# Unlocking potential: Insights into improving teaching and leadership in mathematics education

## Executive Summary

This thematic report focuses on the quality of teaching, learning, and leadership in mathematics in schools across Wales. It outlines effective practice and areas for improvement in teaching, curriculum, leadership, and assessment. Whilst the report identifies aspects of effective practice, it is important to note that, overall, successful mathematics teaching and leadership combines many of the aspects of effective practice identified in this report.

We visited a cross-section of secondary, primary and all-age schools in autumn 2024. In each school, we visited mathematics lessons, spoke with senior leaders, leaders and teachers of mathematics and pupils, and scrutinised a range of documentation. We also drew on evidence from school inspections undertaken over the last three years and the results of two school surveys developed for this report. We surveyed a sample of local authorities and school improvement partners and met with a smaller sample of these to discuss some of the aspects in greater detail. The findings in the report are based on a combination of inspection evidence since February 2022, and the evidence gained on the thematic visits.

Whilst we observed aspects of effective teaching and leadership of mathematics, overall, we found that the quality of teaching of mathematics was too variable and pupils' standards in mathematics were too low. We believe the variability in the quality of teaching of mathematics is partly linked to a reduction in subject-specific support across Wales. Our findings revealed that there is too little focus on the importance of teachers' subject knowledge and subject pedagogy and, as a result, too often teachers have a limited understanding of the best ways to support pupils' learning.

The report emphasises the importance of effective teaching methods, high-quality questioning, a supportive learning environment, professional learning, and parental involvement in enhancing mathematics education. These elements collectively contribute to improving pupil engagement, understanding, and outcomes in mathematics.

Where teaching was most effective and pupils made good progress, teachers:

- had high expectations of what pupils could achieve and challenged all pupils well
- made effective use of a range of teaching and assessment techniques and used their findings from assessments to guide their teaching, adjusting the pace and level of challenge responsively
- ensured that pupils understood what they were learning rather than just following instructions to get the correct answer
- questioned pupils effectively to deepen their understanding of mathematical concepts

- skilfully exposed and addressed pupils' misconceptions
- ensured that pupils were constantly thinking and that the level of challenge was appropriate, stretching pupils without overwhelming them
- helped pupils to make relevant connections to other areas of mathematics and, where appropriate, to everyday life

Where teaching was less effective and pupils did not make enough progress, teachers:

- did not focus closely enough on what they wanted pupils to learn but instead planned tasks and activities that kept pupils busy
- did not plan well enough to teach the understanding of mathematical concepts and identify and address misconceptions; they often taught procedural shortcuts rather than helping pupils understand mathematical concepts and make connections between topics
- did not practice responsive teaching within mathematics classrooms, often due to a lack of confidence in their subject knowledge or pedagogy
- did not question pupils well enough to encourage them to deepen their thinking or improve their understanding of aspects of mathematics
- did not use questioning well enough to address pupils' misconceptions, often because they did not have the subject knowledge to explore aspects around and within topics effectively
- limited the opportunities for pupils to develop independent learning skills due to over-directed teaching, lack of challenge, or ineffective questioning
- did not challenge pupils, particularly the most able and pupils at transition points well enough

We recognise the importance of designing a mathematics curriculum that is comprehensive and coherent. In schools that designed a successful mathematics curriculum they had a number of strong features, such as:

- they were structured to build on pupils' learning
- appropriate time allocated for pupils to acquire mathematical knowledge, understanding, and skills
- the provision of opportunities for pupils to apply their knowledge in authentic contexts and develop their mathematical independence
- high-quality teaching that involved a balance of explicit teaching and time for pupils to explore concepts, collaborate with others, and develop their mathematical independence
- teachers collaborated in their topic planning and framed what effective progression looked like across the topic area, including identifying and addressing misconceptions; where pupils made the most progress, teachers anticipated what came later and taught the pupils accordingly

In general, there were common factors that limited the effectiveness of curriculum planning. These included:

- a lack of understanding of Curriculum for Wales requirements and guidance; furthermore, teachers and leaders often did not know who to approach to clarify and support curriculum-related questions, and this added unhelpfully to teachers' confusion and cognitive overload
- an inconsistent understanding of the effective use of the mathematical proficiencies
- a lack of clarity in national guidance to support teachers and leaders in understanding the minimum expectations of pupils' understanding and progress in mathematics; often, this meant

that teachers and leaders did not have high enough expectations of how pupils should progress in their mathematical understanding
- limited support to improve the quality of mathematics teaching, which was focused enough on pedagogy or how teachers should use their subject knowledge effectively to help pupils learn
- support and professional learning for teachers of mathematics that was too generic, not effective, or wide-ranging enough and many teachers were unaware of the professional learning opportunities available to them externally
- too many teachers who relied heavily on bought-in schemes of work, using them without considering pupils' needs well enough or without considering how to adapt and use a selection of resources to achieve the best learning outcomes

We make a number of recommendations to support the Welsh Government, local authorities and leaders and staff within schools to strengthen mathematics teaching across Wales.

## Our recommendations

### The Welsh Government should:

- provide schools with more detail of expectations for pupil progress in mathematics and numeracy to support teachers with their curriculum planning
- ensure that local authorities and school improvement partnerships provide effective support to improve the quality of teaching and leadership in mathematics
- consider how they can promote a positive attitude to learning mathematics for pupils, parents and carers
- provide clarity for schools about how proficiencies should support the curriculum design process
- consider approaches to promoting mathematics teaching as a career

### Local authorities and school improvement partnerships should:

- improve the quality of support for the development of high-quality teaching and leadership of mathematics
- increase the level of subject specific support for schools
- target practical support to help teachers and leaders of mathematics understand effective curriculum design and delivery including the effective use of the five mathematical proficiencies
- ensure that professional learning opportunities are planned and evaluated effectively to ensure high quality impact

### Senior leaders in schools should:

- ensure that all staff and pupils develop and exemplify a positive attitude towards mathematics and understand its value
- ensure that teachers are given adequate time to improve their subject knowledge and pedagogy ensure that assessment practices and processes support the effective teaching of mathematics
- ensure that professional learning is tailored to the specific needs of mathematics education
- ensure that assessment policies are flexible enough to be effective in different subjects, particularly in mathematics and numeracy

## Schools should:

**Ensure that mathematics subject leaders:**

- maintain a clear focus on addressing the strengths and areas for improvement in the teaching of mathematics
- improve the quality of teaching of mathematics and ensure that the proficiencies are understood and used appropriately
- ensure a secure knowledge of all staff of minimum expectations of pupils' understanding and progress in mathematics
- ensure that curriculum provision builds effectively upon prior learning and between primary and secondary school

**Ensure that teachers of mathematics:**

- teach for pupils' understanding rather than focusing solely on performance
- develop their own confidence in subject knowledge and subject pedagogy to get the best out of the pupils
- develop a range of strategies to support the checking for understanding / responsive teaching.