

25 years of TIMSS in South Africa: Improved achievements but pace of improvement is slowing



Over the past decades, South African learners have made strides in improving their educational achievement in mathematics and science. However, the rate of this improvement has shown signs of slowing and there is much work to do, especially after the disruption caused by the COVID-19 pandemic in 2020. *Vijay Reddy* looks at the history of South Africa's participation in the Trends in International Mathematics and Science Study (TIMSS) and how the country has fared.

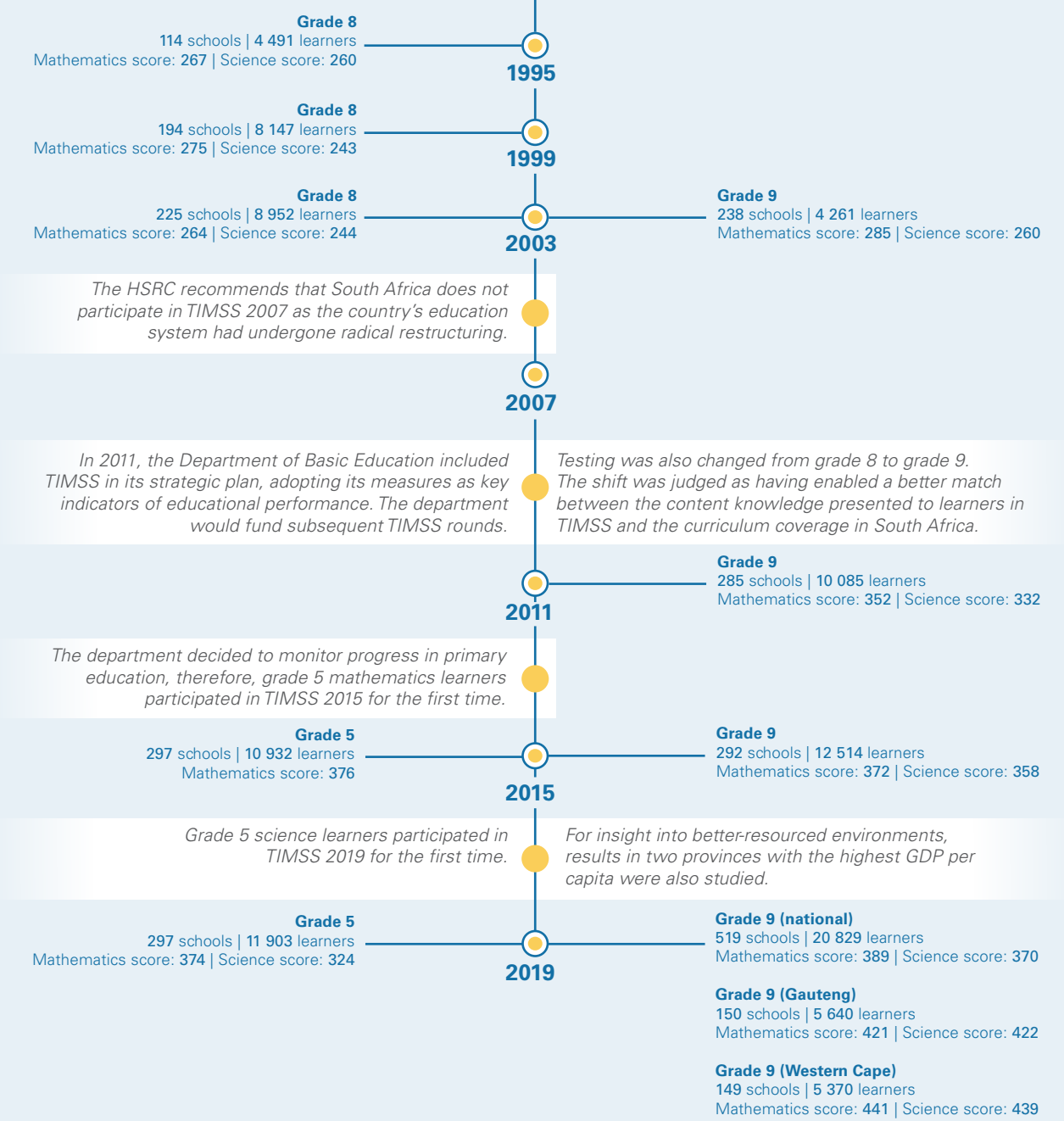
In the context of the political changes of the 1990s in South Africa, the Human Sciences Research Council (HSRC) revised its research agenda in relation to the new democratic government and society. The HSRC reconnected with social science and education communities in South Africa and took a strategic decision to conduct large-scale survey research, which universities may have found difficult to undertake. TIMSS was developed by the International Association for the Evaluation of Educational Achievement to allow participating nations to compare their learners' educational achievement across borders. The late HSRC researcher Dr Derek Gray identified TIMSS as an important study in relation to the South African Reconstruction and Development Plan and to the future planning of the education system in the country. In addition to estimating South African learners' achievement in relation to other countries, TIMSS provided the opportunity to monitor changes in educational achievement over time.

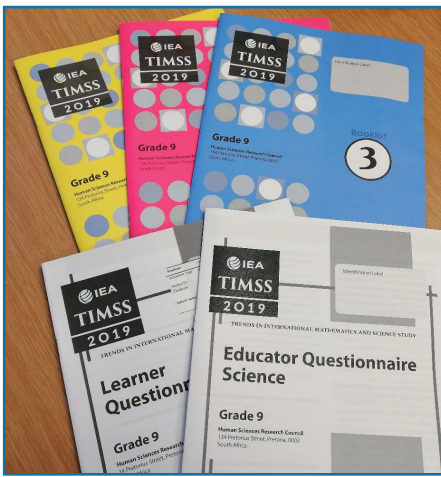
The HSRC conducted TIMSS in South Africa for the first time in 1995, followed by TIMSS 1999 and 2003, funded by the HSRC's parliamentary grant allocation. In 2011, the Department of Basic Education adopted TIMSS as one of the key indicators of educational performance in its strategic plan. The HSRC subsequently conducted TIMSS 2011, 2015 and 2019 at the grade 9 level and TIMSS 2015 and 2019 at the grade 5 level, on behalf of the department. The following infographic summarises the historical timeline of TIMSS in South Africa, which is also detailed in [Society, Research and Power: A history of the Human Sciences Research Council from 1929 to 2019](#) (published in 2021).

Figure 1: The history of TIMSS in South Africa

The TIMSS achievement scale for science and mathematics has a centre point of 500. Learners who achieve a score below 400 do not demonstrate the proficiency for the grade assessed. A score between 400 and 475 indicates some knowledge of the subject, a score between 475 and 550 the ability to apply subject knowledge, and a score above 550 the ability to apply knowledge and to reason.

In the 1990s, the HSRC initiated and facilitated South Africa's participation in TIMSS. The 1995, 1999 and 2003 rounds were funded by the HSRC's parliamentary grant allocation.





TIMSS 2019 test materials
Photo: HSRC

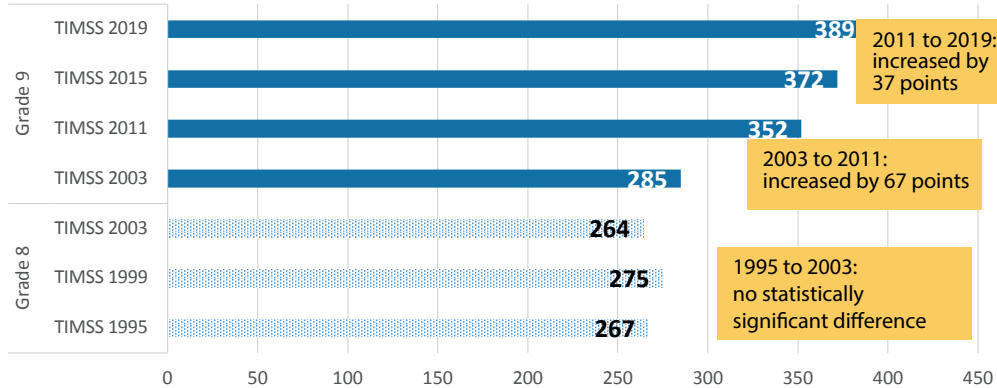


Learners writing TIMSS 2019
Photos: HSRC

Grade 5 and 9 mathematics achievement

South African education, and by extension mathematics and science achievement, has been described as being of a lower quality, with its two unequal systems of education. In this article, we use the 25 years of grade 9 TIMSS data to examine this statement. We will describe South Africa’s performance using the mathematics achievement scores and mathematics proficiency levels. Figure 2 plots the mathematics achievement scores from 1995 to 2019.

Figure 2: TIMSS grade 8 and 9 mathematics achievements from 1995 to 2019



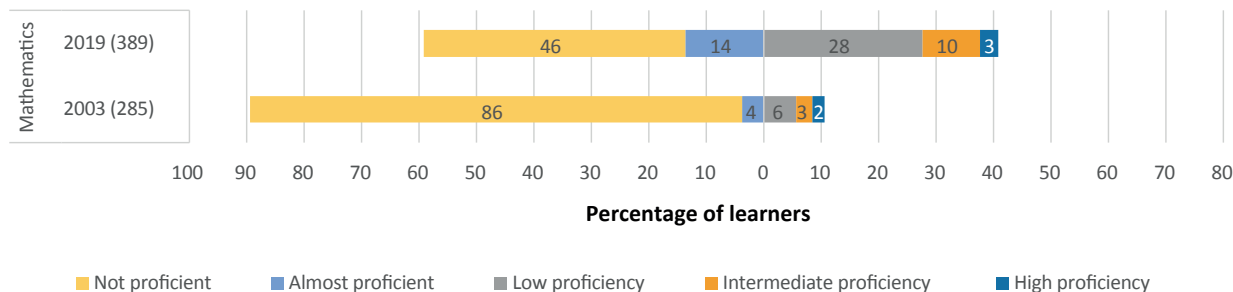
National achievement scores have been way below the TIMSS centre point of 500 since 1995, and South Africa continues to perform at the lower end of the rank order table of participating countries (around 40 countries in each round). The trend analysis shows that, during the 25 years since democracy from 1995 to 2019, South Africa improved in mathematics achievement by one standard deviation or just over 100 TIMSS points – a remarkable achievement.

Drilling down to the changes in three phases over the 25-year period shows us the contours of this improvement: from 1995 to 2003 the achievement scores were very low and stagnant and we did not measure any achievement changes. This is probably due to the massive administrative restructuring to form a single education department and multiple curriculum reforms, like the ill-fated outcomes-based education, during this period. In the second phase, the improvement from 2003 to 2011 was 67 points. These improvements were largely due to the improved home and school conditions effected through social protections like social grants, school nutrition schemes and fee subsidies. In the third phase from 2011 to 2019, the improvement was a lower 37 points. The changes during this last phase could be due to factors like improved home conditions, school resources and instructional materials, improved teacher knowledge, and changes inside schools and classrooms.

In addition to achievement scores, we can describe the abilities that learners demonstrate at a particular score using proficiency level benchmarks. Learners who achieve a score between 400 and 475 are described as being at a ‘low’ proficiency level (have some mathematical knowledge); those between 475 and 550 are at an ‘intermediate’ proficiency level (can apply mathematical knowledge); and those scoring above 550 points are at, ‘high’ proficiency (can apply knowledge and reason). Learners who achieve below a TIMSS score of 400 do not have the mathematical

proficiency for the grade assessed: 'almost proficient' learners score between 375 and 400 points and those 'not proficient' score less than 375. Learners who score over 400 points are more likely to progress to grade 12, succeed in the matriculation examinations and possibly pursue qualifications in science, technology, engineering and mathematics.

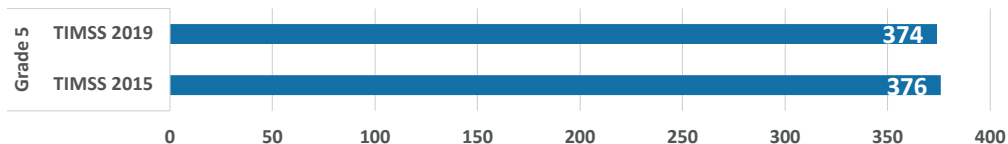
Figure 3: TIMSS grade 9 mathematics proficiency levels and achievement score for 2003 and 2019



In 2003, only one in 10 learners were mathematically proficient. The mathematical proficiency increased over time and in 2019, one in four learners were mathematically proficient. The tipping point for the system is when more than 50% of the learners are mathematically proficient.

South Africa participated at the grade 5 level in TIMSS 2015 and 2019 in order to monitor educational progress in the primary education system. The mathematics achievement over the period remained the same (Figure 4).

Figure 4: TIMSS grade 5 mathematics achievement in 2015 and 2019



This lack of improvement, in contrast to results at the secondary school level, signals the need for greater attention to be paid to the primary education sector.

In conclusion

While we applaud the improvement in grade 9 educational achievement, the rate of achievement improvement is decreasing. For the 2003 to 2011 period, the average rate of mathematics improvement was 7.4 points a year, and for the 2011 to 2019 period these figures dropped to 4.6 points a year. The Medium-Term Strategic Framework (2019–2024), which outlines South Africa’s developmental objectives, expects that in 2023 South Africa will achieve a grade 9 mathematics achievement score of 420 and at grade 5 a score of 426. The TIMSS 2019 achievement scores are a distance away from that target. In the pre-COVID-19 environment, this would have meant strategically targeted interventions and additional effort from all education role players to accelerate the pace of improvement. However, with the learning losses as a result of school closures due to the coronavirus pandemic, this task will be more difficult.

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Marking TIMSS 2019 tests
 Photo: HSRC

