that self-evaluation processes are robust and focus on pupils' subject knowledge, understanding and skills, and the quality of teaching.

Welsh Government Response

Accept

The new professional standards for teaching and leadership identify reflection as an important part of the pedagogy standard. The standards contain descriptors of practice setting out expectations in relation to evaluation for practitioners at the end of Initial Teacher Education (ITE) and end of induction, at the level of sustained excellent practice.

From 1 September, newly qualified teachers (NQTs) undertaking induction will do so using the new standards. NQTs who began their induction before 1 September will continue to use the existing standards. The standards become

mandatory on 1 September 2018 and teachers and leaders have until that time to explore the standards and adopt them at an appropriate time for them.

The final version of the standards and descriptors (following wide consultation) is being made available on the professional standards page of Learning Wales. An interactive version of the model is being developed, and this will form an integral part of the professional learning passport (PLP). The PLP is hosted on the Education Workforce Council's website and is designed to support practitioners' career-long professional development in the pursuit of improved learner outcomes.

Recommendation 5

Schools should provide teachers with training in the areas of science and of design and technology where they lack knowledge and confidence.

Welsh Government Response

Accept

The National Network for Excellence in Science and Technology (NNEST) will work with Pioneer and lead schools to support evidence-based pedagogical development, for improved classroom practice, ensuring that the teaching workforce has access to appropriate training, development and support. Through the Network, regional Consortia will work with universities and practitioners to develop and deliver an enhanced level of professional learning as part of education reforms.

As part of this approach, Pioneer Schools engaged in professional learning development will be working with curriculum design pioneers to develop the specific resources and support for teachers for the new curriculum. This will include support in the areas of Science and Design and Technology.

Schools should consider the support currently available, and their future needs, in the context of their School Development Plans. If provision for a specific need is not readily available in their local area, they should discuss the matter with their regional Consortium for consideration, if appropriate, by the NNEST.

Recommendation 6

Local authorities and Consortia should provide more subject-specific support for teachers to improve teaching and assessment in science and technology and facilitate the sharing of good practice

Welsh Government Response

Accept

This will be a key area of activity for the National Network for Excellence in Science and Technology (NNEST), which includes all 4 regional education Consortia in Wales, as noted in the response to Recommendation 5.

Recommendation 7

Local authorities and regional consortia should provide more support for schools to evaluate their curriculum and plan for the development of the science and technology area of learning and experience.

Welsh Government Response

Accept

Welsh Government is working in partnership with Pioneer Schools, Consortia and Estyn to develop the Science and Technology Area of Learning and Experience (AoLE). The Science and Technology AoLE will draw on physics, chemistry and biology, engineering, design technology (food, textiles, resistant materials), craft, design, graphics and, importantly, computer science. Work on the AoLE began in January.

Consortia will wish to consider how schools are supported as part of the national approach to professional learning, which includes the NNEST.

Publication details

The report was published on 13 July 2017 and may be accessed on the Estyn website: <https://www.estyn.gov.wales/thematic-reports>