

## **The schooling system is still squandering the maths and science potential of many thousands of pupils**, write Jeff McCarthy and Ann Bernstein – Sunday Times Oct 10 2010

*The bottom 75% of schools produced only 17% of mathematics passes, whereas the top 6.6% of schools produced 50%. Even more unequally, the bottom 75% of schools accounted for 13% of science passes, while the top 5.5% of schools produced 50%.*

Mathematics and science at school are vital to higher education, skilled jobs and economic growth. The country desperately needs many more engineers, doctors, scientists, accountants, computer scientists and other professionals who are numerically skilled.

The government needs an abundance of people whose background requires maths if we are to find the skills we need to run large development projects, transport schemes, municipalities, energy plans and much more.

SA should be aiming at the 7% annual growth rate recently announced by President Jacob Zuma. We cannot achieve this level of growth without many more people with a solid grounding in maths and science.

For this reason, the Centre for Development and Enterprise (CDE) has taken a sustained interest in the performance of the schooling system in these subjects.

The CDE has just released the results of four comparative statistical studies of Senior Certificate (SC) and National Senior Certificate (NSC) results from 1998 to 2008. Conducted by the noted economist Professor Charles Simkins, they provide policy-makers and others with important new data.

The results are a mixed bag, ranging from positive to negative and downright disturbing.

First, using comparative statistical techniques, Simkins was able to calculate how many pupils capable of passing either higher-grade mathematics under the old SC or the new subject of mathematics under the NSC did not do so - in other words, how much of the national potential for university-entrance maths passes was, and is, being wasted.

The results show that making either mathematics or mathematical literacy compulsory for the NSC was a major step forward, which doubled university-entrance passes in 2008 over the previous year.

However, whereas almost 60000 pupils passed mathematics, some 35500 who wrote mathematical literacy - or some 60% more - could have passed mathematics instead, thus tripling the number of university-entrance passes over that achieved in 2007.

It shows that the schooling system is still squandering the maths and science potential of many thousands of pupils. Put more positively, it shows that the schooling system could significantly increase the number of skilled people which the economy so urgently needs. It also suggests that the top 40% of all NSC candidates should take mathematics and the rest mathematical literacy.

The number of pupils with the potential to pass science is much smaller. While the demand for science passes is lower than for mathematics passes, they are still required for some important university courses and highly skilled occupations, yet science remains an elective subject in schools. Therefore, talented pupils should be actively encouraged to take it.

A second, less encouraging finding is that the 2008 NSC results reflected a significant degree of grade inflation. If this trend continues, universities and employers will begin to discount these results, and examinations other than the NSC will gain in credibility. Shifting the burden of grade inflation onto universities could pressure them into doing the same, thus devaluing the international "exchange value" of South African public education.

A third, more worrying finding is that, while the base of schools producing mathematics passes has broadened slightly, most passes in mathematics and science are still produced by very few schools.

The bottom 75% of schools produced only 17% of mathematics passes, whereas the top 6.6% of schools produced 50%. Even more unequally, the bottom 75% of schools accounted for 13% of science passes, while the top 5.5% of schools produced 50%.

Put another way, South Africa relies on just more than 400 senior secondary schools for half its mathematics passes at the 50% level, and about 350 schools for half its science passes at the 50% level. (This is out of a total of more than 5000 such schools.)

This seems to suggest that, if additional resources were devoted to schools just below this top layer, the national performance in mathematics and science could be significantly improved.

However, this prospect is deflated by the fourth, downright worrying finding of the statistical study, namely that the maths and science performances of many schools - the bulk of those between the top and bottom layers - vary hugely and unpredictably from year to year.

This apparent "systemic chaos" in the performances of the vast majority of public schools is highly disturbing.

Among other things, it makes it very difficult for education planners to identify promising schools outside the top layer. It also means that parents cannot rely on those schools to perform in the future as they did in the past.

Analysts familiar with the findings believe they reflect an overall lack of professionalism and motivation, as well as a high turnover of maths and science teachers.

Some 90% of our schools are still failing to meet minimum performance standards in these subjects, thus undermining the potential of millions of young South Africans, and hampering national development.

The bulk of the public schooling system is unlikely to improve unless ways are found to link rewards to performance and achievement. This will require a new social contract between teachers and their employers and the wider society.

It also means that we need to treat education as something more than a mere battleground in struggles around civil service conditions or a place for "negotiating marks", despite what world norms have to say about our current dismal standards.

Ann Bernstein, executive director, and Jeff McCarthy, senior consultant, are from the Centre for Development and Enterprise. This article is based on a new CDE report, Maths and Science Performance at SA's Public Schools, summarising work by Professor Charles Simkins