

Better maths adds up to a stronger economy

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If Ireland's 15-year-old students could do as well in maths and science as those in Finland, it could increase our GDP by an average of more than 5 per cent per year.

Earlier this year, the Organisation for Economic Co-operation and Development (OECD) produced a report, 'The High Cost of Low Educational Performance'.

This attempted to estimate what it would be worth to various countries if their students did as well as world-leading Finland in maths and science, using Programme for International Student Assessment (PISA) scores to compare competence levels.

Three PISA reports making international comparisons of educational attainment levels among 15-year-olds have been published since 2000 and the story for Ireland has been consistent: we do quite well in reading, not as well but better than average in science, and about average in maths.

On the whole this sounds like good news, but average is just not good enough in the cut-throat competition for international investment.

This is a problem that appears to be well recognised at government level, and addressing it is a central part of the plan to build Ireland's Smart Economy.

Indeed, a 2008 Forfás document began: "Ireland must raise its level of mathematical achievement to ensure it will continue to successfully compete with other economies.

An adequate supply of people with mathematical, science and ICT [Information and Communication Technology] skills is crucial to Ireland's future social and economic development." At third level, it is clear that a fear of maths is one of the reasons that so few students opt to study science.

Given that there is general agreement that maths competence levels need to be improved, this raises the question of what is the best solution.

There is no magic bullet. What is needed is an extensive set of initiatives across all levels of education to help us reach our goal.

One natural way to raise attainment levels is to work towards making maths more interesting and relevant to students at both primary and secondary level.

Project Maths is a promising initiative in this direction at second level, and has its roots in an initiative to make primary schooling (in maths and other subjects) more student-centred, with active learning being a key philosophy.

Giving bonus points to higher level maths in the Leaving Cert, or making maths a compulsory CAO points subject are other ideas that have been extensively floated in recent times.

The main rationale for bonus points is equity: it seems to be widely recognised by teachers and

students that studying for higher-level maths takes considerably more effort than many other subjects, so bonus points would recognise this fact and hopefully encourage more students to do higher-level maths in the Leaving Cert.

If Ireland wishes to emulate Finland's success in PISA we should consider the factors that helped Finland to do so well.

Chief among these was the Luma project initiated by the Ministry of Education in the 1990s. This project aimed to raise the quality of teaching in maths and science and increase the number of graduates in these areas.

It did this by increasing the number of third-level places in maths and science, enhancing teacher training (including in-service training) from both the subject and pedagogical point of view, and updating computer and laboratory facilities.

This initiative required significant investment by the government.

In addition, maths teachers in Finland are required to have a master's degree.

Crucially, there is a high level of respect for the teaching profession and a lot of trust in teachers.

This means that well-qualified graduates are more likely to become teachers.

Research has shown that subject knowledge of teachers impacts on student learning.

A report earlier this year by Dr Sean Delaney of Marino Institute of Education found that mathematical knowledge levels varied widely among primary teachers.

It also found that when teachers were offered professional development, the goal was usually to improve their teaching methods – rather than their mathematical knowledge.

At second level, there is a lack of suitably qualified maths teachers. A recent report by Dr Máire Ní Ríordáin and Dr Ailish Hannigan of the University of Limerick estimated that 48 per cent of maths teachers did not have a degree in the subject.

Many of these out-of-field teachers may be excellent at their job, but some are forced to teach a subject with which they are not comfortable. It seems sensible to provide supports for these people.

Indeed, earlier this month, the Project Maths Implementation Group called for postgraduate courses for second-level teachers who did not hold a qualification in maths.

At NUI Maynooth, we have been aware of these problems for some time.

In 2009 we launched a MSc programme aimed at out-of-field maths teachers.

This programme is being delivered jointly by the NUI Maynooth Department of Mathematics and the University of Cambridge Faculty of Education, with help from colleagues at St Patrick's College, Drumcondra.

This course is given as a part-time, two-year course with classes in the evenings and at weekends, plus an intensive two day summer session in Cambridge.

It aims to broaden and deepen the teachers' knowledge of maths and introduce them to the latest ideas in Mathematics Education.

This is the only programme catering to out-of-field maths teachers in Ireland and the first programme to involve a teaching collaboration with the University of Cambridge.

The interest level from teachers in the programme has been high. This showed that there was a willingness to engage with such initiatives.

The Teaching Council also has a role to play in ensuring the success of such programmes by recognising the graduates of such programmes as qualified maths teachers. The Irish educational system is a good one, but it needs some improvement in the area of maths.

The various initiatives mentioned above are each likely to be of benefit, but all of these and more will be needed to help Ireland reach top of the class in maths.

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