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News

## How to solve a problem like mathematics



Students are becoming uninterested as teachers become demotivated by politicised maths, according to a recent report.

"The UK's maths economy which powers the financial services sector and wider industry is in danger of atrophy as fewer students study mathematics and attainment falls."

So starts a damning report into mathematics education in the UK by the independent centre–right think tank *Reform*. Their report, *The value of mathematics*, states that many students are turned off by the narrow teaching of mathematics, and that this has led to a generation of "lost mathematicians". These "lost mathematicians" earn £10,000 a year less than they would if they had completed a maths A–level, and this translates to £136,000 less over a lifetime. The report concludes that this has cost the UK economy an estimated £9 billion since 1990.

Even more damning is the statement: "Talk about 'eliminating poverty' is futile if we do not find ways to eliminate the poverty of the mind that needlessly condemns so many children to low grade jobs, or no jobs at all."

*Reform* came to its conclusions regarding "poverty of the mind" by conducting an analysis of all O–level/GCSE examinations since 1951. Between 1951 and 1970, *Reform* found that these examinations required students to "think for themselves" far more than modern examinations. Tests involved thought and initiative in algebra, arithmetic and geometry. By 1980, *Reform* says, exam questions were becoming simpler,

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and following the introduction of the GCSE, there was a sharp drop in difficulty and pass marks were lowered.

The problem, according to *Reform*, is the diminishing role of rigour in maths teaching and exams. "Relevance has replaced rigour in the belief that this would make mathematics more accessible," the report says. It concludes that this has left students trained to answer "specific shallow questions", but with no ability to apply their knowledge to new situations. *Reform* recommends that rigour be brought back into the teaching of mathematics in order to provide a strong sequential approach to problems that builds up a "robust toolkit of cognitive and problem solving skills." (Interestingly, recent research by US researchers has shown that teaching maths using concrete examples can be less beneficial than teaching using rigour. See the *Plus* article [Impractical maths](#).)

Another problem, according to *Reform* is the focus on exam results and league tables. The report concludes, unsurprisingly, that teachers focused solely on exam results become demotivated and that this has resulted in students' lack of enjoyment of the subject. (See the *Plus* article [Understanding uncertainty: A league table lottery](#) for information on the benefits and drawbacks of league tables.)

Typically for a think tank, their concern is expressed in terms of the potential financial damage resulting from a nation with poor maths skills: "In the modern global economy, it is the combination of core techniques, flexible thinking, logic and initiative that will be critical to future success."

While the global maths economy practices "power maths" and its members are becoming "Masters of the Universe", UK workplaces are finding themselves short of people with basic mathematics skills and have to look overseas for recruits.

Moving mathematics from "geek to chic" must be the aim of a mathematics reform, states the report. The way forward, it concludes, is to open up the way maths is taught by allowing institutions and individuals to explore their own abilities, rather than be tied to a centralised and politicised system.

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