



Research on Socio-Economic Policy

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Adding randomised control trials (RCTs) to the education research toolkit¹

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The performance of learners in South Africa has been consistently poor, as measured by several national and international assessments: the Annual National Assessments (ANAs),² the Trends in International Mathematics and Science Study (TIMSS),³ the Progress in International Reading Literacy Study (PIRLS),⁴ and the Southern and Eastern African Consortium for Monitoring Education Quality (SACMEQ).

1. How bad is the quality of education in South African primary schools?

South Africa has participated in two of the three waves of SACMEQ that have been completed and released. In 2007 SACMEQ measured the quality of education in primary schools in 15 southern and eastern African countries by testing a representative sample of Grade 6 learners. The aim was to provide information to help education planners and policymakers make better decisions for improving the delivery and quality of schooling.⁵

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- 1 This policy brief is based on research conducted within the Programme to Support Pro-Poor Policy Development (PSPPD).
- 2 The ANAs were introduced by the Department of Basic Education in 2011 to assess literacy and numeracy skills. They have been administered in Grades 1 to 6 and, more recently, in Grade 9.
- 3 TIMSS is an international study that assesses education systems in Mathematics and Science at Grade 9 level.
- 4 PIRLS is an international reading test that assesses Grade 4 learners in 49 countries.
- 5 Moloi, M. & Strauss, J., *The SACMEQ II Project in South Africa: A Study into the Conditions of Schooling and the Quality of Education*, Harare: Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), 2005.

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SACMEQ classifies learners into eight categories according to their performance in reading and mathematics. Below a certain threshold of performance they are 'non-readers' and 'non-numerate'. Figure 1 shows the percentage of Grade 6 learners that SACMEQ found to be functionally literate and numerate in 11 countries in 2007. Approximately 30% were functionally illiterate and 40% non-numerate. This puts South Africa in the bottom three of the 11 countries SACMEQ surveyed. The survey also showed that there had been no improvement in South Africa's performance since the previous SACMEQ survey in 2000.

Given this country's history, the government has introduced several initiatives and policies to deal with imbalances in the education system and allocated extra funding to poorer schools. A comparison between 1991 and 2008 shows that South Africa's per pupil expenditure in schools in purchasing power parity (PPP) terms exceeded that of all the other countries surveyed by SACMEQ, with the exception of the Seychelles.⁶ But despite the policies, initiatives and funding, South African learner performance in literacy and numeracy is still at a very low level, even lower than many poorer countries.

This raises the question of why our education system cannot convert inputs into outcomes. We urgently need policies, programmes and large-scale interventions that can be shown to make a real improvement in learning outcomes.

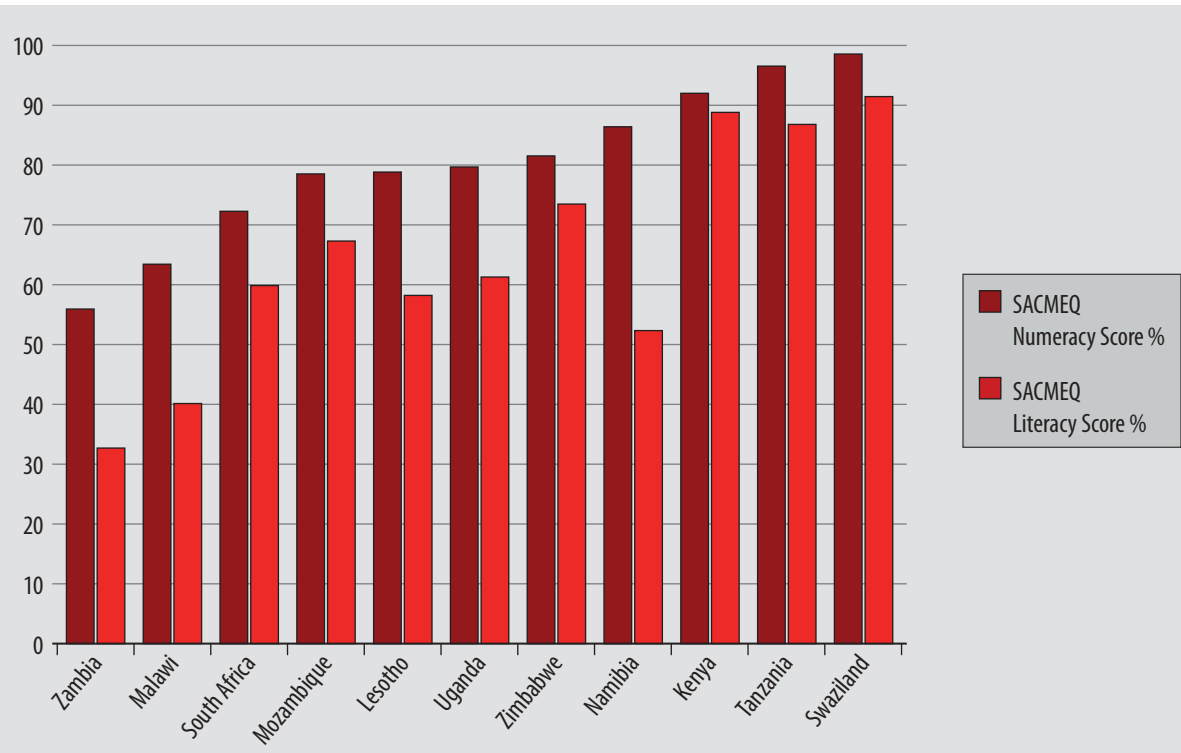


FIGURE 1: Percentages of functionally literate and functionally numerate Grade 6 learners in a 2007 SACMEQ survey

Source: Spaul & Taylor⁷

Note: Demographic and Health Survey data;⁸ some countries did not have the relevant data. The figures presented are uncorrected for those who did not complete Grade 6, with standard errors (%).

6 Gustafsson, M. & Patel, F., 'Managing the teacher pay system: What the local and international data are telling us', Stellenbosch Working Paper Series No. WP26/2009. www.ekon.sun.ac.za/wpapers/2009/wp262009

7 Spaul, N. & Taylor, S., 'Access to what? Creating a composite measure of educational quantity and educational quality for 11 African countries', Comparative Education Review, 59(1), 2015.

8 www.sacmeq.org/?q=sacmeq-projects/sacmeq-iv

2. Why are some evaluation methods ineffective?

Identifying the most effective inputs for improving learner performance is central to education planning and policy. International research shows that the effectiveness of the inputs depends partly on factors such as equity, past policy and the stage of development of the country in question and its education system.⁹ This research on which this brief is based found that important inputs are good curriculum content, with appropriate subject selection, and good teachers who transfer content effectively, spend adequate time preparing lessons and working with the learners, and use methods skilfully and creatively.

However, we still lack rigorous evidence on classroom based practice and resources that will have a measurable effect on learner performance in a developing country like South Africa. The existing studies tend to focus on diagnosing problems rather than evaluating possible solutions. Those that do evaluate interventions often use case studies or small pilot studies. Valuable as these methods are in helping us to understand classroom and school dynamics and identify what makes interventions work, they are often resource-intensive and difficult to replicate or scale up. They are useful in their small-scale detail, but we need larger samples that will allow us to generalise to a larger population.

The main weakness of non-experimental evaluation methods is that they do not consider the counterfactual. Some of them only compare pre- and post-programme outcomes for beneficiaries and do not consider what the outcomes would have been for those beneficiaries had they not received the programme. The result is that programmes are often reported as having large positive outcomes. When they do compare beneficiaries with non-beneficiaries, they do it in a simplistic fashion that will not give a valid estimate of the counterfactual. This is often the case in research into education programmes, and many of the studies of large-scale early grade reading interventions in South Africa are open to this criticism – they do not use properly selected control groups.

3. How can randomised control trials (RCTs) make a difference in South Africa?

RCTs are less commonly used in developing countries than other research methods, but their use is increasing. There is a growing body of work on their rationale, appropriateness and methodology in the social sciences, including education.

In research that is intended to inform policy, two critical requirements are that the interventions and findings should be relevant to the larger school population and that the effects should be measured precisely. By using a lottery to allocate participants to an intervention and a control group, an RCT constructs a credible 'counterfactual' scenario – what might have happened to those who received an intervention had they not received it. With a large enough representative sample to avoid the influence of outliers, random assignment gives us two groups that, prior to the intervention, can be assumed not to differ in any systematic way. This method makes it possible to generalise findings from a sample to the larger population. The methodological rigour of an RCT gives us confidence that the measured effects are reliable.

RCTs also enable us to statistically evaluate competing interventions that address the same education policy problem.¹⁰ They thus enable us to identify binding and non-binding constraints; in simple terms, to distinguish the problems that need to be tackled most urgently from the less urgent ones that can wait.¹¹

9 Boissiere, M., *Determinants of Primary Education Outcomes in Developing Countries*, Washington: World Bank, 2004.

10 Svensson, J. & Pettersson-Lidbom, P., 'Impact evaluation of service delivery programs: Methods and concepts for impact assessments in basic education, health, water and sanitation', paper prepared for the African Economic Research Consortium, 2008.

11 Duflo, E., Glennerster, R. & Kremer, M., 'Using randomization in development economics research: A toolkit', *Discussion Paper No. 6059*, London: Centre for Economic Policy Research, 2006.

Binding constraints

The binding constraints approach used in this study, developed by Hausmann et al.,¹² was also used by the Harvard Group who investigated South Africa's economic growth prospects in 2008.¹³

The essential idea is that not all constraints are equally binding. Take for example constraints in education. If our problem is absentee teachers, then efforts to improve teachers' knowledge of their subjects will not go far to solve the problem. Before dealing with the problem of teachers' inadequate knowledge (the non-binding constraint), we first need to deal with the binding constraint – teachers not being there to teach their classes. The binding constraints approach helps us assess priority. Binding constraints need attention first.

As an illustration, consider the volume of water that a half barrel made of vertical slats would hold. The volume is determined by the height of the lowest slat, so increasing the height of the other slats is not useful. The binding constraint, preventing us from increasing the volume of water, is the lowest slat. The other slats are non-binding.¹⁴

This approach – identifying binding constraints to focus on – is central to the research project *Binding Constraints in Education*, of which this Policy Brief forms part.

Using RCT findings to evaluate a variety of policies enables policymakers to compare the gains in learner performance achieved by competing interventions and thus assess the cost-effectiveness of those interventions. The best ways to bring about improvement are not always the most expensive; comparisons that identify the most cost-effective way of achieving a policy objective are particularly useful for policymakers with limited budgets.¹⁵

4. Some recommendations

- Researchers, practitioners and policymakers should broaden the range of methods used to evaluate school programmes and interventions, in particular including quantitative methods such as RCTs to improve the accuracy of measurement.
- Quantitative and qualitative research methods should be combined to measure different aspects of education interventions. Accurate learner assessment information and administrative data on learner characteristics – already collected in the system – provide more opportunities for analysing the specific conditions in which interventions make a difference.
- When evaluating the impact of interventions in the absence of a credible counterfactual, policymakers should be aware that there is a higher probability of a false positive result and moderate their claims accordingly.
- Policymakers should note that although various quantitative impact evaluation methods are available, the best way to eliminate selection bias and get a valid estimate of the counterfactual is by conducting an RCT.

12 Hausmann, R, Rodrik, D. & Velasco, A., 'Getting the diagnosis right', *Finance & Development*, 43(1), 2006.

13 Rasool, F. & Botha, C.J., 'The nature, extent and effect of skills shortages on skills migration in South Africa', *South African Journal of Human Resource Management/SA Tydskrif vir Menslikehulpbronbestuur*, 9(1), 2011.

14 See Figure 1 p.17 in Hausmann, R., Klinger, D. & Wagner, R., 'Doing growth diagnostics in practice: A mindbook', *CID Working Paper No. 177*, Cambridge, MA: Centre for International Development, 2008. <http://growthlab.cid.harvard.edu/files/growthlab/files/177.pdf?m=1434036303>

15 DBE (Department of Basic Education), 'Summary report: Evidence based policy review', paper presented at Pretoria workshop, 23–24 October 2012.

5. When should RCTs be used?

- Oversubscription in a government programme, i.e. where there are more potential beneficiaries than the programme can accommodate, presents an opportunity for randomisation of allocation. If the oversubscription is because of budget restrictions, random allocation may be one of the more equitable ways of selecting beneficiaries.
- Policymakers often have to choose between policy interventions. If the methods used for prioritising are not based on rigorous information they will be unsystematic and thus not ideal. The notion of binding and non-binding constraints will help with prioritisation.
- RCTs can create a credible evidence base that will help policymakers to evaluate proposals for improving teaching and learning before going ahead and committing resources.

6. A further application of RCTs

Developing countries such as South Africa have so far had only limited success in using ICTs (information and communications technologies) effectively for education administration and improving learner performance. The emphasis has been mostly on infrastructure to deliver ICTs to schools, districts and provinces and not enough on the content of the programmes to be delivered, particularly for improving curricula and learner performance.

The use of ICTs in the education sector has been given priority status in various national government plans, including the recently launched *Operation Phakisa* led by the Presidency.¹⁶ The intention is to transform teaching and learning through the appropriate use of ICTs, as envisaged by the 2004 White Paper on e-Education.¹⁷

However, little credible research has been conducted and the impact of the proposed or currently implemented programmes has not been properly evaluated. Considering the magnitude of the required resources and the size of the target population of the ICT rollout, further research through RCTs would be a useful policy exercise. Without careful consideration of existing and new research and evaluations to inform the points of emphasis in the ICT rollout, particularly in establishing credible curriculum focused programmes for improving learner performance, the ICT drive will not attain the critical goal of enhancing learning and teaching in a meaningful way.

16 www.operationphakisa.gov.za/Pages/Home.aspx

17 www.education.gov.za/LinkClick.aspx?fileticket=Keu0%2fbkee%2bM%3d&tabid=191&mid=484