

Making Maths Count: One Year Review Report

TRANSFORMING SCOTLAND INTO A MATHS-POSITIVE NATION

Overview

The [*Making Maths Count*](#) report focuses on three key themes that together form the ambitions of the National Profile-Raising Group for Mathematics and will, if addressed, succeed in raising attainment in mathematics in Scottish education, impact positively on economic and social outcomes and transform Scotland into a confident and maths-positive nation.

This paper considers the recommendations within the three themes and discusses progress since the *Making Maths Count* report was published in September 2016. It provided a structure for the meeting of the Chair of the Group and the Deputy First Minister and Cabinet Secretary of Education and Skills in December 2017.

Activity and progress is highlighted alongwith areas for further development and those that need to be prioritised.

1. Transforming public attitudes to maths

1.1 The Scottish Government should work with partners to commission a sustainable culture change strategy for Making Maths Count.

The Group have focused strongly on this priority as we recognised that in order to improve maths attainment we had to improve its reputation first.

Action

The first Maths Week Scotland, held 11-17 September 2017 was very successful. Some highlights:

Outdoor maths events in Kelvingrove Park in Glasgow and the city centre streets of Edinburgh and St Andrews, lectures and talks, class and school activities like code breaking, murder mysteries, alien missions, Dragon's Den, escape puzzles, outdoor maths trails and digital maths app competitions, creation of videos, posters, maths relays, scavenger hunts and maths cakes. Lots of schools and nurseries involved parents and carers through inviting them to participate in learning and encouraging maths activity at home. Universities welcomed busloads of primary and secondary pupils onto their campuses to experience maths in their settings with a range of stimulating talks. Maths was celebrated through literacy, science, art, physical activity, languages and history. Some inspiring collaborations emerged between schools and the National Museum of Scotland, the NHS, the Royal Navy, science centres, BBC Learning, libraries, universities and colleges and many schools engaged with local businesses and employers to promote the value and fun of maths as well as the diversity of maths careers. The most entertaining one we found was the butcher's shop in Glasgow which displayed a different maths puzzle each day.

All local authority areas participated in a range of ways and hundreds of schools showcased creative, innovative and impressive activity that created a buzz on social media and in local press. Many local competitions took place and at a national level the Group were hugely grateful to Sumdog and MangaHigh for their digital competitions, to

Chris Smith for his *Maths wi nae Borders* competition and to the Scottish Mathematical Council for their support in creating the Deputy First Minister's Daily Maths Challenge. The Sumdog contest involved 860 schools, 100,000 students and 16,827,720 maths questions answered. The winning class received a trophy, visited Sumdog at their Edinburgh headquarters and met the Deputy First Minister to discuss Maths Week. *Maths wi nae Borders* received 480 responses and gathered attention way beyond Scotland and as far as Canada, the USA and Australia. The winning team received a trophy, vouchers for team members and their maths department and had a day in Edinburgh that included a visit to Dynamic Earth and a meeting with the Deputy First Minister to receive the prizes.

Outcomes include:

- Upper primary and senior school pupils attending university campuses and lecture theatres creating a reference point for higher education and maths.
- Teachers of maths in Scotland being provided with a focus that allowed them to show leadership and creativity among the school and local community.
- Different schools within universities making contact to collaborate (often for the first time) and establishing relationships.
- Local businesses being engaged by schools to promote maths and careers creating sustainable relationships.

Members of the Group have also been responding to as many requests as possible to speak at events in order to extend the message and raise the profile of maths. Some examples:

- Peter McNaughton, Head of Service in Fife, addressed the Parliamentary reception during Maths Week led by Sumdog and introduced the event with the *Making Maths Count* context.
- Heather Reid delivered a lecture to launch the new University of Glasgow Maths Department premises, and was involved in a range of events across the Week introducing Professor Adam McBride's session for primary school teachers amongst others. Heather provided the keynote address at The West Partnership-wide event for staff to launch Maths Week and will be the speaker at the Scottish Mathematical Council conference in March 2018.
- Billy Burke, Headteacher at Renfrewshire High School has spoken at a range of national conferences promoting the themes of Making Maths Count and the approach in Renfrewshire.
- Lorna Harvey from Education Scotland promotes Making Maths Count and its values at interactions with teachers and schools across Scotland on a regular basis.
- Maureen McKenna has given presentations on the report to two national events in Edinburgh, to headteachers and maths principal teachers in Fife, to maths leaders in Renfrewshire as well as to maths teachers in Glasgow.
- Joe McLachlan, National Parent Forum of Scotland representative on the Group gave presentations to P7 and P5 children on using maths in the workplace and also visited a number of schools who were promoting Maths Week.

In March, the Chair of the Group is to be awarded the 2018 Scottish Mathematics Council Achievement Award. This award is made each year to someone "who has been involved in mathematics education for a significant amount of time and has made a major contribution to the learning and teaching of the subject at primary, secondary or tertiary level through working directly with pupils or students or by holding a position of influence within a school, college, university, institute of teacher education, local authority, Education Scotland or the Inspectorate."

The National Profile-Raising Group is very grateful for the support provided by Aberdeen Asset Management (now Standard Life Aberdeen). The Maths on Flags initiative at The Scottish Open was even more successful this year. Similar to last year, school pupils in the local area were involved in creating calculations for the pinhole flags. This year in order to engage with more pupils and schools, with the very positive support of North Ayrshire Council, we held a competition and members of the Group selected 18 mathematical expressions for the flags. The First Minister visited the Scottish Open and attracted positive publicity for the initiative. There was also an article in both the men's and the women's programme highlighting the initiative and promoting maths positively. The Minister for Public Health and Sport, Aileen Campbell MSP, and the Chair visited the Ladies Open. The flags generated significantly more interest this year as evidenced by Twitter and TV channels using them when interviewing players. Standard Life Aberdeen have committed to continuing this support next year.

As well as this the Read, Write, Count programme has enhanced its numeracy resource and support for families. The initial Deputy First Minister Holiday Maths Challenge issued in December 2017 and will seek to embody the Making Maths Count theme to transform public attitudes to maths.

Priority areas going forward:

- Confirm dates for Maths Week Scotland 2018 (10-16 September 2018 now agreed).
- Identify resource for Maths Week Scotland 2018 with opportunities and flexibilities to build on the success of this year and create new partnerships and initiatives.
- Broaden the support for numeracy and mathematics activity, events, promotions and celebrations beyond Maths Week to ensure momentum, creativity and learning is maintained and fostered wherever possible. This should include opportunities across the year for maths-focused events for learners ideally involving partnerships between early years centres, primary schools, secondary schools, colleges, universities, science centres, libraries, employers and particular sectors, the STEM learning community, families and community and alignment with other endeavours such as adult education and skills for work.
- Partnership with Standard Life Aberdeen on Maths on Flags and The Scottish Open and seek wider opportunities to work alongside SLA on shared ambitions to promote numeracy and mathematics in real-life and sporting contexts.

1.2 Each local authority should develop and implement a strategy to ensure that all schools and nurseries engage with parents, employers and others in their local communities to help children and young people develop greater awareness of the importance of maths to everyday life and future jobs. Education Scotland and local authorities should collaborate to share and disseminate good practice.

This has proved less successful although we have some emerging evidence of good practice through the West Partnership, which has held events across authorities, for example, a Saturday morning in-service for primary teachers was 'sold out' almost immediately. Members of the National Profile-Raising Group contributed to the programme for this event.

Attainment Challenge authorities have increased their focus on numeracy and mathematics but this is not yet universal.

There is some evidence from Education Scotland but, again, more needs to be done in this area. The Education Scotland National Numeracy and Mathematics Hub and Mathematics Principal Teacher and Faculty Head Forums provide strong networks for collaboration and sharing and these platforms should continue to be used to enhance their collaboration and impact.

Action

The Group will continue to monitor the position with Attainment Challenge authorities. The inspection evidence which will be generated during 2018 will be helpful in this regard.

The Group will also consider the improvement plans to be developed by each of the Regional Improvement Collaboratives and promote the inclusion of mathematics as a priority area.

2. Improving confidence and fluency in maths for children, young people, parents and all those who deliver maths education to raise attainment and achievement across learning

This section includes recommendations that address the role of the teaching sector, local authority education departments, Education Scotland and the GTCS. The Report flags up some key areas for consideration including promoting the Growth Mindset approach and understanding and addressing 'maths anxiety'.

2.1 Schools and nurseries using a wide range of effective learning and teaching approaches to promote positive attitudes and develop high expectations, confidence and resilience in maths.

This links closely to recommendations 1.2, 2.2, 2.3, 2.4, 2.5 and their associated actions. The frameworks for this to happen are in place through the improvement role of Education Scotland and its Inspectorate function, the National Improvement Framework, the STEM Strategy and many local improvement plans. A co-ordinated and structured approach would help to assess progress in this area.

Maths Week and engagement with schools and nurseries demonstrate some excellent practice but a comprehensive assessment is required to understand the national picture and, most importantly, where the gaps are.

2.2 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.

Education Scotland's Quality and Improvement 2012-16 report published in 2017 identified a range of areas for attention relating to mathematics. However, there is no action in their workplan to undertake this work. The presentation to the National Profile-Raising Group from Education Scotland on their contribution was more generic.

The Chair did meet with the only specialist maths HM inspector along with an Assistant Director. At that stage, there was no coherent plan presented although there was another maths HMI to take up post.

Action

The Group will continue to link with Education Scotland to ensure that all available data – attainment in BGE and senior phase and inspection evidence from schools, nurseries and challenge authorities – is used effectively to improve practice. The Group will also continue to press for a more strategic and coherent approach to be developed and led by Education Scotland.

2.3 The importance of Initial Teacher Education (ITE) in establishing the understanding, skills, attitudes and confidence to teachers during their learning process and tasks the GTCS, in partnership with ITE Institutions, Education Scotland and local authorities to undertake research on how well ITE students are being prepared to teach maths as newly-qualified teachers.

The Report identifies key areas to explore and draw recommendations and conclusions on:

- Minimum entry requirements to ITE for Maths.
- Other means of ensuring applicants have good quality maths skills, e.g. online testing of applicants' numeracy skills.
- The extent to which there is sufficient coverage of maths in primary ITE programmes to allow meaningful, quality maths learning in primary schools.
- The means by which ITE institutions continuously update and improve their programmes and provide a practical focus on teaching and learning styles that instils teacher confidence in delivering maths.
- The extent to which the probationary year promotes good quality teaching and learning styles and improving confidence in maths.

The Director of Education and Professional Learning at GTCS attended the October 2017 meeting of the National Profile-Raising Group for Mathematics and provided an initial outline of the GTCS position on ITE broadly covering the data from their recent ITE Content Analysis and the numeracy and maths components of that. The second phase of the exercise looking at the qualitative aspect of ITE was underway. The Group accepted the importance of how the quality and quantity interplay on the overall experience of ITE but expressed concern about the variation inherent in the results on the analysis, and the relative proportion of numeracy content in comparison to the other subjects.

Action

Group members highlighted the areas identified above as opportunities for improvement and encouraged the GTCS to embed these in their future plans. An accreditation review was due to begin looking at the broader ITE framework and the Group were invited to contribute to that process.

2.4 All sectors of education should promote access to high-quality career long professional learning (CLPL) to increase staff confidence and enhance professional practices in teaching maths to children, young people and adult learners. Each local authority should design, implement and evaluate the impact of a CLPL strategy for teachers and community learning staff to develop their professional practices in teaching maths.

The group will look at this recommendation once a clearer sense of recommendations 1.2, 2.1, 2.2, 2.3 and 2.5 are established.

2.5 Schools supported by the Attainment Scotland fund as part of the Scottish Attainment Challenge should increase their focus on raising attainment in numeracy and include parental engagement in maths as part of their plans.

Action

Activity in schools supported through the Attainment Challenge Funding and Pupil Equity Funding continues to build and establish positive outcomes but evidence is clear that while many interventions enhance pedagogy across all three priority areas, numeracy is consistently and significantly the smallest element of the funding allocations and general proportion of attention. Literacy was rightly identified as the immediate priority to ensure a broad ability to access the curriculum but priority now needs to shift to numeracy with clear leadership on this from Scottish Government and Education Scotland. SSLN data shows that the poverty-related attainment gap is more pronounced for numeracy across all age groups and is proportionately lower than literacy across all age groups.

There is an increasing desire for evidence of emerging impact and good practice that can be shared.

3 Promoting the value of maths as an essential skill for every career

This section includes recommendations that address the imperative that our workforce is confident and fluent in maths if Scotland's economy is to continue to compete internationally. It also recognises that many employees are parents, and that developing their maths skills would also help them to better support their children's learning.

Progress against the earlier recommendations will make a significant impact on this theme in the short, medium and long term.

3.1 Raising Scotland's skills base and promoting our economic competitiveness, looking to Skills Development Scotland, Education Scotland, Scottish Funding Council and other relevant partners to work with employers, colleges and schools to develop an action plan for improving maths skills for employment. This should include a focus on adult learners both as workers and parents.

Action

A working group has been formed with representation from the organisations above and led by Education Scotland to explore the issues and develop an action plan. Initial action has involved commissioning research to scope current provision and format of adult numeracy education at a local national level. This will conclude in January 2018 and a second qualitative phase will follow. Work will continue in parallel to identify the policy drivers at play and where there are opportunities to enhance and connect.

There are close links with Maths Week Scotland future ambitions to embed adults valuing maths and gaining skills. This year's programme saw many successful events promoting adult numeracy skills through local authority community learning, school's parental engagement role, and the Deputy First Minister's Holiday Maths Challenge should further develop the focus on parents supporting maths learning.

Future plans will consider:

- How to work with National Parent Forum Scotland, Parent Councils and other parent representative groups to identify their needs and non-intimidating ways to explore learning;
- Engagement with regional skills and support services providing employability services through new devolved social security powers; and
- Work with National Numeracy to promote their resources, research and profile to raise awareness of the issues and the opportunities for learning.

3.2 The network of Developing the Young Workforce Regional Groups should be asked to contribute to the development and implementation of the action plan proposed in recommendation 9 in relation to school/employer engagement to promote maths as an essential skill for employment. This should cover primary as well as secondary schools.

An area for priority action once the foundations of the above action plan for recommendation 3.1 are scoped and areas relevant to school/employer-focused are drawn out. The STEM Strategy introduces a framework for this but important to protect numeracy and mathematics as fundamental skills for employment and financial capability. Maths Week activity in senior schools provide an opportunity for relationship building with schools and employers and work will begin shortly to enhance the maths profile within the STEM Ambassador programme.

NATIONAL PROFILE-RAISING GROUP FOR MATHEMATICS – REMIT AND MEMBERSHIP

Revised Remit for the Group from February 2017

To oversee and drive forward policy and practice to transform Scotland into a Maths-Positive Nation.

- The Group will monitor progress on the implementation of the *Making Maths Count* recommendations.
- The Group will discuss, support and challenge Scottish Government Learning Directorate and Education Scotland maths-related policy and activity.
- The Group will act a forum for sharing information, expertise and influence to promote the impact of the *Making Maths Count* recommendations locally and nationally.

The Scottish Government Curriculum Unit will provide secretariat support to the Group.

Membership

Maureen McKenna - Chair - Executive Director of Education, Glasgow City Council

Professor Tara Brendle - Glasgow University, School of Mathematics

Billy Burke - Headteacher - Renfrew High School

Dr Sandra Cairncross - Edinburgh Napier University

Lorna Harvey – Education Scotland

Joe McLachlan - National Parent Forum for Scotland

Peter McNaughton - Head of Education and Children's Services, Fife Council

Sean Phayre - Aberdeen Asset Management

Dr Heather Reid – Meteorologist and STEM Consultant

Caroline Stuart - Independent Director