Greater than the sum

Engagement and Enjoyment in Mathematics Education:
a new partnership for Greater Manchester's universities and schools

MANCHESTER 1824
The University of Manchester

Manchester Metropolitan University

contents

Engagement and Enjoyment in Mathematics Education

Engagement and Enjoyment in Mathematics Education (EEME) is a new partnership between Manchester's universities helping our young learners to discover their love of maths.

The toughest maths problem of our time won't be found in any textbook. Yet in classrooms across Greater Manchester, they seek to answer it every day:

How can we give every child and young person the best possible chance to reach their potential in maths?

The University of Manchester and Manchester Metropolitan University have formed a new partnership to help schools solve this challenge. EEME is bringing maths experts from both institutions together with schools to inspire teachers and learners alike. The partnership will work collaboratively with existing maths networks including the Greater Manchester Maths Hubs, the National Centre for Excellence in the Teaching of Mathematics and the Advanced Mathematics Support Programme.

By creating a happier, more confident classroom, we aim to boost the chances of learners to progress in maths, to help overcome the socioeconomic barriers to success and, ultimately, contribute to greater achievement for the good of our city-region.

Together we're greater than the sum of our parts.

Manchester's maths challenge

IMPROVING THE OPPORTUNITIES OF YOUNG PEOPLE IS A REGIONAL PRIORITY. MORE THAN TWO-FIFTHS OF ALL YOUNG PEOPLE IN GREATER MANCHESTER LEAVE SCHOOL WITHOUT THE EQUIVALENT OF FIVE GCSES INCLUDING ENGLISH AND MATHS, A KEY INDICATOR OF FUTURE SUCCESS.*

The Greater Manchester Combined Authority has a target to support schools to drive up levels of achievement and close the gaps in performance seen across the city-region.

"Our vision is to make Greater Manchester one of the best places in the world to grow up, get on and grow old ... a place where all children are given the best start in life and young people grow up inspired to exceed expectations."

Our people, our place:
The Greater Manchester Strategy

The view from the classroom

Of course addressing these inequalities is a wider-reaching challenge than can be solved in the classroom. So how can schools give our learners the best possible start? And how can our universities support them?

We asked our local schools. This is what they said:

- Maths undergraduates in the classroom in a sustained way, to familiarise students with problem-solving approaches and to increase aspirations.
- Introducing secondary school learners to university mathematics to encourage and increase take-up post-16.
- Helping teachers to access the most recent mathematical education research and how this can be applied in the classroom.
- Improving links between the work being developed in schools and initial teacher education and training.
- Supporting evaluation to determine what strategies and interventions are most effective.

* www.greatermanchester-ca.gov.uk/media/1084/greater_manchester_summary__full_version.pdf

Addressing the Challenge

We've looked at maths performance across the key stages over a three-year period and many schools are performing in line with or above the national average. However, there are a significant number of schools where performance is well below the national average and this often correlates with the proportion of pupils eligible for free school meals.

Primary

While the average attainment level is in line with national standards, there are substantial differences within Greater Manchester with 16% of schools well below the national average.

Secondary

At secondary level, 32% of schools are well below the national average by 10% or more. Twenty-seven schools are more than 17% below the national average where only 53% or less of pupils reach a standard pass. Students in Greater Manchester are also less likely to achieve a strong pass at GCSE (new grade 5).

Post-16

While half of Greater Manchester's local authorities' A-level maths uptake is above the national average, there are substantial differences between local authorities. This variation is also seen in the pass rate, so while the average pass rate for Greater Manchester is in line with the national average, there are significant differences between different areas of the city-region.

Finding the solution together

MANCHESTER'S A CITY THAT FAMOUSLY DOES THINGS DIFFERENTLY. COULD WE TEACH DIFFERENTLY TOO?

EEME aims to increase the confidence of learners and teachers alike by helping them build on existing best practice and develop a fresh perspective on maths. Together, The University of Manchester (UoM) and Manchester Metropolitan University (Man Met) will give teachers access to the latest research and help them apply this to their practice.

"From Alan Turing to Ernest Rutherford, Brian Cox and Danielle George, scientists based in Manchester have inspired millions across the world. By working with Man Met and local schools, we hope to create the same sense of wonder in our classrooms."

UoM maths academic, volunteer

But we also want to work closely with our city's schools and educational organisations to understand the needs of teachers and learners, helping to remove the barriers to engagement and enjoyment of maths.

Big numbers, bigger benefit

Together, Manchester's universities have a track record of innovation and achievement in the STEM subjects.

Together their heritage includes great minds such as the WWII codebreaker Alan Turing and breakthroughs including the first stored-program computer and the wonder material graphene. They lead the world in mathematics education research, from curriculum design to how mathematics applies to art, philosophy and society.

Case study: North West One Maths Hub

The North West One Maths Hub has a long history of working with Manchester's universities to deliver national projects, for example Multiplicative Reasoning and the Maths Education Strategy Hub.

Over this period, a collegiate professional learning community has been established. Several staff at the universities support the Maths Hub as critical friends, mentors and coaches, and an innovation work group has been developed to engage classroom teachers with research.

Examples of impactful work from the collaboration include a Man Met-led project to use a Realistic Mathematics Education approach to enhance performance in Key Stage 3, and the introduction by UoM of Japanese lesson-study techniques for teachers' professional development.

Mapping Manchester's expertise

Here's a snapshot of The University of Manchester and Manchester Metropolitan University's combined mathematical and educational footprint.

1,431
Number of UG maths students

11
Number of academics involved in mathematical research

50
Number of trainee Maths teachers

10,924
Number of UG students studying maths-related courses

Current outreach programmes

Fun with Robots
A talk aimed at years 2 to 6 on the future of robotics and the significant role mathematics plays.

PopMaths Quiz
Designed for school children in Year 7-11 this quiz will test students' knowledge and skills in mathematics.

Taking Maths Further
One-day event for Year 11 students considering a future in maths.

Mathematical puzzles and competitions
Challenging students to solve mathematical problems through activities such as the Alan Turing Cryptography Competition and the PopMaths Quiz.

Women in Maths Research project
Women in Mathematics Research project is an event aimed at female mathematicians in years 10 and 12, encouraging them to consider a career in mathematics.

Enlivening Mathematics Teaching through Maths Research
A choice of workshops designed to help teachers of mathematics to reconnect with real world mathematics.

"Man Met has deep roots in the community, taking students from our city and its surroundings and feeding back through partnerships with schools and colleges. This initiative is a great opportunity for our universities to join forces and increase our impact."

Yvette Solomon, Professor of Education, Man Met

Priorities for the partnership

OUR UNIVERSITIES WILL BE COLLABORATING ON A RANGE OF PRIORITIES:

“The national and local collaborative mathematics education projects on which I’ve engaged with UoM and Man Met have been consistently well received and the evaluations have been extremely positive. Working with the universities has had impact on the wider maths community and empowered colleagues to develop their professional practice.”

Simon Mazumder FIMA,
Lead at the North West One Maths Hub

Coordinating and publicising opportunities for teachers and learners to engage with mathematics at university, particularly around the key transition phases between primary, secondary and post-16 study. Increasing engagement, enjoyment and confidence with mathematics, and studying the impact of these.

Establishing and strengthening partnerships with schools, supporting excellent and innovative teaching through research and continuing professional development. Increasing opportunities for current university students on maths-related course to have high-quality experiences in the classroom.Inspiring more mathematics students to become teachers.

Using our research expertise to build a shared understanding of the challenges for mathematical education and achievement across Greater Manchester, particularly to address gaps in areas of disadvantage. Reducing barriers by making our research more widely available and accessible.

Working with schools and partners such as the National Centre for Excellence in the Teaching of Mathematics and the three Maths Hubs serving schools in and around Greater Manchester to identify research projects and future development opportunities.

We will be supporting schools across these key areas:

Inspire and Challenge

We will work with schools and mathematics departments so that pupils reach their potential, developing challenging curricula and novel problems. We will also introduce schools to opportunities with businesses and third-sector organisations to expand learning beyond the classroom.

Research expertise

Our universities produce ground-breaking research in mathematics education theory and practice through the Manchester Institute of Education at UoM and the Education and Social Research Institute at Man Met. We aim to overcome the challenges around the accessibility of research for teachers to help enhance and facilitate teaching and learning, respond to poverty and disadvantage, and analyse and evaluate impact.

Teacher training, support and development

Our institutions share a history of delivering initial teacher training through different pathways, while a host of CPD courses are available for qualified teachers. We want to ensure that everyone who is practising as, or training to become, a teacher is able to engage with research and understand which opportunities will bring the most benefit to their development and to their learners.

Maths ambassadors and outreach

UoM and Man Met encourage students to broaden their skills and employability through a broad range of outreach activities, from mentoring to tutoring in schools. With a combined number of 1,431 undergraduates studying Mathematics and 10,924 studying maths-related courses, our universities have a substantial pool of potential maths ambassadors to act as positive role models to schoolchildren and young people.

Work with us

WHETHER YOU WORK IN EDUCATION, ARE STUDYING OR SIMPLY SHARE OUR PASSION FOR MATHEMATICS, PLEASE GET IN TOUCH TO DISCUSS HOW WE CAN WORK TOGETHER.

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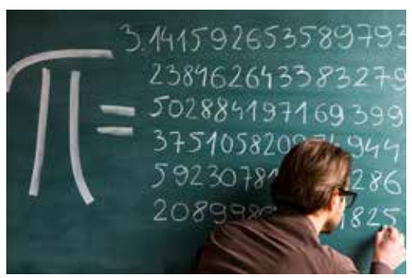

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