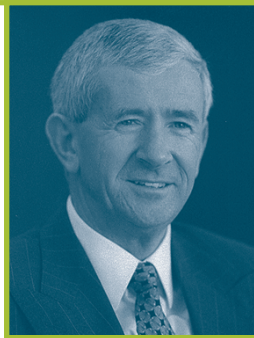


Science and maths: could we do better?

by Roger Kerr

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Parents worrying about their children's aptitude and interest in science and maths, and concerned about how they might fare in the school year ahead, would have been alarmed to read in late December of the sharp decline in maths and science teachers without relevant qualifications.



Figures released by the Ministry of Education from its three-yearly teacher census and analysed by the Royal Society show the number of maths and science teachers who did not have relevant tertiary papers jumped from 8% and 4% respectively in 2001 to 29% and 20% in 2004.

As past president of the New Zealand Association of Maths Teachers, Alan Parris, put it: "We believe it is a problem as you need to know something about the subject to be able to teach it".

A recent survey by the Post Primary Teachers' Association confirmed that many schools struggled to get suitable applicants, with maths, science and technology observed by many as the most difficult areas in which to recruit.

Some reassurance can be found in the recently released

findings of the 2006 PISA study (Programme for International Student Assessment). PISA, an OECD initiative whose focus this year was on scientific literacy, assesses and compares 15 year old students in 57 countries on how ready they are to meet real life opportunities and challenges.

At first glance the news is good. New Zealand scored high in the top bracket of countries, with only Finland and Hong Kong-China doing significantly better, and New Zealand's top performing students doing exceptionally well.

However, the report notes that compared to other high-performing countries, New Zealand had one of the largest variations in performance, with our lowest-performing 15 year olds scoring significantly lower results than other countries in the same bracket and lower than the OECD mean. It is no surprise to read that Maori and Pacific Island students were over-represented in this group.

Light has been shed on the problem in *Staying in Science*, a two-part New Zealand Council for Educational Research paper funded and published last year by the Ministry of Research, Science and Technology (MoRST). In reflecting on the low participation rates of Maori and Pacific Island students in senior secondary sciences, MoRST notes that the same pattern appears to be associated with another concerning trend: much lower rates of participation in senior sciences in

low decile schools nationally.

The paper cites indirect evidence to support the hypothesis that low decile students are experiencing a different quality of science teaching: "A recent national survey of secondary schools found that decile 9 and 10 schools were less likely to have difficulty in getting suitable mathematics and science teachers (Hipkins and Hodgen 2004).

Another recent study investigated teacher mobility in New Zealand. The research found that, in times of overall teacher shortage, teachers tend to move from low to high decile schools, leaving low decile schools to recruit from wherever they can. These circumstances can result in disproportionate numbers of overseas-trained, beginning, and older returning teachers on the staff of low decile schools (Ritchie 2004). Together these findings suggest teaching issues may contribute to the low uptake of science in low decile schools."

What can we make of all this? Should we simply accept that if a budding Rutherford turns up in a low decile school, the chances of their abilities being recognised and their potential fulfilled are probably very low? Hardly.

One important factor that can be addressed is the ability of schools to attract and reward better teachers with better pay related to performance, a concept that has, strangely, long been resisted by teacher unions.

Another factor the survey identifies that is associated with performance, even after accounting for socio-economic background, is greater school autonomy. Students in countries where autonomy is more common did better, regardless of whether they themselves were enrolled in relatively autonomous schools.

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School choice and parental influence also made a difference. Across OECD countries, 60% of students were enrolled in schools whose principals reported competing with two or more other schools in the local area. Across countries, having a larger number of schools that compete for students is associated with better results, over and above the relationship with student background.

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These studies add to the growing body of local and international evidence to support greater choice and competition among education providers, government and non-government, and performance-based pay for teachers. Without changes we risk a growing divide in the achievement and participation levels of New Zealand children in education, not just in maths and science but across the board.

This article does not necessarily reflect the views of the Education Forum

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