CDE INSIGHT

MATHEMATICS OUTCOMES IN SOUTH AFRICAN SCHOOLS
What are the facts? What should be done?

South Africa is significantly underperforming in education, particularly mathematics teaching and learning. Mathematics teaching is often poor quality, with teachers not able to answer questions in the curriculum they are teaching, one indicator of the challenge. Often national testing is misleading as it does not show the major gap at lower grade levels. Of the full complement of pupils who start school, only 50 per cent will make it to Grade 12 and only 12 per cent will qualify for university entrance. Fundamental reforms are needed in the public sector. Business leaders need to incorporate an understanding of private education and other market experiments and schooling innovations in their overall perspective and priorities for intervention and reform.

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The Centre for Development and Enterprise is one of South Africa's leading development think tanks, focussing on vital national development issues and their relationship to economic growth and democratic consolidation. Through examining South African realities and international experience, CDE formulates practical policy proposals for addressing major social and economic challenges. It has a special interest in the role of business and markets in development.

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This report was written by Jeff McCarthy and Rebecca Oliphant, and is a summary of two specially commissioned research papers for CDE.

BACKGOUND RESEARCH REPORTS

This document is based on background reports by Professor Charles Simkins, Performance in the South African Educational System: What do we know? and Nicholas Spaull, South Africa's Education Crisis: The quality of education in South Africa 1994-2011. These documents are available on www.cde.org.za.

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5 Eton Road, Parktown, Johannesburg 2193, South Africa
P O Box 1936, Johannesburg 2000, South Africa
Tel +27 11 482 5140 • Fax +27 11 482 5089 • info@cde.org.za • www.cde.org.za

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Cover: Chalkboard and math addition (Photo from http://www.shutterstock.com/)

Background

The teaching of mathematics in South African schools is amongst the worst on the world. In 2011, the Trends in International Mathematics and Science Study (TIMSS) showed that South African learners have the lowest performance among all 21 middle-income countries that participated. A recent CDE report further underlines the issue as it found rapid increases in enrolments in private extra mathematics classes, which was partly in response to poor teaching in public schools.[1] Such supplementary efforts fail to address the wider deficiencies in mathematics education. Vast improvements in this area of the public schooling system are vital to South Africa's future socio-economic prospects: for the learners as well as the development of the country as a whole.

This report summarises two specially commissioned CDE reports, both independent studies of the state of schooling in South Africa as of early 2013, done by university-based experts Nicholas Spaull and Charles Simkins.[2] The two experts, with access to separate but corroborating data, arrive at much the same disconcerting conclusions. Although there are subtle differences in their analyses, their data and conclusions indicate that despite some improvement, South Africa is still significantly underperforming in maths education.

Mounting indicators on school performance and teaching reveal largely unacknowledged poor teaching of mathematics in the great majority of schools. Poor teaching competencies and, as an extension, learner results will not quickly be remedied. Yet mathematics is a key requirement for not only entry into higher education, but also for most modern, knowledge-intensive work.

South Africa's development as a knowledge economy depends partly on improving the teaching of mathematics and numeracy. Furthermore, South Africa's extremely high youth unemployment, which is currently at 50 per cent,[3] is closely linked to the quality of schooling – numeracy and mathematics competency in particular.

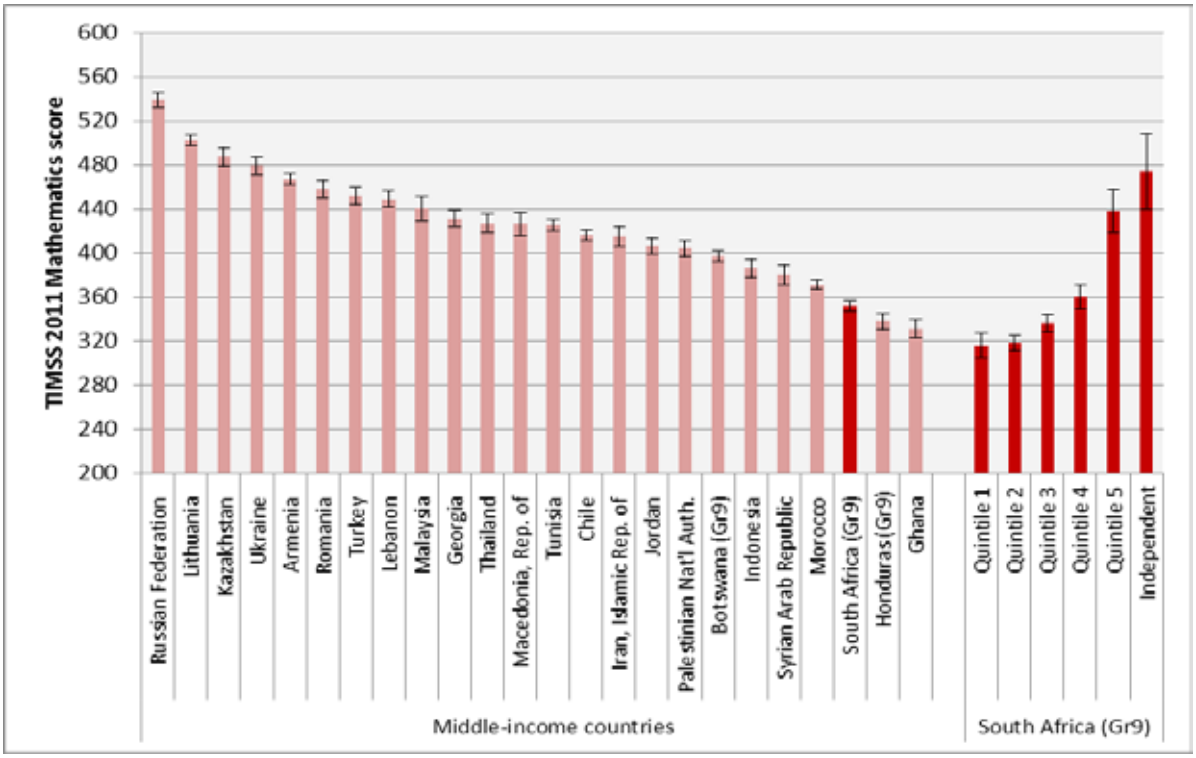
To appreciate the scale of mathematics schooling deficiencies and the challenges that lie ahead, it is best first to put learners' and teachers' competencies into an international context. Here we draw more on the work of Spaull, whereas in the second part of this summary we draw more on Simkins, and focus on systems inefficiencies in schooling in general. We conclude by analysing the origins and depth of poor mathematics schooling before offering recommendations.

South African Mathematics Schooling in an International Context

International studies often show that South Africa has the worst educational outcomes of all middle-income countries that participate in cross-national assessments of educational achievement, especially in mathematics. We also do worse than many low-income African countries.

Figure 1 shows one aspect of where we stood in 2011. The Trends in International Mathematics and Science Study (TIMSS) is an international standardised test for mathematics and science. It is intended for Grade 8, however in South Africa it was decided that the tests were too difficult for South African Grade 8 learners; in 2011 only Grade 9 learners wrote the test. Only Botswana and Honduras out of 42 countries also tested Grade 9 rather than Grade 8 learners. Average mathematics competencies at Grade 9 in South Africa on the standardised test were closest to those of Honduras and Morocco, but only just over half as good (in terms of absolute scores) as Russia. When dividing South African schools into different sectors, the independent schools' Grade 9 learners did much better than the average, but were still just under 90 per cent of the average Russian Grade 8 mathematics achievement (although there are issues about the sample used for South African independent or private schools, which likely hide the good performances of the better of them).

Figure 1: Average Grade 8 (South African Grade 9) Mathematics Achievement in 2011 in Comparison to Other Middle-Income Countries



Source: Spaull 2013, report for CDE, *South Africa's Education Crisis*
The quality of education in South Africa 1994-2011

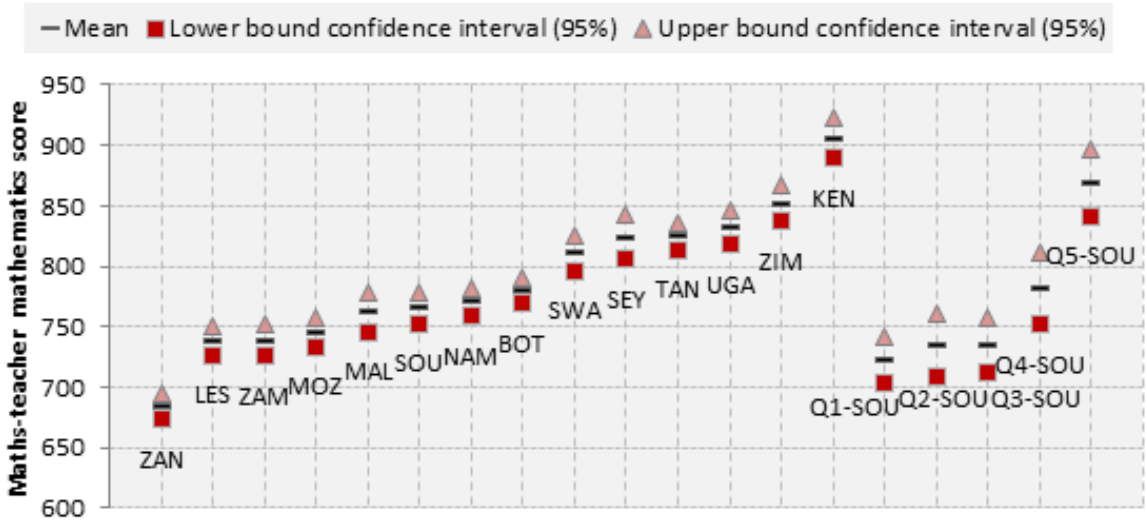
The government has begun to accept that there is a crisis in education requiring urgent intervention. Yet its extent and depth is often underestimated in favour of reports of 'progress' (see for example the August 2013 Development Indicators 2012 report of the Presidency).[4] One of the most important factors limiting the quality of mathematics education is the poor quality of our teachers, and numeracy and mathematics teaching in particular, especially at lower grade levels.

Figure 2, which shows mathematics teachers' competencies compared to a selection of other Eastern and Southern African countries, places the competency of South Africa's Grade 6 mathematics teachers at the bottom end of the spectrum.[5] However, when looking at inequalities within South

Africa, there is significant disparity. Whilst South African mathematics teachers in quintile five (the richest areas) schools can nearly compete with the average Kenyan mathematics teacher, the bottom three quintiles (nearly two thirds of the population – probably reflective of the average rural area and small towns and most townships) do slightly worse than Lesotho and Zambia.

Unlike South Africa, Lesotho and Zambia are lower income economies,[6] and are far from South Africa's level of economic modernisation. Most of the countries with similar results to South Africa have a much lower per capita spending on schooling. Countries performing much better than South Africa like Tanzania, Uganda and Zimbabwe have per capita GDPs which are only a small fraction of South Africa's and, interestingly, also have a high proportion of their learners attending low-fee private schools.[7]

Figure 2: South African Mathematics Teachers' Competencies in Relation to Eastern and Southern African Counterparts



Source: Spaull 2013, report for CDE, *South Africa's Education Crisis*
The quality of education in South Africa 1994-2011

National Evaluations of Mathematics Schooling

The international comparisons show that South Africa is performing poorly; but to see another side of the crisis one must look at national evaluations.

In data collected in 2007, the majority of Grade 6 teachers in South Africa cannot answer a question that their learners ought to be able to answer based on the Grade 6 curriculum. In one example, 'only 23 per cent of South African Grade 6 mathematics teachers could answer [such a Grade 6] question – with the proportion answering correctly ranging from 13 per cent for quintile one teachers to 46 per cent for quintile five teachers'.[8] Obviously it is almost impossible to teach that which you do not

know. The accumulated learning deficits seem to reach a decisive point after Grade 9, when there are high drop-out rates from South African schools.

Table 1 shows the distribution of results of last year's Annual National Assessments (internationally benchmarked national tests) for Grade 9 Mathematics.[9] There are issues around the reliability of these tests, but for now we can observe that less than 5 per cent of learners achieved 40 per cent or more in mathematics. Issues of ANA precision aside, even if the situation is only half as bad as reflected in the ANAs, it can be seen that mathematics teachers at Grades 10, 11 and 12, in the run-up to the National Senior Certificate (NSC, commonly referred to as 'matric'), are expected to make up for large deficits.

Table 1: 2012 Grade 9 Mathematics Scores by Percentage Range

Range	Percentage of scores
Less than 30%	91,9
30-39%	3,8
40-49%	2,1
50-59%	1,1
60-69%	0,6
70-79%	0,3
80% and over	0,2
Total	**100**

Source: Simkins 2013, report for CDE, *Performance in the South African Educational System: What do we know?*

Thus, it is not surprising that there are huge learner drop-out rates at Grade 10, with fewer learners making it through to the NSC examinations over time. As discussed later, this partly accounts for the slight improvements in the NSC mathematics pass rate in recent years: weaker potential candidates are pushed out of the system before taking the NSC exam.

Results of the NSC examinations are therefore somewhat distorted. Only 50 per cent of pupils who start school will make it to Grade 12, only 40 per cent of those who start school will pass NSC, and only 12 per cent of those who start school will qualify for university. The forcing out of weaker learners before they reach Grade 12 automatically inflates the NSC pass rates, since a smaller and better quality fraction writes the NSC than in the past.

The emphasis on the NSC also leads to a misperception of where to target interventions in the system. The Department of Basic Education as well as many NGOs and private sector interventions tended to focus on the secondary school level, especially on matric (NSC) outcomes. Yet much evidence shows that the best way to raise achievement is to focus on the primary school level. The learning deficits children acquire early on hinder their ability to learn in later years. As time goes on, children fall further and further behind, until catching up is almost impossible.

Catching Up on Deficits and Teacher Competencies

The 2011 TIMSS showed that South Africa performed worse than any other middle-income country. The average South African Grade 9 learner is 2 years' learning behind the average Grade 8 learner from 21 other middle income countries in mathematics (and 2,8 years behind in science).

How does one make up such deficits? Teacher competency is an issue. Dr Nick Taylor, in his most recent report as Head of the Department of Basic Education's National Education Evaluation and Development Unit (NEEDU), argues that poor learner performance in most schools is largely due to the poor subject knowledge of teachers, especially in mathematics.[10] He also emphasised the role of patronage in teacher appointments in his input paper for the National Development Plan.[11]

More broadly there is a major problem with teacher complacency, and this is linked to the ways in which many teachers are appointed – often not on merit. One aspect of this lack of attention to merit is how teachers evaluate themselves. Spaull reports that:

> In the recent TIMSS 2011, 89 per cent of South African Grade 9 teachers felt 'very confident' in teaching mathematics, in stark contrast to teachers in Finland (69 per cent very confident), Singapore (59 per cent very confident) and Japan (36 per cent very confident), the best performing countries. This is particularly at odds with Grade 9 student performance, where 32 per cent of South African students perform worse than random guessing on the multiple choice questions.[12]

This perception indicates that in reforming mathematics teaching, we are likely to encounter resistance from teachers. Why should they want to improve and undertake retraining, for example, if they believe they are already doing a good job? Remedial interventions will thus have to bear in mind this attitudinal challenge.

Based on this evidence, CDE has developed four points that must be borne in mind in addressing South Africa's numeracy and mathematics schooling challenge.

1. Improving mathematics teaching and learning in public schools will not happen fast, but must begin in earnest as a matter of urgency (see discussion below);
2. Poor mathematics and numeracy in public schools is likely to accelerate private schooling growth and enrolment in private extra mathematics lessons;
3. If South Africa is to be realistic about having a knowledge economy and creating more and better jobs, it will require a sustained focus on teacher and teacher-training enhancement, particularly in mathematics teaching, which – given its scale and current attitudes – will likely take a decade or more to achieve significant results;
4. In the interim, it is likely that we will have growing numbers of innumerate young people, and a majority of young South Africans could be unqualified for many types of white collar work (assuming less than 30 per cent in mathematics in Grade 9 roughly translates into such a status).

Making the Education System as a Whole Work More Efficiently

Where must South Africa begin to break the pattern of producing largely innumerate young people who lack the skills needed for all but the least sophisticated work? The preceding section suggests a need for immediate interventions to enhance teaching and learning in general, and of mathematics in particular, *throughout the schooling system* (with a stronger focus on the lower grades).

With almost 30 per cent of the population involved in some form of education (that is studying or teaching in some way), the efficiency of the overall schooling system is vital. Simkins' research shows that there are crucial weaknesses in some areas of the overall schooling system, and he concurs with Spaull that these are especially found in mathematics (and languages). This is directly related to un- and under-qualified teachers and inadequate coordination of the schooling system's various levels and components.[13]

There are five major components when evaluating efficiencies in the education system.

- **First, the inefficiencies in basic education** (public and independent schools). This stretches from Grade R ('reception year') to Grade 12 with an enrolment of 12,4 million learners in all ordinary schools in 2012. One of the largest inefficiencies is the high drop-out rate.[14] Most learners stay in school until Grade 9, though there is a discernible drop-out at the end of Grades 6 and 7. Repeat and drop-out rates increase markedly from the end of Grade 9 to Grade 11.

  Simkins estimates of every 1 000 pupils entering Grade 1, 927 enter Grade 9, but only 692 enter Grade 12. Thus, there appear to be important inefficiencies originating somewhere between Grades 5 and 9, most likely due to poor teaching.[15] The Annual National Assessment also shows a decline in those passing maths, with 68 per cent for Grade 1 and only 13 per cent for Grade 9. However, with those who do take the National Senior Certificate exam, since its introduction in 2008, the pass rate has risen from 62,5 per cent to 73,9 per cent (there are however debates as to the quality of these passes – see the full Spaull and Simkins CDE reports for the debate at www.cde.org.za).
- **The second and third component of education is early childhood development programmes and special needs education**. According to Simkins, there is very limited information on these aspects of the education system. Just over a quarter of a million children are enrolled in early childhood development and just over a hundred thousand in special needs schools.
- **A fourth component is further education and training (FET) colleges**, which aspire to play a greater role. FET colleges are multi-product institutions offering national certificates (vocational), the older N1 to N6 qualifications, national higher certificates (in conjunction

with universities), learnerships and skills programmes. Unfortunately, only aggregate enrolments are published and those only for public colleges. There is no systematic account of output even in public colleges, but according to Simkins the 2012 *Green Paper on Post-School Education and Training* indicates that their output is very low, 'making FET colleges even less efficient than senior secondary schools'. While this persists, not much progress can be expected towards a greater role for FETs. Moreover, two-thirds of those enrolled in FET colleges had stayed at school through Grade 12, making the option of entering after Grade 9 a minority route. More research needs to be done on the private colleges, especially given the growth in their numbers. (See the 2012 CDE publication *VOCATIONAL EDUCATION IN SOUTH AFRICA – Strategies for improvement).*

- **Finally, enrolments are growing faster at universities than in other parts of the system.** Even faster at postgraduate than undergraduate level, and faster than average in science, engineering and technology, business, commerce and education. Qualifications awarded grew by 15 per cent a year between 2008 and 2010. However, pass rates are still low with roughly half the learners at contact education universities who start a bachelor's degree graduating while only 40 per cent of diploma learners graduate.

There continue to be many problems in addressing these inefficiencies. Additionally, any efforts to improve efficiency in the education system must assess the linkages between parts of the system as well as efficiency within each part. Some of the key problems include:

- Grade R was supposed to cut down repeat rates in Grades 1 and 2, but the Simkins analysis indicates that there is no evidence that this happened.
- Inadequate attention has been paid to the policy that 'multiple pathways' should follow the end of Grade 9. Instead we find high drop-out rates, of what is likely largely unemployable youth, outside of manual labour.
- There has been insufficient attention to learners who gain a diploma pass in the National Senior Certificate, with some tertiary institutions freezing diploma programmes or even closing them.
- There is incomplete coordination between FET colleges and universities, each not having much knowledge of what the other is doing. However, it is clear that while FET colleges are faltering, university graduates are finding employment (See CDE's report *GRADUATE UNEMPLOYMENT IN SOUTH AFRICA: A much exaggerated problem,* 2013*)*.
- Outside university education – much of which requires NSC mathematics for entry – there is no linkage to employment. The system at lower levels does not prepare learners well for either higher educational levels, work or self-employment (see below).

Transition to Work

The research undertaken for CDE shows that absorption into employment between the ages of 15 and 34 varies. There are radically different trajectories for people with different levels of education, with employment rates ranging from the mid-30s to 60 per cent for those with Grades 9 to 11, 70 per cent for those with Grade 12, 80 per cent for those with post-school certificates, 90 per cent for those with university diplomas and close to 100 per cent for those with degrees. Hence increasing educational efficiencies below university level, and translating schooling into work-eligibility, should become major policy emphases.

Enhanced numeracy and mathematical abilities, especially at lower levels, are very important for getting ahead in the educational system and for obtaining job opportunities outside of education. But complacent and poorly trained teachers stand in the way. Not all skilled work requires proficiency in mathematics, and English proficiency in some cases may be more important. However, basic arithmetic competencies (typified by a Grade 9 mathematics pass) are usually required of those who occupy more than so-called 'elementary' occupations, as they are to run a successful small business or micro-enterprise.[16] Unless improvements are made, millions of South African learners will not have the skills needed to hold down decent jobs or run a profitable micro-enterprise. The recent ANA results suggest that more than 90 per cent of South African youth could fall into this category.

Recommendations

The depth of the schooling challenge is often misinterpreted due to the historically strong focus on the National Senior Certificate (NSC) results. In the past, this was understandable given that the NSC used to be the only externally evaluated, nationally standardised school examination. However, it is now accompanied by three sets of Annual National Assessments (ANAs) which are also externally evaluated and nationally standardised, and monitoring and understanding the relationships between these scores is clearly something that needs to be on-going.

Elsewhere, CDE (and others) have analysed the most recent trends in science and mathematics NSC results, which are complex subjects.[17] However, a fixation on NSC can lead to an underestimation of the scale and depth of the educational challenges, and a misunderstanding of how to respond to them appropriately.

The recent (2013) OECD Country Report on South Africa concluded that to redress 'catastrophically high unemployment among the youth…[51 per cent in the fourth quarter of 2012] …education remains… the critical problem'. The OECD argues that South Africa's educational outcomes are 'aggravating the excess supply of unskilled labour and worsening income inequality'.[18]

A key factor is mathematics schooling, which is very poor in a global context and deeply rooted in lower grades. While other subjects (especially languages) face similar challenges, numeracy and

mathematics are more resilient to the effects of grade inflation than other subjects, and thus arguably more reliable barometers of South African schooling performance levels.

Appropriate roles for government

Much needs to be done by government especially in regard to the mathematical and pedagogical competencies of teachers.[19] Teaching quality alone may not be sufficient to redress the country's schooling ills, but it is likely a necessary precondition for such improvement. Where does one start in this regard?

With regard to *existing teachers*, targeting where and how to enhance the South African public system is critical. Comparative analyses here could be helpful. Government spending in South Africa on schooling (overwhelmingly on teachers' salaries) is many times the equivalent of Zimbabwe, Uganda and Tanzania combined; yet the population of these latter countries (about 94 million in 2011) is almost double South Africa's. Despite these differences, their mathematics teachers, overall, perform significantly better. Surely this raises questions of resource targeting and value for money? What can South Africa learn from these (and other) countries?

The answers to this are not yet clear, but hypotheses worthy of research in this arena could include:

- Teacher quality is clearly important. Have we been selecting, appointing and promoting teachers on the basis of their teaching qualities, as opposed say to the teachers' other relationships or affiliations? If not, how can this be changed?
- Since research finds that formal teaching qualifications in South Africa are not an indicator of performance; could de-emphasising formal teacher qualifications, and rather focusing on a system of teacher rewards for learner performance, be a contributor to the solution?[20]
- Could directing more resources to teaching in school grades with the most serious deficiencies (in South Africa, currently Grades 5-8) make the most difference to end results at NSC level?
- Could the most worthwhile strategies include providing training and educational services to school administrators and leadership on:
    - Explaining why South Africa needs to improve, for example by linking youth unemployment to poor numeracy and literacy;
    - Communicating the importance of enhancing teacher skills, especially in numeracy and mathematics;
    - Focusing on how to address teacher complacency, (e.g. by utilising private sector human resource management strategies)?
- Could pre-school interventions aimed at *learners* not help teachers later? Whereas there are questions that could be asked of South African teaching and school leadership, the research also suggests that learners often have difficulties in being taught, many of them before they even get to school (see Simkins). School readiness is crucial; and, for that, early childhood

skills are necessary. Good sensory equipment as developed in Montessori schools could be introduced in poorer communities here. Montessori methodologies adopted in pre-schooling are, according to experts, perhaps the only type of pre-schooling where gains in Mathematics persist beyond Grade 4 or 5. This is because children playing with and using concrete materials equipment develop a real understanding of numbers.[21] The question needs to be asked: Can this be done on the scale required if it works?

- Also, on the subject of learner preparedness, it is CDE's understanding that very few, if any, of the countries cited for comparison in Spaull's research have what we in South Africa call 'automatic progression' (moving learners on to the next level almost irrespective of their marks in the previous level).[22] Automatic progression in South Africa should be investigated and its scale understood and the efficacy and consequences of this practice revisited. In the same arena, pass marks for promotion from one grade to another should be raised from 30 per cent. The specifics of these pass marks are currently under investigation by a ministerial committee,[23] and it would be premature to be prescriptive in detail here, except to say that our evidence is that 30 per cent passes in English and in Mathematics (or applied Mathematics) should be raised to at least 40 per cent.

These kinds of questions need to be asked, and answered, of the South African public schooling system in the light of our dismal performance and the results achieved elsewhere.

South Africa places a lot of emphasis on reforming public schools. This is a vital but challenging task with political dimensions that often inhibit the more promising initiatives. CDE would argue that South Africa should increasingly push schooling reform efforts beyond only the public system. Let us then conclude on possible market and business roles.

Existing and new roles for business and markets

Up to now we have commented on issues for further research and investigation regarding priorities for action on mathematics schooling and learning. Much of this requires efforts by government, and it is important for business to examine Corporate Social Investment (CSI) interventions and priorities in the light of this daunting evidence of system dysfunction. What does it mean for privately funded interventions?

This could be the subject of separate investigations in their own right, and it is not possible to do justice to the subject of CSI here. Inevitably there will be debates on appropriate roles, and whether, for example, CSI has ventured too far into what should be government's responsibilities. There are big questions on the table. Are its efforts merely 'Band-Aids' on a dysfunctional system or genuine reform? Would a new strategic approach bear greater fruit?

But, aside from CSI, what is the role of entrepreneurs, markets and companies?

To some extent this question has already been answered in practice at a micro-scale by entrepreneurs and some companies actively involved in the schooling sector. For example, through the further

growth of private schooling in poorer communities, through privately run distance learning, and the rapid rise of private extra maths lessons.

However, at a macro-level business as a whole has an interest in promoting alternative, market-driven models of schooling on a wider scale. In a context of extreme system malfunction of the public sector, the growth of the private sector in schooling for poorer South Africans will have beneficial consequences. The growth of a sector of schooling in the country with greater accountability, with the freedom to experiment with new approaches to affordability and quality should be encouraged and promoted. Quality is of course a challenge in this growing private schooling sector as well, and new innovations are taking place that deserve support.

In addition, business could start experimenting with new approaches for possible adoption within the public system. The basic issue here is how can a highly centralised, essentially 19th century, model of schooling engage with, and use entrepreneurial actors, services and technology to help improve outcomes in South Africa's schooling? Questions here include: Does every school need a maths teacher? How can information technology be adapted to help improve quality teaching and learning in South Africa's schools? Private sector experimentation in collaboration with the public sector is what should be encouraged here. For example, why should several districts not contract with a maths teaching service to see if that can enhance quality? In addition, business can look at ways in which experts in the private sector could provide management training for principals, and aspects of existing and future teacher training.

Looking to market forces, such as introducing best practice management systems from the private sector, or importing digital training technologies both for teachers and learners,[24] and/or importing the world's best teacher-trainers as recently suggested by South Africa's Deputy President,[25] could be good places to harness market dynamics to help in improving South Africa's education system.

Concluding Remarks

Lobbying for the right types of reform to the public system should remain a priority for business. This is far more important than individual projects which are often too expensive to replicate on any kind of scale. However, there is now sufficient evidence of the dynamism and potential of market-driven initiatives to argue that business leaders need to incorporate an understanding of private education and other market experiments and solutions to schooling challenges in their overall perspective and priorities for intervention and reform.

If there is one key result to emerge from our research it is that South Africa's mathematics teachers – at most grades – are near to the bottom of world standards. Performance management is absolutely essential, and this political nettle must be grasped and private players need to raise this vital issue much more strongly and frequently.

In addition to this vital reform, it is probable that the best scope for sustainable, private sector interventions that could have systemic impacts would be a focus on how best to use local and global

expertise on best practice training (and retaining), high quality, high impact mathematics teachers who are relevant to various school grades, as well as to pre-school.

We hope that the recently established National Education Collaborative Trust and Council could be a new, promising stakeholder structure where the private sector can bring forward such ideas, and lobby for research and experimental programmes to investigate additional areas for action, and for funding.

Endnotes

1. *Extra Maths in South Africa – a short summary of an exploratory investigation*, CDE, June 2013, www.cde.org.za.
2. These are the reports of N. Spaull *South Africa's Education Crisis-The quality of education in South Africa 1994-2011* and C. Simkins *Performance in the South African Educational System: What do we know?* Both commissioned by CDE, 2013, www.cde.org.za.
3. This is the narrow youth unemployment rate of all 18-24-year-olds who were unemployed by the end of 2011 as defined in the 2011 census.
4. Reference: SA Presidency: *Development Indicators 2012*, Report released in August 2013, http://www.thepresidency.gov.za/MediaLib/Downloads/Home/Publications/DPMEIndicators2013/DPME%20Indicators%202013.pdf.
5. The name of this consortium is SAQMEC (Southern and Eastern African Consortium on Monitoring Educational Quality (www.saqmec.org).
6. South Africa's GDP per capita is reported as USD 13 300; Zambia's GDP per capita is reported as being USD 1000; Tanzania's as USD 800; Malawi's USD 600; and Lesotho's as USD 2 700. (All figures 2006: http://www.southafrica.info/africa/sadc.htm).
7. See discussion in the conclusion to this report on these countries, but in the interim note that Zimbabwe and Kenya both have a large proportion of learners in private schools and Tanzania about 50 per cent. See the August 2013 CDE report, *SOUTH AFRICA'S MISSING SECTOR*, www.cde.org.za.
8. Spaull *op cit*.
9. The Annual National Assessment provides a large amount of data, however, the test is still relatively new and there are concerns about the data and its use as a tool for evaluation.
10. There may be debate on the extent to which the challenge is one of motivation versus preparedness, see for example http://www.kagiso.co.za/blog/most-schools-underperform-because-they-cant-perform-any-better-says-needu-report/.
11. Taylor, N. *National School Effectiveness Study - Synthesis Report,* 2011, Johannesburg: JET Education Services.
12. Spaull *op cit*.
13. CDE reports elsewhere on teacher training and retraining, and we restrict ourselves here to systemic inefficiency and the breakdown between the component parts of learning and education as a whole. See

for example CDE's forthcoming reports *The Quality of Mathematics and Physical Sciences Teaching at Second-Tier Secondary Schools in Gauteng and KwaZulu-Natal; and The Challenges of Teacher Training in South Africa.*

14. This drop-out rate is not all about systemic schooling inefficiency, however – many young people recognise that they won't pass NSC and that in the absence of a pass, their chances of finding work are very poor. If the job market were better for those who complete Grades 10, and 11, young people might stay in school longer.
15. According to DBE tests of numeracy and mathematical competencies of learners, the average Grade 1 learner mastered 68 per cent of the curriculum. In Grade 9, the average was just 13 per cent. Only 8,1 per cent of those tested achieved 30 per cent and above, 2,2 per cent 50 per cent and above.
16. For example, how can a micro-entrepreneur determine returns on any investments or efforts, or make a convincing application for a loan, if they are unable to calculate percentages?
17. See the for example 2010 CDE report *The Maths and Science Performance of South Africa's Public Schools.*
18. OECD Economic Surveys: South Africa 2013, http://www.oecd.org/eco/surveys/southafrica2013.htm.
19. South Africa's Deputy President Motlanthe also recently suggested importing the world's best teacher-trainers as a strategy; see 'Kgalema Motlanthe calls for better education', *The Wits Business School Journal*, Issue 33, 2013, pp. 6-8. As we remark later however, this may need to be a possible intervention considered by business.
20. See the CDE report *Teacher Pay for Performance: Lessons from other countries*, November 2012, www.cde.org.za.
21. Personal communication, Dr J Hofmeyr of the Independent Schools Association of Southern Africa, June 2013.
22. Ibid.
23. This is according to a report in the *Daily News*, 30 September, 2013, p3 entitled 'Raising the 30% matric pass mark weighed'.
24. Already the private sector has contributed successfully to teacher training as in the Embury College case recently purchased by Curro; but the potential scope seems likely much greater than this.
25. See note 18 above.

CENTRE FOR
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Informing South African Policy

5 Eton Road, Parktown, Johannesburg, South Africa
P O Box 1936, Johannesburg 2000, South Africa
Tel 27 11 482 5140 • Fax 27 11 482 5089
info@cde.org.za • www.cde.org.za

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