



UPMAP

(Understanding Participation rates in post-16
Mathematics And Physics)



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Both in the UK and worldwide, there is still a shortage of studies in mathematics and science education that examine student engagement over time and research the reasons for the take up or non take up of mathematics and science once these subjects become optional. In the UPMAP Project we study these issues with particular reference to mathematics and physics. Our presumption is that once students are no longer required to do certain subjects, participation depends at least in part on how students see both themselves and the subjects. Neither of these is fixed. Each can shift as a result of experiences both inside and outside the classroom.

The UPMAP Project has three strands. In Strand 1, 'Mapping trajectories of engagement and disenchantment', we designed student questionnaires to include items from established psychological constructs alongside validated subject-specific conceptual tasks so that possible relationships between performance, confidence and intrinsic and extrinsic factors could be explored in each subject and across the two subjects. A total of 23,000 students completed these questionnaires in either year 8 or 10 and 7000 of these students completed them two years later. We also had teacher questionnaires to obtain data about the mathematics and science departments in our 140 project schools.

In Strand 2, 'Investigating subjectivities and school culture', we worked with 12 of our Strand 1 schools in more depth. In each of these schools, interviews were undertaken with six students when they were 15 years old, 16 years old and 17 years old (when the students might or might not still be in formal education). A certain amount of ethnography was also undertaken in each school. Semi-structured interviewing was used to explore such issues as: student views of the role of parents and other significant adults, peers, teachers and out-of-school experiences on subject choice; student understandings of the nature of mathematics and physics and, as a comparison, English; student views of their abilities in mathematics, physics and English and their relationships to the subjects.

In Strand 3, 'Documenting the reasons for Higher Education choices', we worked with 50 first year undergraduates under the age of 21 across four Higher Education Institutions. Half these students had started undergraduate courses in accountancy, mathematics, engineering or physics, and half had started other degrees yet had qualifications that would have allowed them to start accountancy, mathematics, engineering or physics courses. Narrative interviewing was used to explore with the interviewees their experiences of and feelings about their education, their family and occasions on which they felt they had made a decision about their future.

Put concisely and simply, the UPMAP study indicates that young people are more likely to continue with mathematics and/or physics after the age of 16: if they have been encouraged to do so by a key adult (usually in their family or at their school); if they believe that they will gain from studying the subject in terms of job satisfaction and/or material rewards; if they can manifest conceptual understanding in the subject (s); and if they have been well taught. From a policy point of view we would stress the value of deep conceptual understanding mediated by long-term relationships with excellent teachers.

Further Information

Rodd, M., Mujtaba, T., & Reiss, M. (2010). Participation in mathematics post-18: undergraduates stories. *British Society for Research into Learning Mathematics*, 30, 175-182.

Reiss, M., Hoyles, C., Mujtaba, T., Riazi-Farzad, B., Rodd, M., Simon, S., & Stylianidou, F. (2011). Understanding Participation rates in post-16 Mathematics And Physics: Conceptualising and operationalising the UPMAP Project. *International Journal of Science and Mathematics Education*, 9(2), 273-302. DOI: 10.1007/s10763-011-9286-z

Rodd, M. (2011). Participation in undergraduate mathematics: choices and defences. In K. Kislenko (Ed.), *Current State Of Research On Mathematical Beliefs XVI* (pp. 237 -254). Tallinn, Estonia: Institute of Mathematics and Natural Sciences.

Rodd, M. (2011). Mathematics but and yet: undergraduates narratives about decision making. In Smith, C. (Ed.) *Proceedings of the British Society for Research into Learning Mathematics*, 31(1), 132-137.

UPMAP project website

<http://www.ioe.ac.uk/study/departments/cpat/4814.html>

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<http://tisme-scienceandmaths.org>