RESEP

Research on Socio-Economic Policy

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What the ANAs tell us about socioeconomic learning gaps in South Africa[1]

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RESEP Policy Brief

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The South African school system is under pressure to develop children's potential irrespective of home background. But currently the system's uneven functioning tends to widen the learning gap.

This brief is based on research that examines learners' performance across the education system, using data from the Annual National Assessments.[2] The ANAs have their limitations, but *relative* performance in these tests can reveal learning gaps and suggest how they evolve.

Our analysis of ANA results across grades shows that the learning gap between children from richer and poorer schools is already very wide by Grade 4. Most disturbingly, Grade 4 results across the school system look similar to those for the Bachelor's pass in Grade 12 (previously known as the matric exemption). This implies that potential access to university, with all the advantages that such access confers in the labour market, is largely predetermined by Grade 4.

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1 This policy brief is based on research conducted within the Programme to Support Pro-Poor Policy Development (PSPPD). For fuller versions of this research see Van der Berg, S. 'What the Annual National Assessments can tell us about learning deficits over the education system and the school career', *South African Journal of Childhood Education* 5(2), 2015, pp. 28–43, and Van der Berg, S., 'What the Annual National Assessments can tell us about learning deficits over the education system and the school career', *Stellenbosch Working Paper Series* No. WP18/2015. www.ekon.sun.ac.za/wpapers/2015/wp182015

2 The ANAs were introduced by the Department of Basic Education (DBE) in 2011 to assess literacy and numeracy skills. They have been administered in Grades 1 to 6 and in Grade 9.

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This finding has huge policy implications for where intervention is needed.

Current policy interventions informed by the ANAs target poor performance in mathematics in Grade 9. This is taking the wrong message from the ANAs. Our research shows that the damage is done long before Grade 9.

1. What do we know about learning deficits in South Africa?

Our knowledge of performance in South African schools has expanded over the past decade, thanks largely to international evaluation data such as SACMEQ, TIMSS, PIRLS and prePIRLS,[3] the Systemic Evaluations undertaken from time to time, and some major school-based evaluations, particularly the National School Effectiveness Study.[4] More than a decade ago the deficits of our school system were already starkly evident.[5]

Looking closer, we see in the classrooms incomplete curriculum coverage, slow pacing, and low levels of cognitive demand.[6] School interventions show little sign of success.[7]

2. The limitations of the ANAs

The main ANA tests, called 'universal ANA', are administered by the schools themselves. There have been objections to these tests on various grounds, such as the quality of the tests themselves and how well they are calibrated. The results for the same schools vary alarmingly across time.

The aggregated results published by the DBE show that the proportion of learners achieving 50% or more in Grade 3 ANA mathematics tests jumped from 36% in 2012 to 59% in 2013 and 65% in 2014. In Grade 6 the jump was from 11% to 27% to 35%.[8] Such increases cannot credibly be attributed to improvement in performance; more likely, the standard of the tests was lowered. The DBE has acknowledged this problem and started to develop technical measures to keep the standard consistent over time and so improve the comparability of results.[9]

The ANA tests are poorly calibrated not only across years but also across grades. The technical measures can in principle be used to fix calibration across years but we have no similar technique for setting tests of equal difficulty across grades.

In 2014 average performance in mathematics dropped from 56% in Grade 3 to 37% in Grade 4. Given the poor year-to-year calibration of the tests, this drop probably tells us little about whether learners are keeping pace with the curriculum or losing ground. The same probably applies to the rise in the average to 43% in Grade 6, followed by a sharp fall to 11% in Grade 9. It is this last figure which has led the Minister and the Department to institute drastic measures to deal with what they regard as bad teaching of mathematics in Grade 9. But it is far more likely that the problems in Grade 9 simply reflect what has happened earlier in the system.

3 Southern and Eastern African Consortium for Monitoring Educational Quality; Trends in International Mathematics and Science Study; Progress in International Reading Literacy Study.

4 Taylor, N., Van der Berg, S. & Mabogoane, T., *Creating Effective Schools*, Cape Town: Pearson, 2013.

5 Taylor, N., Muller, J. & Vinjevold, P., *Getting Schools Working*, Cape Town: Pearson, 2003.

6 See for example: Reeves, C., 'The effect of "Opportunity to learn" and classroom pedagogy on mathematics achievement in schools serving low socio-economic status communities in the Cape Peninsula', unpublished PhD thesis, University of Cape Town, 2005.

7 Schollar, E., 'The Primary Mathematics Research Project 2004–2012: An evidence-based programme of research into understanding and improving the outcomes of mathematical education in South African primary schools', unpublished PhD thesis, University of Cape Town, 2015.

8 DBE (Department of Basic Education), *Annual National Assessment 2014: Report on the ANA of 2013*, Pretoria: DBE, 2014, p. 9.

9 DBE, *Annual National Assessment 2014*, p. 36.

The DBE has identified worryingly high manipulation of ANA results at school level. The problem is not yet widespread enough to discredit the results generally. But it may grow if the ANAs are perceived to be about holding schools and teachers accountable rather than providing data for diagnostic purposes.

To determine how pervasive cheating is in the ANAs we compared them with the externally administered and moderated Systemic Evaluations in the Western Cape. We found that the scores were very similar. The correlations between learners' marks in the two tests were high for reading (0.74 for Grade 6 and 0.75 for Grade 9) and very high for mathematics (0.87 for Grade 6 and 0.91 for Grade 9). This indicates that the ANAs are measuring the same thing as the Systemic Evaluations, at least in these two grades and in the Western Cape.

It also suggests that there cannot be much manipulation of marks and that students are taking both tests seriously, otherwise such high correlations would have been impossible. If the Systemic Evaluations rather than the ANAs are used more often for monitoring purposes in the Western Cape, then it is possible that this province may experience less manipulation of ANA tests than other provinces.

3. Using the ANAs to identify gaps

The poor calibration across grades limits the usefulness of the ANA test scores for comparing performance between grades. But we can use the scores to analyse some children's performance *relative to others*. Differing performance in these tests reveals learning gaps between children from different backgrounds and can suggest how these gaps evolve across grades.

The picture is complicated by the large numbers of repeaters in the system. In our research we consider all those who are over-aged to be no longer on track. In 2012, 15% of the Grade 1 children who wrote the ANA tests were one or more years over-aged. By Grade 6 this had risen to 41% (and 51% in Quintile 1 schools). By Grade 9 more than half the students, 54%, were over-aged.[10] But despite having repeated one or more grades their level of cognitive performance was no better, as international tests show.

Quintiles divide a population into fifths according to the distribution of a particular characteristic. The South African school-going population is divided according to socioeconomic levels. The quintiles vary in size, with Quintile 5, the most affluent, containing the fewest learners. Resource allocation favours the poorer schools, so schools clamour to be classified in the lower quintiles. Some schools are inaccurately classified because of inadequate information. But despite some drawbacks the quintiles are useful as they broadly reflect student socioeconomic status and are associated with learning outcomes.

To estimate the performance required in each grade to achieve the TIMSS average in mathematics, we use a reference group that is roughly on track. The group is selected on the basis of TIMSS Grade 9 test scores. It consists of white and Indian children in Grade 9 who are the appropriate age for their grade and who achieve scores roughly one year better than the international TIMSS average for Grade 8 mathematics.[11] Comparison with this group gives us a broad idea of the level of performance of all children writing the ANA tests in every grade. We can discover how many children in a particular grade are on track relative to the reference group, in terms of their ANA performance and not being over-aged.

10 Per quintile, the percentages of over-aged pupils in Grade 9 were 64%, 61%, 56%, 49% and 31% for Quintiles 1, 2, 3, 4 and 5, respectively.

11 We adjust for the fact that in South Africa this test is administered in Grade 9 rather than in Grade 8 as in other countries.

South African Indian and white students in Grade 9 perform at about the international TIMSS average for Grade 8 mathematics.[12] However, if we consider only those students in this group who are not over-aged, we find that their performance (based on the ANA results) is about 30% of a standard deviation or one year of schooling higher. This means that our reference group (students from these two population groups who are the appropriate age for their class) perform roughly at the TIMSS average. They are at about the same performance level as their counterparts in countries such as the UK, Denmark, Australia and New Zealand.

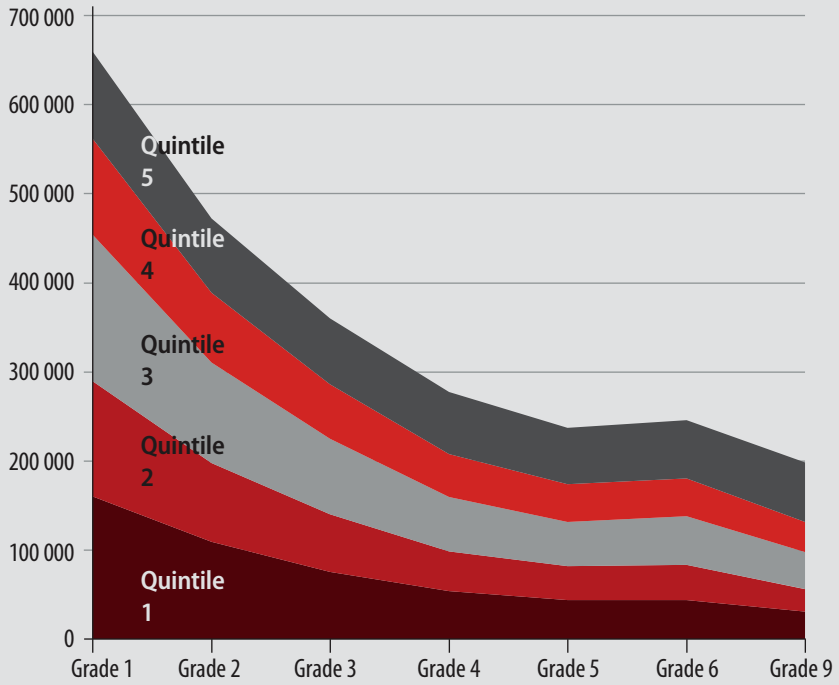
TIMSS has set a low international benchmark for a level of performance indicating only a basic knowledge of whole numbers, decimals, operations and basic graphs, certainly not an unreasonably high target.[13] This low benchmark is about one standard deviation below the performance of our reference group. So for every grade that writes the ANA test we can use a level of one standard deviation below the performance of the reference group as an approximation of performance at the TIMSS low international benchmark. Then we can look at the ANA scores to see which learners who are not over-aged match up to this level and are therefore performing at the TIMSS low international benchmark. All learners who are not over-aged and who perform at or above this level are classified as being on track.

4. Our findings

Figure 1 uses the national school quintiles as a broad reflection of performance in 2012. We see that the proportion of learners who are on track declines across the grades, especially in the lower quintiles (the poorer schools). By Grade 4 most learners are no longer on track, and the deficit increases only a little more in subsequent grades.

It appears that by Grade 4 the damage has been done.

FIGURE 1: Number of students on track in ANA 2012 by school quintile



12 HSRC (Human Sciences Research Council), *Towards Equity and Excellence: Highlights from TIMSS 2011: The South African Perspective*, Pretoria: HSRC, 2014.

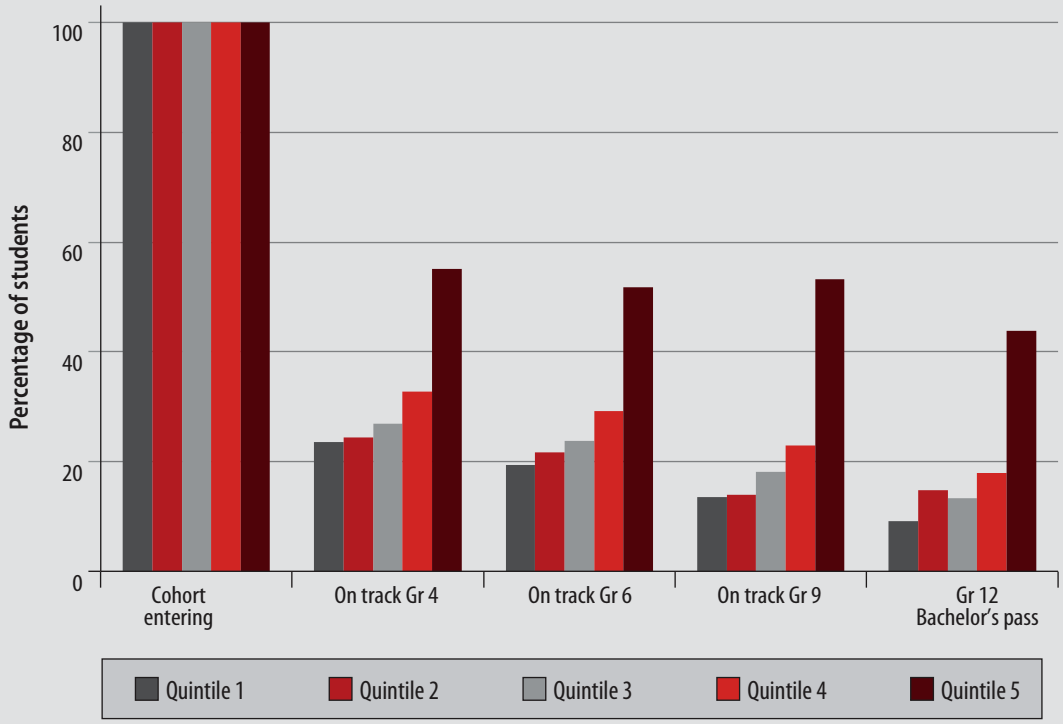
13 Reddy, V., Zuze, T.L., Visser, M., Winnaar, L., Juan, A., Prinsloo, C.H., Arends, F. & Rogers, S., *Beyond Benchmarks: What Twenty Years of TIMSS Data Tell Us About South African Education*, Pretoria: HSRC (Human Sciences Research Council), 2015, pp. 4–5.

Figure 2 shows that by Grade 4 the pattern of learners who are on track (meaning they score above the TIMSS low international benchmark and are not over-aged) across quintiles is remarkably similar to the pattern of those who achieve a Bachelor's pass in Grade 12, that is, those who perform well enough to be able to enter university.

It appears that the flat learning trajectories experienced by children attending poor schools sabotage their chances of doing well in matric and therefore their future careers. We find that their performance is already below the benchmark as early as Grade 3 or Grade 4.

For most South African students therefore, academic success in the form of a good matric pass and possible university degree, with the benefits this confers in the labour market, is likely to be already unattainable by the time they reach the end of the Foundation Phase.

FIGURE 2: Percentage of students on track in various grades in ANA 2012, and Bachelor's passes in Grade 12, by school quintile



So far we have analysed the ANA results only for 2012 and 2013. Our analysis of ANA 2013 shows a similar pattern of performance to ANA 2012, across the grades. The results for both 2012 and 2013 point to large learning deficits that have left their mark by the middle of the primary school years. They show that, for most children, catching up and getting back on track is not a realistic prospect.

5. Concerns about the ANAs at lower grades

South African educational outcomes vary widely across schools. One measure that reflects this pattern is the intra-class correlation coefficient, or rho value. This tells us how much of the overall variation in scores is between rather than within schools. The rho value ranges between 0 and 1. If all schools performed exactly the same, the rho value would be 0, indicating that all the variation in scores occurred within schools. Analysing the ANA performance for 2012, we find that the rho value increases across grades, from a low value between 0.25 and 0.32 in Grade 1 to almost double those values by Grade 5. This indicates that the learning gaps between schools increase from the early to the higher grades.

It is, however, possible that the low rho value in Grade 1 and to some extent also Grade 2 simply reflects a test that is less able to differentiate at this level. One of the concerns about the ANAs is the quality of the tests, particularly at the lower grades. The weaknesses of the ANA as a measuring device in the earliest grades make it difficult to draw conclusions about those grades. We cannot be sure, for example, whether a large part of the learning deficit already exists in these grades or whether it grows quickly in these grades. Yet there can be no doubt that by Grade 4 the differences in performance between poor and more affluent schools are already well established.

6. Policy implications

The policy message is simple, and stark.

The ANA data confirm what many international and domestic assessments have found: South African school children perform weakly in terms of cognitive outcomes.

They show that these children are unlikely to make up for early loss of ground in school or backlogs that may have built up even before they started school. For most of them, learning deficits are so bad by the middle of primary school that many doors have already closed for them. Efforts to repair the damage at higher grades are important and must continue for the sake of those who may still benefit from them. But the biggest effort is required in the early school years, if not before.

The data also show a large learning gap between children from different socioeconomic backgrounds. This is where the greatest policy challenge lies. We must reduce the deficits that are holding back mainly children from poorer communities. Whether the cause is weak early instruction or a disadvantaged home background, early remedial action is imperative.

We advise that the policy emphasis should fall on the early grades.

This contradicts the conclusions drawn from the ANA results by policymakers who have decided that the weak test scores in Grade 9 require major intervention mainly at that grade and mainly in mathematics. This is intervening long after the damage has been done.

7. The need for further research

The ANAs are a massive logistical exercise. They have been relatively successful. We must build on that success and sharpen this instrument further.

But we need better information on young children's performance and learning trajectories. We need another instrument. Most importantly, we need a panel survey of children in the Foundation Phase. The survey would ask parents retrospective questions about early childhood development. It would also track children's cognitive development in the first few years of school – and preferably even before they enter school. The survey would show us, as the ANAs cannot do, what can go wrong at school and at home in those crucial early years and help us to remedy it. Failure to develop poor but bright children may be a key reason for social immobility in South Africa.[14]

14 Similar findings apply to developed countries, though probably in smaller measure. See Feinstein, L. & Duckworth, K., 'Development in the early years: Its importance for school performance and adult outcomes', *Wider Benefits of Learning Research Report* 20, London: Institute of Education, 2006.