

# Multiplying skills, adding value

## Executive summary

Numeracy and mathematics  
for Scotland's learners:  
a thematic inspection





This executive summary accompanies the report [“Multiplying skills, adding value: numeracy and mathematics for Scotland’s learners”](#). You can also access a further resource from the thematic inspection, “Comments and Cameos”, which provides stakeholder comments and short case studies.



“To face the challenges of the 21<sup>st</sup> Century, each young person needs to have confidence in using mathematical skills, and Scotland needs both specialist mathematicians and a highly numerate population.”

**(Building the Curriculum 1)**

# Foreword

“**Multiplying skills, adding value**” offers a timely account of the work going on across Scotland’s early learning and childcare settings and schools, to improve the numeracy and mathematical experiences and outcomes of our children and young people. The report provides a summary of the important progress achieved in recent years, and equally, a clear agenda of what needs to improve. The report hopes to speak, clearly, to every stakeholder with an interest in mathematics, helping to identify their roles – your roles – in this important national work. Numeracy and mathematics are important to us all.

This quotation originates from the early days of Curriculum for Excellence, however, there can be no doubt that it has stood the test of time. It also confirms how numeracy and mathematics, from those earliest days, were recognised as an essential foundation for all children’s and young people’s learning. Over the intervening years, Scottish schools and early learning and childcare settings have witnessed major developments in how numeracy and mathematics are planned, organised, delivered, assessed and evaluated. The good news has been the advancing professionalism with which numeracy and mathematics are taught and learned by Scotland’s 3-18 year-olds. That has not been achieved without challenge and hard work on the part of all those involved, keeping abreast of, and at times leading, professional thinking.

**Making Maths Count (MMC) (2016)** set out three important objectives:

- transforming public attitudes
- improving confidence and fluency in maths; and
- promoting the value of maths for every career.

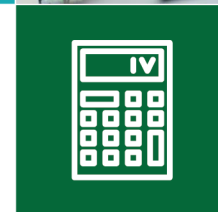
We hope and intend that this report builds on the recommendations of MMC, celebrating success where that is due, providing direction where work remains to be done and taking forward the MMC idea of a “maths-positive nation”. Numeracy and mathematics can hold their own when it comes to giving children and young people challenge and excitement in their learning – in the “infinite science” of mathematics and its close companion numeracy – and this report seeks to add momentum to improvements in Scotland’s early learning and childcare settings and schools.



Gayle Gorman  
HM Chief Inspector of  
Education

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# Introduction



This report reviews current practice in numeracy and mathematics. It contains advice and guidance around what is working well, as well as important areas for discussion and further development.

The report is intended to promote improvements in Scottish education by using the findings of inspection to stimulate reflection and professional dialogue and act as a stimulus for ongoing professional learning.

This thematic inspection supports Education Scotland's commitment to Recommendation 5 from the final report of the Making Maths Count group, namely;

Education Scotland should evaluate the quality of children's and young people's learning experiences and attainment in maths and share examples of good practice.

[p17. Final report of the making maths count group, 2016](#)

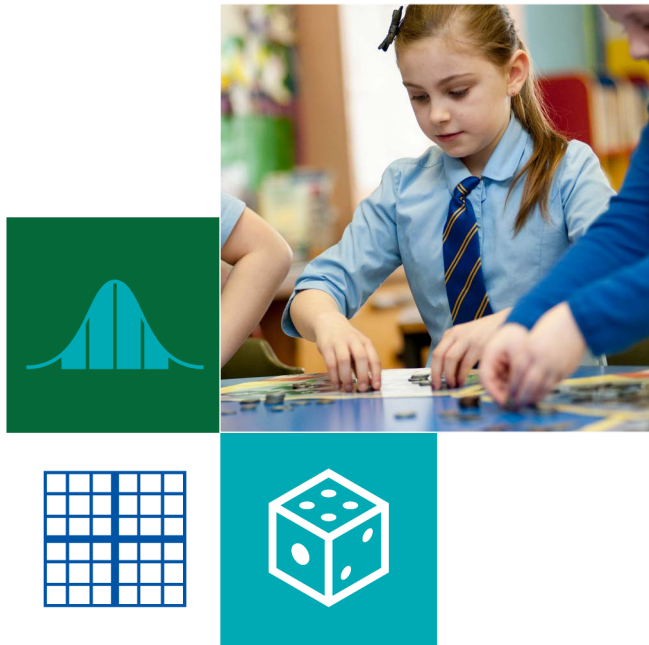
HM Inspectors visited 40 establishments from the early learning and childcare, primary, secondary and special sectors across Scotland's 32 local authorities between January and June 2019. Staff completed a self-evaluation of their approaches to numeracy and mathematics. HM Inspectors used this information as a starting point for gathering evidence. They observed learning at first-hand, reviewed documentation and spoke with a range of stakeholders.

HM Inspectors gathered evidence and evaluated progress in the following aspects:

- 1. Curriculum: the effectiveness of the numeracy and mathematics curriculum in meeting the needs of all learners.**
- 2. Learning and teaching: the quality of learning and teaching in numeracy and mathematics.**
- 3. Attainment and achievement: the effectiveness of raising the attainment and achievements of all learners in numeracy and mathematics.**

Whilst maintaining a focus on the three aspects of **Curriculum, Learning and teaching** and **Attainment and achievement**, HM Inspectors also explored specific key factors including themes of leadership and improvement planning.

This report provides the professional view of HM Inspectors, drawing on the findings from these visits along with evidence from recent inspections.



All teachers have responsibility for promoting the development of numeracy. With an increased emphasis upon numeracy for all young people, teachers will need to plan to revisit and consolidate numeracy skills throughout schooling.

p20, [Building the Curriculum 1, 2006](#)  
Further reading can be found in [numeracy across learning: principles and practice](#)

### Qualitative and quantitative terms

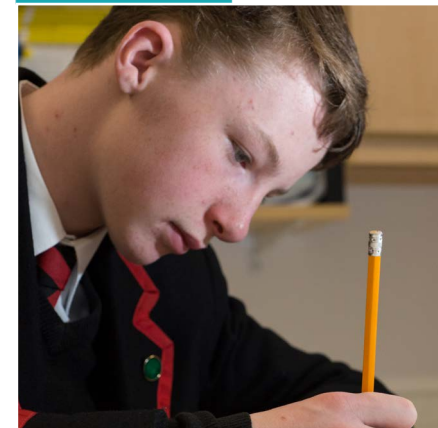
The following terms are used in our scrutiny activities and are also reflected in this publication.

<b>Excellent</b>	outstanding, sector-leading
<b>Very good</b>	major strengths
<b>Good</b>	important strengths with areas for improvement
<b>Satisfactory</b>	strengths just outweigh weaknesses
<b>Weak</b>	important weaknesses
<b>Unsatisfactory</b>	major weaknesses

The following standard terms of quantity used within the report are:

<b>All</b>	100 %
<b>Almost all</b>	91 - 99%
<b>Most</b>	75 - 90%
<b>Majority</b>	50 - 74%
<b>Minority/less than half</b>	15 - 49%
<b>A few</b>	less than 15%

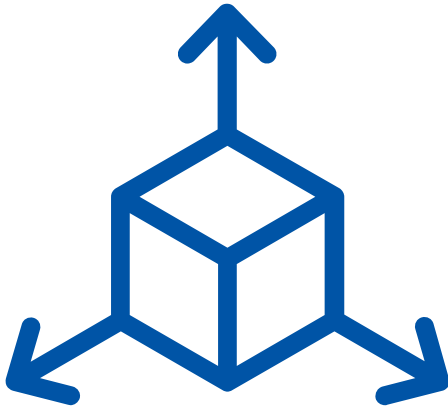
Other quantitative terms which may be used in this publication are to be understood as in common English usage.



Throughout this report, the term 'parents' should be taken to include foster carers, residential care staff and carers who are relatives or friends.

# Curriculum

## How effective is the numeracy and mathematics curriculum in meeting the needs of all learners?



### So, in summary, what is working consistently well?

- The commitment of staff to improve the curriculum in numeracy and mathematics, building on proven strengths and tackling key areas for improvement.
- Staff's investment in career-long professional learning in aspects of numeracy and mathematics.
- The clarity which settings and schools have achieved in shared understanding of the key features of national, local and establishment policies, for numeracy and mathematics, which seek to improve outcomes for all children and young people.



### What is improving?

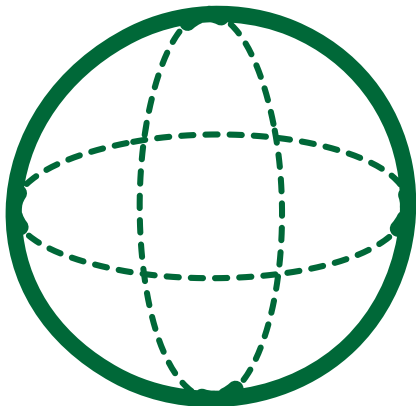
- The focus on closing the poverty-related attainment gap, including reference to numeracy and mathematics issues. These issues include the crucial importance of numeracy and mathematics skills in the labour market, such as the influence of digital technologies on the world of work.
- The impact of self-evaluation which is increasingly evident in strategic planning for numeracy and mathematics.
- The professional learning focus on pedagogy, across all sectors. Strong developments, some of which derive from professional learning in assessment and moderation, take a broad view of moderation as a force for better learning.
- Evidence of successful focus on strengthening skills in number but noting the caution in the following text.

### What are the challenges and areas for improvement?

- Leadership for learning, with roles for all members of the learning community, has not yet achieved sufficiently high standards and consistency in learners' experiences in numeracy and mathematics within and across sectors.
- The curriculum needs constant review to ensure it is relevant, for example capturing real-world numeracy and mathematics contexts, leading to increased motivation and appropriate progression in children's and young people's learning.
- Professional learning, whilst deepening staff knowledge and skills in numeracy and mathematics, is not yet resulting in significant improvement in outcomes for children and young people.
- The corporate expertise in the education community, for gathering and analysing data on attainment in numeracy and mathematics, needs to be further enhanced.
- The balance of the curriculum needs to be kept under review, to ensure proportionate coverage of shape, position and movement, and information handling, and to avoid an over-emphasis on aspects of number.

# Learning and teaching

**How is leadership for learning in numeracy and mathematics working? What impact are professional learning and collegiate working achieving?**



**So, what is working consistently well?**

- Positive relationships among and between learners and staff, laying foundations for a positive tone to learning in numeracy and mathematics.
- Clear commitment to closing the gap in attainment in numeracy and mathematics, between children from the most- and least-disadvantaged areas.
- Most learners' positive views about learning in numeracy and mathematics. Most respond well to strategic approaches, for example the concrete/pictorial/abstract structure.
- Teaching is well organised and almost all staff offer clear explanations.

**What is improving?**

- The quality of dialogue among associated schools, and transition arrangements, which support children and young people to build on their prior learning in numeracy and mathematics.
- The recognition that using real-world numeracy and mathematics contexts can achieve huge impact on learners' motivation.
- A focus on professional learning in aspects such as moderation, and questioning techniques which encourage higher order thinking skills.

**What are the challenges and areas for improvement?**

- Invest further in pursuing greater consistency in the quality of learning and teaching, eliminating passive learning, specific to the complementary needs of numeracy and mathematics.
- Continue to focus on planning, tracking and monitoring, to inform how well children and young people progress through the broad general education.
- Revisit issues of differentiation, to advance practice in meeting the needs of all learners for pace and challenge appropriate to their individual needs.



# Attainment and achievement

## How well are we raising the attainment and achievement of all learners in numeracy and mathematics?



### So, what is working consistently well?

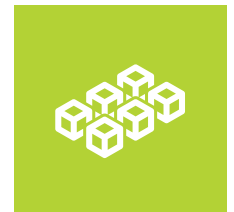
- In almost all early learning and childcare settings, practitioners make effective use of the routines of the day, for example reception and registration, and snack time, to build interest and progress in learning relevant to numeracy. These approaches capitalise on the role of numeracy in the children's everyday lives.
- Almost all staff in primary schools show commitment to raising attainment and achievement in numeracy and mathematics. Almost all staff have invested in professional learning focused on attainment strategies including approaches for developing early arithmetical skills.
- National data shows that across the senior phase, the majority of young people presented perform well in numeracy and mathematics at relevant SCQF levels, including at National, Higher and Advanced Higher. In 2019, attainment in mathematics improved slightly at National 5 with the majority of young people presented achieving an award at A-C. The number of young people taking Applications of Mathematics (formerly Lifeskills Mathematics) increased substantially from 2018 to 2019, with a majority achieving National 5.

### What is improving?

- Early learning and childcare practitioners are increasingly using play-based pedagogy approaches to advance children's learning in numeracy. Most make effective use of different play settings to capture children's interest, for example in ideas about number and money, shape and movement.
- The majority of primary schools have included a focus on numeracy and mathematics in their plans for Pupil Equity Fund. Almost all have undertaken reviews of programmes with the aim of improving attainment, for example adopting more rigorous approaches to mental strategies.
- Collaborative working in numeracy and mathematics across school groups is supporting better teaching and more reliable judgement of achievement of a Curriculum for Excellence level.
- The increasing reliability of assessment data. Teachers make better use of information from ongoing assessment, Scottish National Standardised Assessments and National Benchmarks to inform their professional judgement.
- National data shows that the majority of S4-S6 leavers achieve an SCQF level 5 numeracy award or better, with the proportion increasing in recent years. The percentage of young people (a majority) passing Higher mathematics at A to C increased from 2015 to 2018 but fell slightly in 2019.

### What are challenges and areas for improvement?

- There remains scope for early learning and childcare practitioners to explore further the role of play settings as contexts for learning in numeracy, for example through professional dialogue and professional learning.
- Overall, primary schools should explore further the potential of STEM and DYW to add value to children's experiences in numeracy and mathematics, alongside more local contexts including the school's own provision for IDL.
- In a minority of schools, progression routes in the broad general education are not providing learning which allows young people to make a smooth transition to the senior phase. This is resulting in challenges meeting the requirements for succeeding at National 5 by the end of S4.
- There remains a gap in performance between children and young people from the least and most deprived areas, especially at fourth level of Curriculum for Excellence.





# So what do I/we do now? A framework for action

This section offers prompts in the form of a draft agenda for each of the relevant stakeholder groups.

## Children and young people including pupil councils

Supported by their schools, for example using the agency of pupil councils, children and young people should be given the opportunity to explore the implications of this report. The following draft agenda offers a basis for valuable discussions.

- What do I think about my learning experiences in numeracy and mathematics?
- How am I helped to understand why, in some ways, numeracy and mathematics are different?
- Do I feel that my work in numeracy and mathematics is exciting, interesting, easy, difficult?
- How could my experiences in numeracy and mathematics be improved?

## Senior leaders and middle leaders in early learning and childcare settings and schools

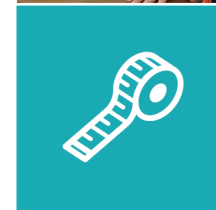
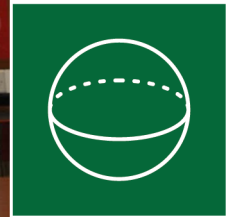
- Where are the strengths in our curriculum, learning and teaching and attainment in numeracy and mathematics?
- How clearly do we know our priorities for improvement and how convincing are our plans and

strategies? Where do numeracy and mathematics feature in our improvement planning?

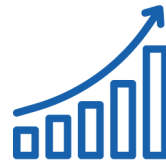
- How well do we use the four curriculum contexts, real-world topics and wider contexts and contributions to add value and credibility to our programmes in numeracy and mathematics?
- Among our professional learning targets, do we need to do anything to improve our capacity for generating and analysing attainment data?

## Early learning and childcare practitioners and class teachers

- What response do I see from children and young people when we are working on numeracy and mathematics?
- What impact do my approaches and pedagogy have on them, in terms of outcomes progression and achievements?
- Do I have a clear understanding of current thinking on high-quality learning and teaching in numeracy and mathematics, relevant to the children and young people I work with?
- Do my opportunities for professional learning give me confidence that my practices are effective and improving?



# So what do I/we do now? A framework for action



## Support staff

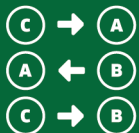
- What role do I have/should I have, in supporting children and young people in their work in numeracy and mathematics?
- Do my opportunities for professional learning give me confidence that my contributions are effective?
- Am I fully equipped with knowledge of the setting's/school's approaches in numeracy and mathematics, and supported in fulfilling my role?

## Local authorities

- How well do our processes for supporting and challenging our establishments meet the needs of our children in numeracy and mathematics?
- Do our authority and regional collaborative improvement plans give sufficiently clear priority to numeracy and mathematics?
- In respect of professional learning, how effective are our arrangements for staff to network, to share good practice in numeracy and mathematics?

## Parents and carers, including Parent Councils and parent organisations

- What is our perception of the setting's/school's performance in respect of numeracy and mathematics?
- Where do we see strengths/weaknesses in respect of curriculum/richness of children's experiences in learning and teaching/outcomes in terms of enjoyment of numeracy and mathematics and attainment?
- How best can we support and challenge the school in its efforts to improve learning and attainment in numeracy and mathematics?





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