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Early action key to improving maths

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WHEN people speak about the economic importance of maths and science my mind does not immediately jump to technological innovations such as Google, Tesla or SpaceX — all of which are impossible without the mathematical and scientific insight of their founders and engineers.

I am instead reminded of a tenacious African woman, who my good friend and colleague, Prof Veronica McKay, told me about a few years ago. McKay was assigned the mammoth task of developing a government adult education programme (Kha Ri Gude) for those excluded from education under apartheid, especially the illiterate and innumerate among them.

Asked why she had attended the six-month course, one of the participants replied: "Because I wanted to know how to count. I wanted to know when I have enough money to buy things at the shop. Before, I just had to hold out my hand with my money and the man at the shop would take the money and give me back the change. I don't think he was giving me the right change, but now I can tell."

SA aspires to much more than basic financial literacy, and the lofty curriculum and policy documents are testament to this.

There are many improvements in education for which the government does not get enough credit. It has implemented a good curriculum, rolled out workbooks and textbooks to almost all students, and launched annual national assessments that will one day provide the kind of useful information we need.

It also provides school meals to more than 8-million pupils every single day. This is no small feat.

Unfortunately, the major failure has been in meaningful teacher development where little has been done. This helps explain the current reality where the vast majority of pupils still do not acquire even minimal competencies in maths and science during their school years.

The most recent reliable international assessment, the Trends in International Maths and Science Study (TIMSS), tested our Grade 9 students on the international Grade 8 test.

To those outside of academia, it is difficult to convey how abysmally low SA's average TIMSS maths (352) and science (332) scores really are.

They mean that three-quarters (76%) of Grade 9 pupils in 2011 still had not acquired a basic understanding of whole numbers, decimals, operations or basic graphs and could not recognise basic facts from the life and physical sciences.

Here are some example questions from the test to help illustrate the problem:

■ "Kim is packing eggs into boxes. Each box holds six eggs. She has 94 eggs. What is the smallest number of boxes she needs to pack all the eggs?"

Only 12% of South African Grade 9 students could answer this. The results are poor even in the best-performing province, the Western Cape, which scored 20% on this question, and in the wealthiest 20% of schools where 33% could answer it correctly.

■ "The fractions $^{4}/_{14}$ and $^{\square}/_{21}$ are equivalent. What is the value of $\square$?" Only 33% of our Grade 9 students can answer this correctly.

■ Only 61% of Grade 9 students knew that $^{3}/_{5}$ is equal to 0.6. This was the easiest question in the test and is covered in the Grade 6 curriculum.

Research that I and others have conducted shows that about 80% of our Grade 9 pupils are achieving at a Grade 5 level in mathematics and that the backlog starts in Grades 1 to 3.

My best reading of the research base in mathematics in SA leads me to conclude that it is ludicrous to focus our efforts on interventions in Grades 9 to 12, when it is clear these learning deficits are already present in Grade 3 — where less than one third of students can calculate a Grade 3-level problem such as "270 + 28 = __".

Half of Grade 5 students cannot calculate "24 ÷ 3 = ___".

It is near impossible to remediate four years of backlogs in one or two years. We need to focus on improving the quality of teaching and teacher training in primary schools. The later in life we try to repair early deficits, the costlier the remediation becomes.

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Grade 11 maths teacher Mbiraga Munyuki teaches pupils at Manyangana High School in Mpumalanga. File picture: SUNDAY TIMES

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