

## Research Briefing N° 2

# How can we get more students to study mathematics or physics? – The UPMAP Project

The Understanding Participation rates in post-16 Mathematics And Physics (UPMAP) Project examines why some students continue to study mathematics or physics once these subjects are optional whereas other students do not.

**Key words:** mathematics education; physics education; science education; student choice; participation; pedagogy



Photo credit: The Institute of Physics

## Key findings

Our study indicates that young people are more likely to continue with mathematics or physics once these subjects become optional (i.e. after the age of 16 in England) if four conditions are fulfilled:

- If they have been encouraged to continue with them by a key adult. This will usually be someone in their family or one of their teachers at school. If this person is a family member, they may not be good at mathematics or physics themselves, but they will be positive about the worth of studying these subjects.
- If they believe that they will benefit from studying the subject in terms of job satisfaction and/or material rewards, such as a bigger salary.
- If they can manifest conceptual understanding in the subject, in other words 'do well at it' in more than a superficial way.
- If they have been well taught at school in the subject.

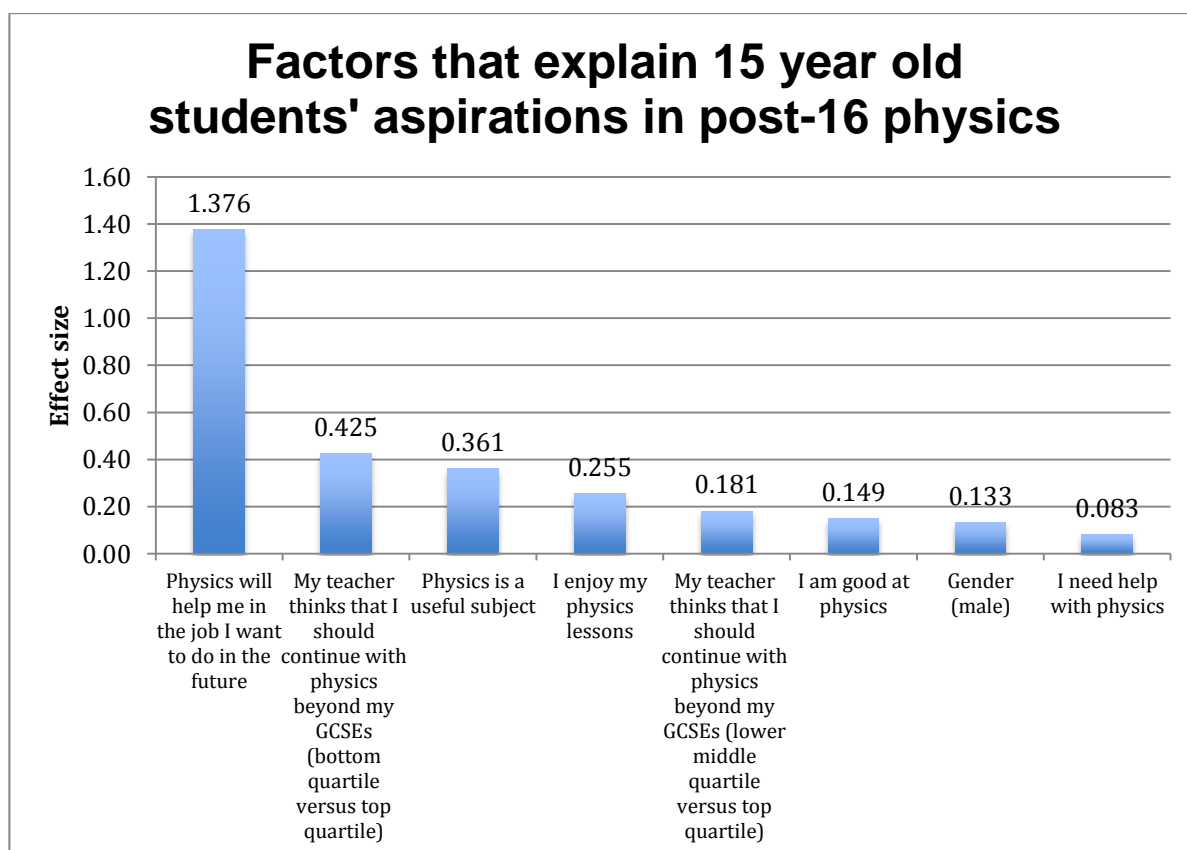
From a policy point of view, given that governments have little control in the short term over how parents view subjects, we stress the value of deep conceptual understanding in mathematics or physics mediated by long-term relationships with excellent teachers.

## What we did

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, the subjects, and themselves in relation to the subjects. None of these is fixed. Each can shift as a result of experiences both inside and outside the classroom.

The project was funded by the Economic and Social Research Council (ESRC). Data were collected from 2008 to 2011.

**Figure** (Factors are shown in decreasing order of importance)



## How we did it

The UPMAP Project has three strands. In Strand 1 a total of 23,000 students completed questionnaires in either year 8 or 10 and 7,000 of these students also completed them two years later. The questionnaires explored things like performance, confidence and liking for mathematics and physics.

In Strand 2 we worked with 12 of our schools in more depth. Interviews were undertaken in each of these schools with six students when they were 15 years old, 16 years old and 17 years old. Interviews explored 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 student views of their abilities in mathematics and physics.

In Strand 3 we worked with 50 first year undergraduates under the age of 21 in four universities. Interviews explored the students' experiences of and feelings about their education, their family and occasions on which they felt they had made a decision about their future.

## Further information

We are grateful to the ESRC for funding the study and to all the participating students, teachers and schools for their participation.

We have worked with a number of professional organisations so that the findings become embedded in practice.

A full list of our publications is available at our project website [www.ioe.ac.uk/UPMAP](http://www.ioe.ac.uk/UPMAP)

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