

## Researchers and mathematics teachers must collaborate to overcome barriers to student participation in Higher Education

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### About the research

Bristol is a city with some of the most affluent and some of the poorest neighbourhoods in the country. In England participation rates in Higher Education (HE) vary considerably between lower and higher socio-economic groups. For example in Bristol in 2010/11, 16% of students in Bristol South progressed to HE, compared with 46% in Bristol West.

The Bristol-based research project *Overcoming the Mathematical Barriers to Participation in HE* had the following aims: 1) to work in partnership with mathematics teachers to raise attainment in GCSE mathematics and 2) to understand the role that GCSE mathematics plays in terms of access to HE.

Researchers collaborated with mathematics teachers to develop their students' capability to obtain the GCSE grade in mathematics required for their chosen area of study. Teacher partners worked in schools classified by the University of Bristol as "Widening Participation schools". The research also examined student performance in GCSE mathematics in state-maintained schools in Bristol and the relationship between GCSE mathematics and local and national university entrance requirements.

**Collaboration between researchers and mathematics teachers is essential if solutions are to be found for increasing participation in HE.**

### Policy implications

- On-going collaboration between school and university teachers is essential in order to tackle the gap in HE participation rates between different areas of Bristol. From a social justice perspective it is unacceptable that levels of participation are three times higher in some parts of the city than others.
- Collaborative action research between teachers and researchers, as opposed to 'one-off events', should be prioritised as a means for tackling under-achievement in GCSE mathematics, in order to impact on the HE participation rate. In this way, mathematics teachers can be supported to identify barriers to mathematical attainment and then be given the time and space to implement appropriate changes.
- The message should be communicated, via free resources for schools, that Higher Tier GCSE topics can be offered to students at all levels of prior-attainment. This is in-keeping with the recent changes to the Mathematics National Curriculum and the emphasis on all students achieving mathematical mastery.

## Key findings

- The majority of degree courses require at least GCSE grade C in mathematics. The exceptions tend to be Arts and Humanities courses at Post-92 universities. In Bristol, less than 50% of students in the majority of schools located in the poorer areas of the city achieve this qualification, compared with more than 85% of students in schools situated in more affluent areas.
- Teacher partners identified a range of barriers to mathematical achievement for students at risk of not obtaining this qualification. These included: students being placed in sets with no expectation that they will pass GCSE level; students' lack of self-belief; lack of student engagement; students not working independently.
- As teachers raised their expectations of what low-attaining students could achieve and offered them access to Higher Tier GCSE content, then student self-belief, engagement and attainment increased markedly.

## Further information

Researchers worked with two groups of mathematics teacher partners, in 2013-2014 and 2015-2016 respectively. Each group met ten times for two-hour meetings on a fortnightly basis, over a period of a year and as part of a Masters Degree course. Early meetings focused on supporting teachers to find and clarify their own research questions. Data was also collected on the mathematical performance of schools and the entrance requirements of a range of undergraduate degrees at pre- and post-92 universities across the UK.

For further related reading see:

Brown, L., Coles, A. (2011). *Developing expertise: How enactivism re-frames mathematics teacher development*. ZDM, 43(6-7), pp. 861-873.

Coles et al (2016) "I'll help him because I'm doing grade 'A' work at the moment": teachers' action research to overcome barriers to student achievement in mathematics

Sutherland et al (2016) *The Capabilities Approach: GCSE Mathematics and University Access*.

Papers available from the researchers on request.

## Contact the researchers

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