THE INTERNAL EFFICIENCY OF THE SCHOOL SYSTEM

A report on selected aspects of access to education, grade repetition and learner performance

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EXECUTIVE SUMMARY

After several decades of efforts to promote universal access to education around the world, the focus within educational development work has been shifting towards improving the quality of schooling. This report reflects this shift by examining patterns in access to schooling in South Africa and moving towards issues of quality, all the time applying a framework of efficiency. At a basic level, non-participation in schooling is a grossly inefficient use of a country's human capital. At the other side, enrolling children in schools that deliver a low quality of education is an inefficient use of time and resources committed to providing that education. There are also various other sources of internal systemic inefficiencies that this report examines, including high rates of grade repetition, poor subject selection and late entry into school. The main findings can be summarised in six points:

1) Access to early educational opportunities has substantially increased over the past decade, mainly due to the rapid expansion of the Grade R programme. In 2001, approximately 40% of 5-year-olds were attending an educational institution, whereas by 2011 this figure had risen to about 80%.

2) Primary school-aged children are almost universally enrolled, and this has been the case for some time now. Late entry into grade 1 and late completion of grade 1 has decreased noticeably over the past decade. This represents an improvement in internal efficiency.

3) High levels of school drop-out begin at about age 16. The proportion of youths attaining matric has been marginally increasing over the past decade. Attainment of matric is still unequal across the race groups, with white and Indian youths more likely to attain matric than black and coloured youths.

4) There is a "queuing" phenomenon in grades 10 and 11. A large proportion of children reach these grades but then spend a few years in these grades before dropping out without attaining matric. This is reflected in high rates of repetition in grades 10 and 11 and high rates of drop-out during grades 10 and 11.

5) The report examines two other specific inefficiencies, both of which are symptomatic of weak school-based assessment practices. Firstly, grade repetition in many schools is random in the sense that it is not strongly related to actual learning. This is clearly inefficient, especially given that repeating learners are unlikely to be exposed to a strong remedial programme. Secondly, many learners make poorly informed subject choices with the result that some learners who could have passed matric do not and other learners who could have passed demanding subjects, such as mathematics, instead opted for other subjects such as maths literacy.

6) The major inefficiency observed in the system is the low quality of learning and teaching that characterises many of our schools. This problem is especially severe in the early grades and manifests in a delayed and incomplete acquisition of foundational skills such as reading, writing and numeracy, which are crucial for subsequent learning. The 2011 TIMSS study, which provides rigorously comparable performance information over time, indicates noticeable improvements amongst South African grade 9 learners in mathematics and science performance since 2002. Although the level of performance is still low by international standards, the indication of an improving trend is encouraging.

The report concludes with several recommendations:

1) Strengthen the implementation and use of the Annual National Assessments as a way to improve school-based assessment practices to inform remedial instruction, grade promotion and subject choices.

2) Investigate effective strategies for teacher development, especially with respect to improving key instructional activities such as the teaching of reading.

3) Raise the status of non-academic pathways for learners who reach grade 9 but would have better prospects under a form of vocational training than if they remain in school in the hope of attaining matric.

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1. INTRODUCTION

Government spending on education in South Africa amounts to roughly 6% of the country's Gross Domestic Product (GDP). Education receives the largest allocation in the budget (about 19.5%). While these proportions are not abnormally high by international standards, it is clear that education receives considerable resource prioritisation in South Africa. In contrast, local and international surveys of educational achievement have revealed relatively low educational quality. Many critics would therefore argue that the education system is operating inefficiently.

The concept of efficiency describes how available resources are used to achieve desired outcomes. An inefficient education system would be one where better educational outcomes are attainable with no additional deployment of resources. Of course in the real world, all education systems operate inefficiently to a greater or lesser extent.

This report investigates selected aspects of the internal efficiency of the South African schooling system. This report does not comprehensively cover all sources of inefficiency in the system. For example, this is not a Public Expenditure Tracking Study (PETS), which would follow government spending to determine the extent to which resources reach the intended destination. Neither does this report contain cost-effectiveness analysis of specific educational interventions or policies. Rather this report focuses on the ways in which learners enter and then progress through the system. Internal system inefficiencies are therefore caused by sub-optimal school entry patterns, grade repetition practices and drop-out patterns.

A situation in which large numbers of talented school-aged children are for some reason not attending school must certainly be regarded as an inefficient use of the country's human resources. Therefore, this report examines measures of access to schooling at various levels – Early Childhood Development, primary and secondary levels. Similarly, when children are enrolled but are either too old or too young for the grade they are attending, this too can be inefficient. Starting school late, for instance, is one avoidable form of inefficiency. High rates of grade repetition are another source of internal inefficiency, especially when repetition does not have a positive remedial impact, as this causes children to spend additional years in the school system for the same level of outcomes, at great cost to themselves and to the state. Perhaps the most grievous source of inefficiency is a low quality of learning and teaching, which results in educational resources not having the impact on people's lives and on the economy that one would hope for.

The next section discusses the worldwide shift in focus from access to schooling to the quality of that education. Thereafter, the report conducts an empirical overview of numerous inefficiencies in the school system including patterns in enrolment, grade repetition, subject choices, drop-out rates and survival rates. The underlying problem of low quality outcomes in the early grades is also described. Throughout the report the intention is to provide the most recent available information and to examine what the trends over time have been. The report concludes with a discussion of the priorities for education policy arising out of the analysis.

2. BACKGROUND: THE SHIFTING FOCUS FROM EDUCATION ACCESS TO EDUCATION QUALITY

As more and more countries have approached the goal of universal access to primary education and have also substantially expanded access to secondary education, the issue of quality in education has become a central part of the global education agenda. Locally, the policy focus is also shifting toward issues of quality as is evident in the DBE's sector plan known as the "Action Plan to 2014."

There has been a huge expansion in the schooling sector in South Africa over the past few decades. The population grew rapidly during the past century. For instance, in 1961 the population was roughly 18 million. Over this same period of population growth, there has been a substantial increase in enrolment rates and attainment rates amongst South Africans. The average years of education attained by black South Africans born in the 1940s was about four years. For black South Africans born since 1980 the average educational attainment is just above ten years (Taylor, 2010: 26). This massive expansion of education to a growing population, while a notable achievement, was arguably done without sufficient regard for quality (Crouch and Vinjevold, 2006). Indeed, numerous international and local surveys of educational achievement that have been conducted in recent years have confirmed the low levels of learner performance. This is important historical context for understanding the current school system.

More recently, fertility rates have been declining – for whites this started in the 1950s and for blacks in the 1980s. Currently, the population is growing at about 1% annually and is predicted to be growing at about 0.5% by 2030 (NPC, 2012). Declining fertility means that the school enrolments have already stabilised, and if anything have been shrinking in recent years. This affords some space to address issues of quality throughout the school system in the forthcoming years.

3. EDUCATIONAL PARTICIPATION

3.1 Overall summary of activities of children

It is useful to begin the discussion around school enrolments, repetition and drop-out with a description of the proportions of children and youths engaged in various educational activities and forms of employment or non-employment across the age spectrum. Figure 1 provides such an overall picture by showing for every age cohort the proportions of children engaged in specific activities. The figure is derived using Statistics South Africa's General Household Survey of 2011.

Figure 1: The educational and employment activities of various age group
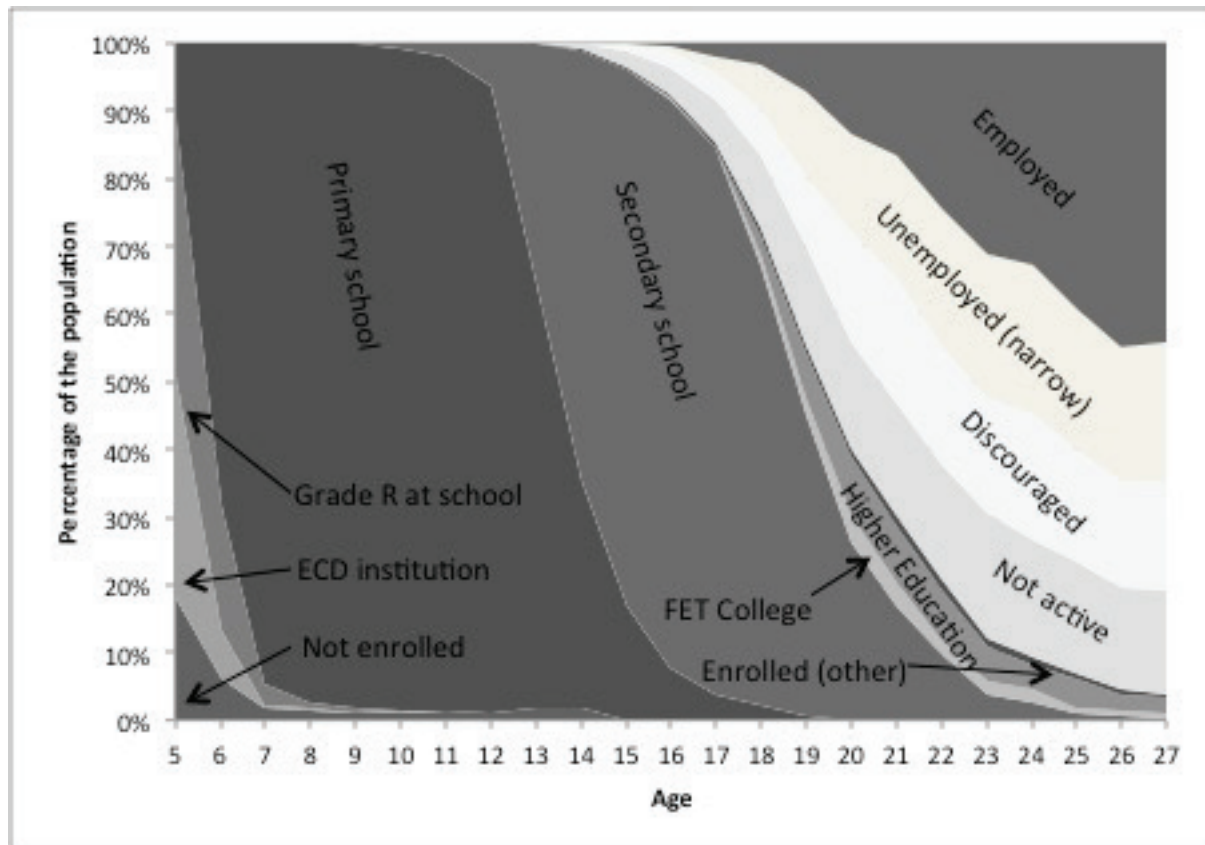
Source: Own calculations using GHS, 2011

The area graph in Figure 1 can be used to highlight several stylised facts about the activities of South African children and youths. Firstly, non-enrolment is a negligible problem in South Africa. At most, 2% of any age cohort between the ages of 7 and 15 is not enrolled in school. Secondly, even among five-year-olds, the strong majority of children are attending some form of educational institution. For five-year-olds, the majority are attending either Grade R at a primary school or are attending an ECD facility. Thirdly, although over-aged enrolment in secondary school used to be more prevalent than it is nowadays (previous years not shown in this graph), there are still a considerable number of old learners attending school. For example, just less than one in five 21-year-olds are attending secondary school. Fourthly, very small proportions of youths are attending FET Colleges or other forms of non-school education (apart from Higher Education Institutions). Fifthly, the proportion enrolled in higher education has increased in recent years but remains below a desirable level. Sixth, the scourge of youth unemployment in its various forms (not active in the labour market, discouraged work seeker and unemployed according to the narrow definition) is clear. The left side of the graph purports a positive story (most children attend school) but the right side of the graph indicates that the destiny of many children is less satisfying (not very many participate in higher education and far too many will not be employed).

3.2 Patterns in school enrolment

The General Household Survey (GHS) has been conducted annually by Statistics South Africa since 2002. This survey, which includes information on various education variables, provides a valuable source for monitoring trends over time. The next figure shows age-specific enrolment rates (i.e. the percentage of an age cohort that is attending an educational institution) for the ages 5 through to 24 for two years – 2002 and 2011.

Figure 2: Age-specific enrolment rates – percentage enrolled in an educational institution
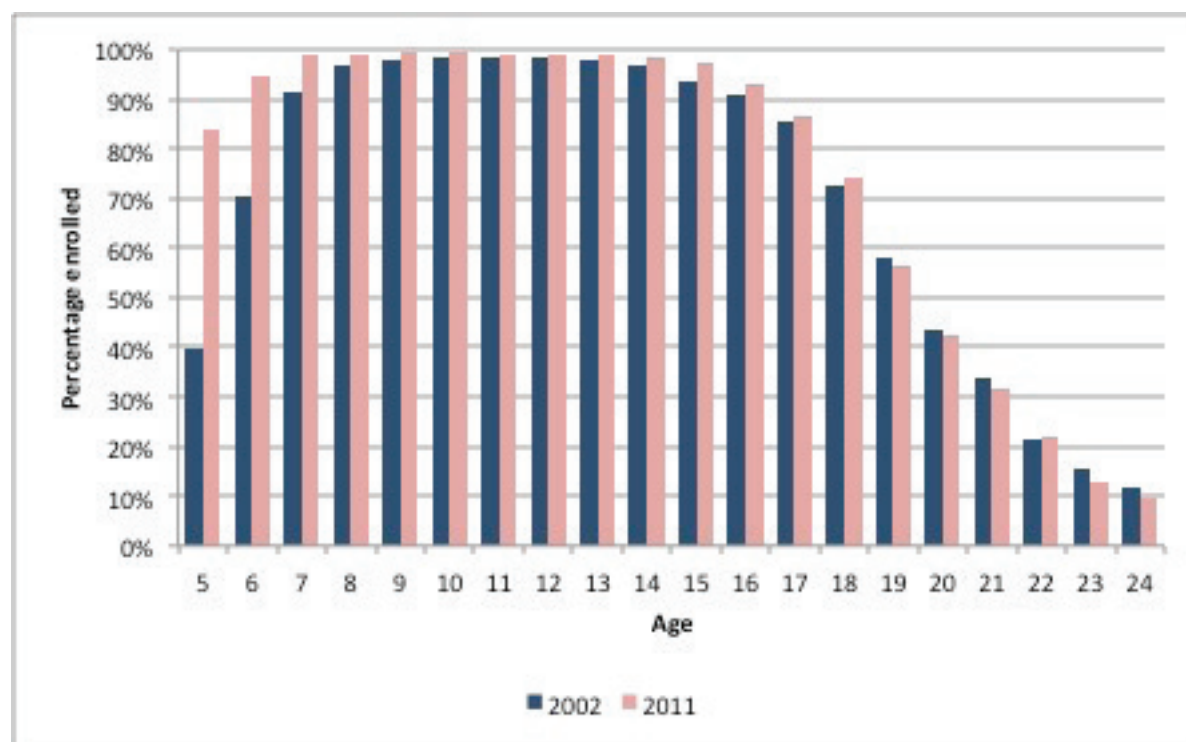
Source: Own calculations using GHS 2002 and 2011

To summarise Figure 2, overall school enrolment has been generally stable between 2002 and 2011 with substantial increases for the enrolment of 5 to 7 year olds, slight increases in enrolment for 13 to 18 year olds and slight decreases in the enrolment of 19 to 23 year olds.

The dramatic increase in enrolment for 5- to 7-year-olds (44 percentage points for 5-year-olds, 25 percentage points for 6-year-olds and 8 percentage points for 7-year-olds) is primarily a reflection of the roll-out of the Grade R programme since 2001. The Education White Paper No.5 of 2001 set the explicit target of achieving universal access to a reception year for five year olds by 2010 (Department of Education, 2001). Although universal access has not yet been fully realised, there has nevertheless been a rapid expansion of access to pre-school. As Figure 2 indicates, grade R enrolments have increased steadily from 241 525 in 2001 to 734 654 in 2011, according to administrative records. In order to approximately express this as a proportion of children enjoying access to grade R, Figure 2 also shows the ratio of grade R enrolments to grade 2 enrolments.[1] This ratio has also risen steadily and considerably from about 0.26 in 2001 to about 0.73 in 2011.

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1   *The use of grade 2 enrolments is preferred to grade 1 enrolments due to the large amount of repetition that occurs in grade 1.*

Figure 3: Grade R enrolments since 2001 according to administrative data
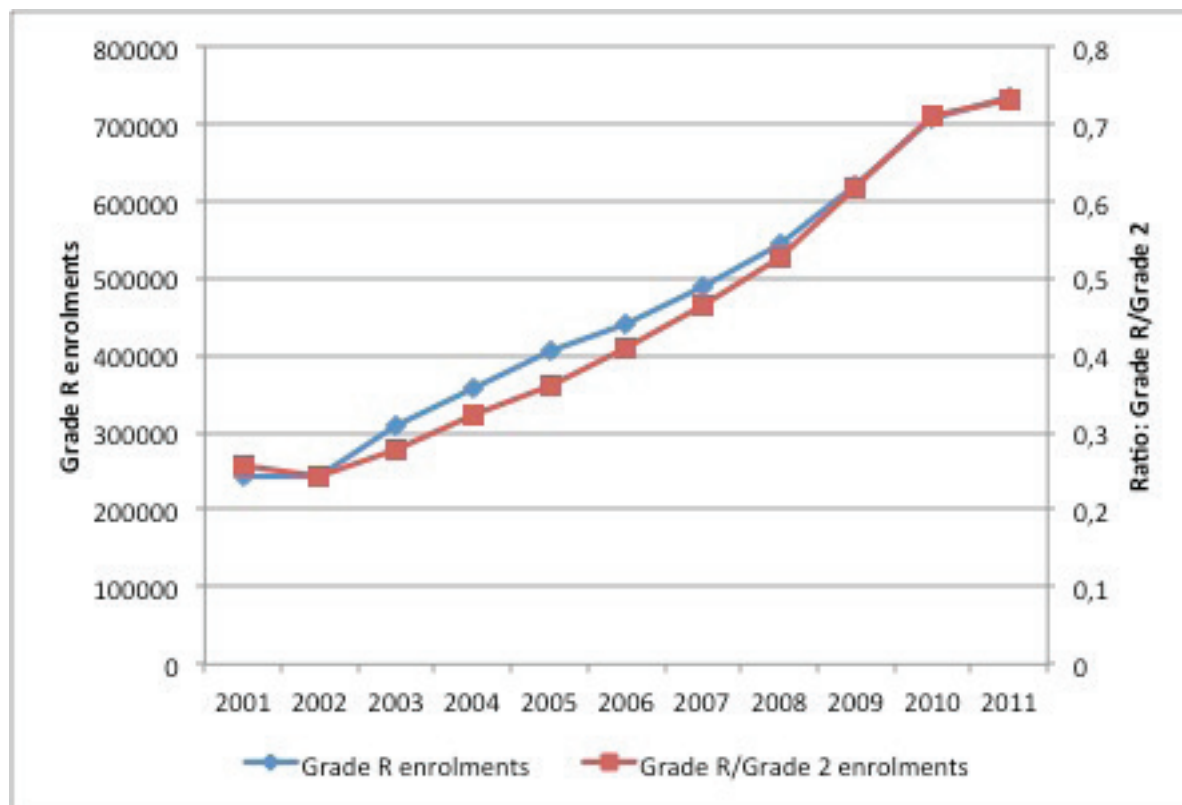
Source: DBE, Annual Survey of Schools (ASS)

The increase in the age-specific enrolment rates for five-, six- and seven-year-olds, as observed in Figure 2, may also partly reflect a decline in late entry into school. The next figure provides one indication of the extent to which late entry has occurred since 2002. It shows the proportion of seven-, eight- and nine-year-olds that have already completed grade1, since 2002 until 2011. The proportion of seven-year-olds having already completed grade 1 increased from about 36% in 2002 to about 57% in 2011. This must reflect a combination of less grade repetition in the first grade and less late entry into school. The same applies for eight-year-olds (for whom grade 1 completion rose from 80% to 89%) and nine-year-olds (for whom grade 1 completion rose from 91% to 98%). Late entry is known to have a negative impact on later educational outcomes (Timaeus, Simelane and Letsoalo, 2013). Therefore, this trend of declining late entry must be seen as improved efficiency in the system.

Figure 4: Proportion of children having completed grade 1 by age
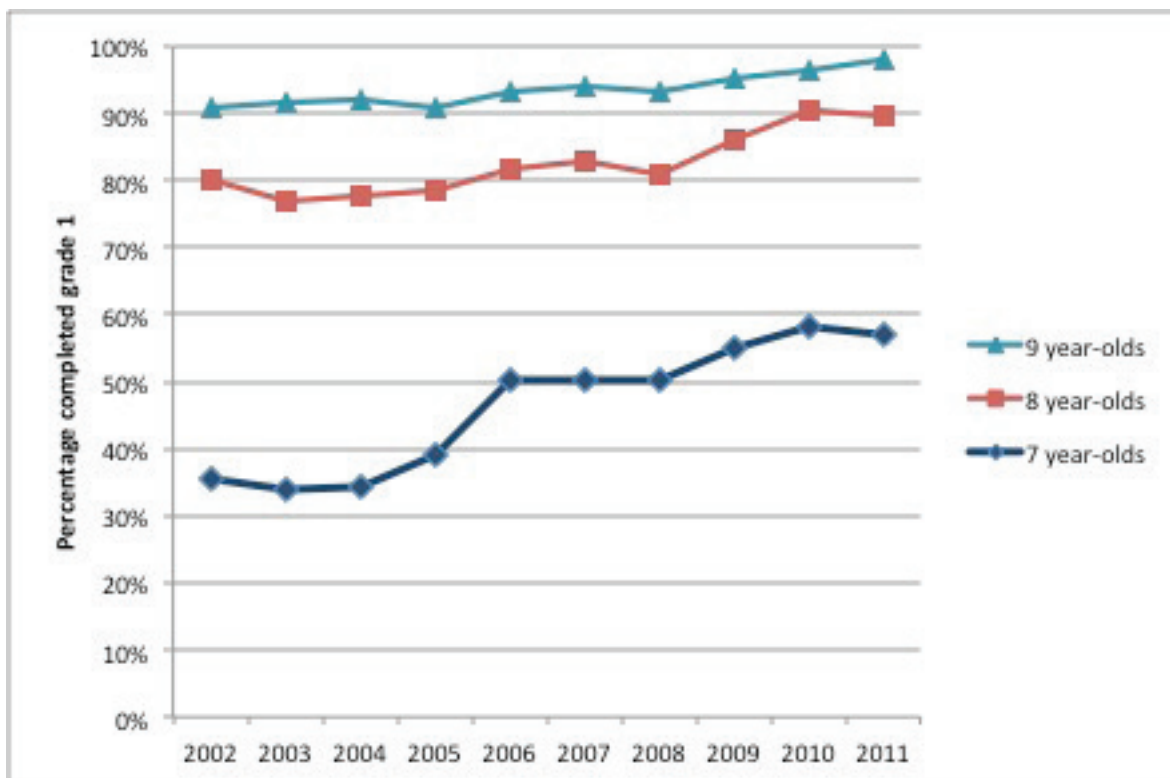
Source: Own calculations based on GHS, 2002 - 2011

Two further possible factors contributing to the increased enrolment of young children and to the incremental improvements in enrolment amongst 8- to 18-year-olds include the expansion of the National School Nutrition Programme (NSNP) and the expansion of no-fee schools. Internationally, the provision of meals at school and the lowering of financial constraints are both known to increase the likelihood of participating in school, though there is not yet empirical evidence demonstrating this dynamic in South Africa. However, the next figure suggests that school fees have recently become less of a burden on South African households. It is also interesting that household complaints about a lack of books at school have been declining since 2004, as the next figure indicates.

Figure 5: Household complaints about aspects of schooling
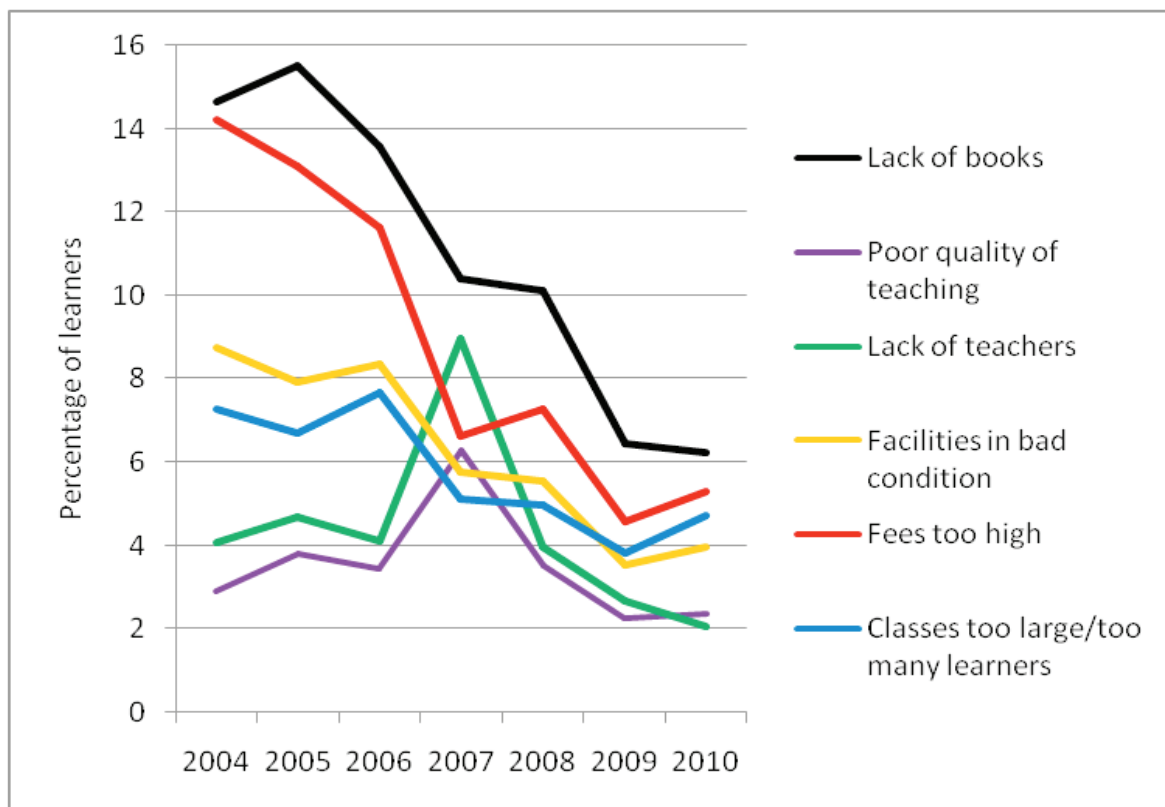
Source: General Household Surveys (2004 – 2010)

Another interesting feature of Figure 2 was the slight decrease in age-specific enrolment rates for those aged 19 to 24. However, this does not reflect a decline in educational opportunity. Figure 6 indicates that the proportions of 19- to 24-year-olds enrolled in a post-school educational institution have actually increased between 2002 and 2011. This means that the decline in age-specific enrolment rates observed in Figure 2 is because this age group is now less likely to be enrolled in school. Therefore, the pattern is being driven by less over-aged enrolment in school. This trend of lower numbers of over-aged learners in the school system has been documented by Burger, Van der Berg and Von Fintel (2012).

Figure 6: Proportion enrolled in post-school education only
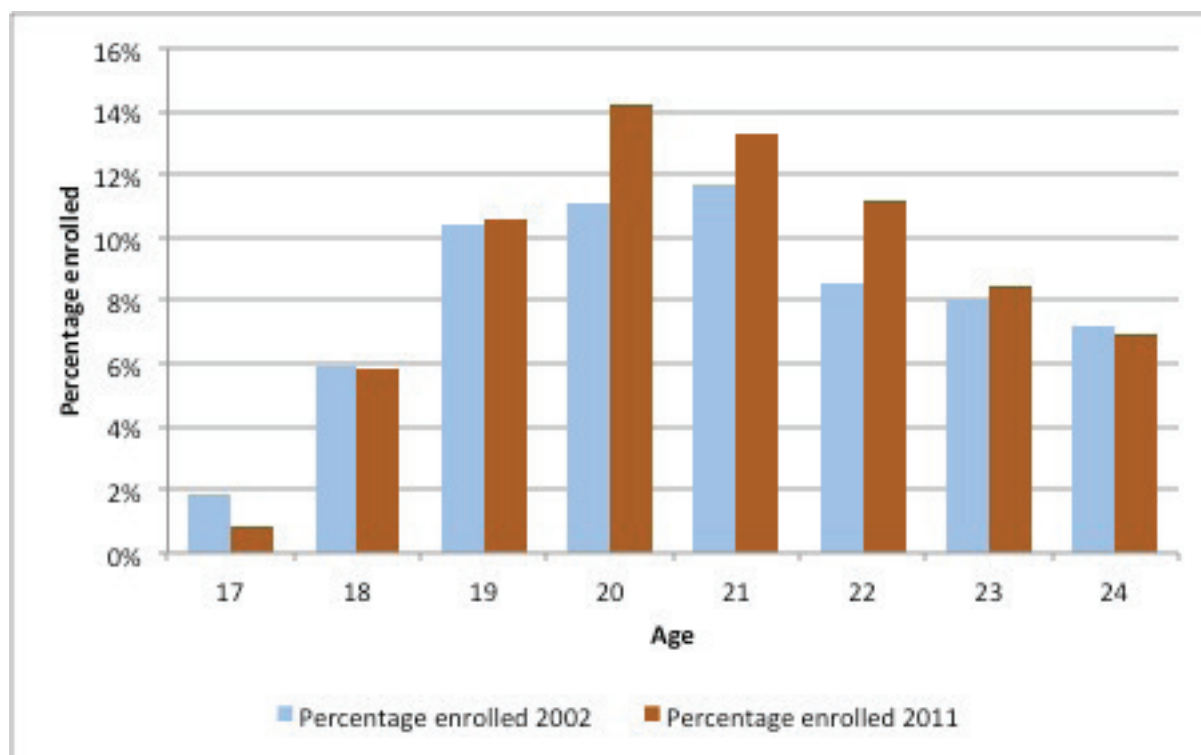
Source: Own calculations using GHS, 2002 and 2011

In summary of overall enrolment trends, we can say that there has been a significant increase in early educational participation mainly due to the Grade R programme, while access to education for older children has incrementally improved over the last decade. Although access is near universal for those aged 7 to 15, there is a sharp drop-off in educational participation from the age of 16 onwards.

3.3 Enrolment patterns by race

There has been a long run trend of increasing access to education in South Africa, and of a narrowing of the gap between the educational attainment of whites and other race groups. For example, the average years of education attained by black South Africans born in the 1940s was about four years. For black South Africans born since 1980 the average educational attainment is just above ten years (Taylor, 2010: 26).

This section focuses initially on enrolment amongst learners in the 7-15 age group as this corresponds to the ages in which it is compulsory for children to attend school. According to Figure 7 and the corresponding table below, educational participation for all race groups is now near universal within this age band. Moreover, the small gaps between the race groups have further diminished since 2002. The improvement from about 96% to 99% for black children is a notable improvement and may have resulted from interventions by the DBE such as the introduction of no-fees schools, provision of learner transport and the school feeding programme.

Figure 7: Enrolment of 7-15 year olds
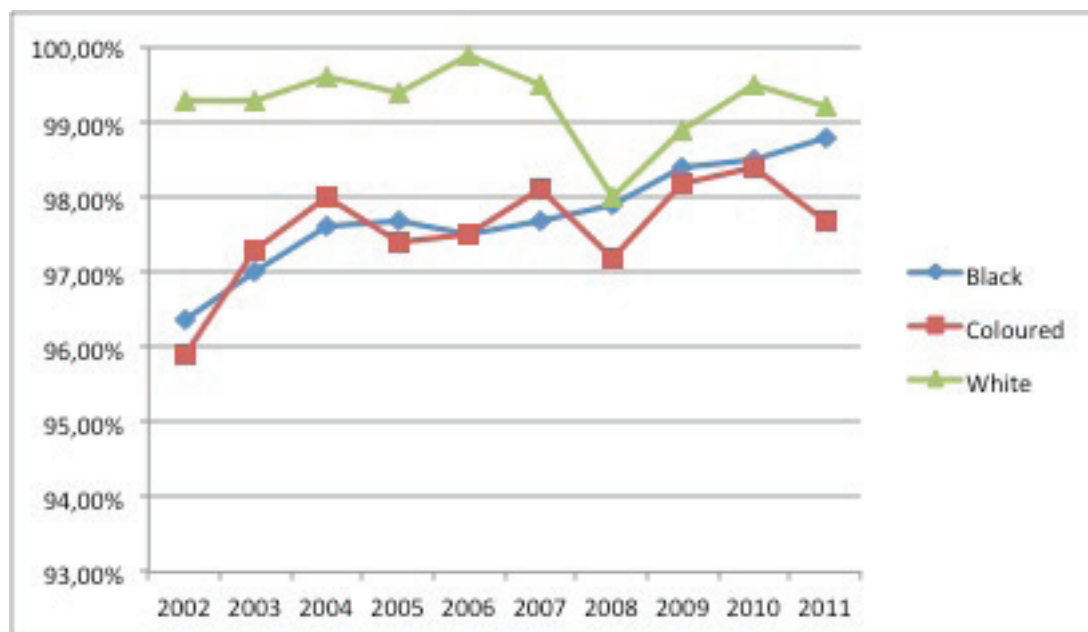
Source: Own calculations using GHS, 2002 to 2011

Note: Enrolment amongst the Indian population is similar to that of whites, but due to small sample size this group is not reported here

Table 1: Enrolment of 7-15 year olds

GHS year	Black	Coloured	White
2002	96.36%	95.90%	99.30%
2003	97.00%	97.30%	99.30%
2004	97.60%	98.00%	99.60%
2005	97.70%	97.40%	99.40%
2006	97.50%	97.50%	99.90%
2007	97.70%	98.10%	99.50%
2008	97.90%	97.20%	98.00%
2009	98.40%	98.20%	98.90%
2010	98.50%	98.40%	99.50%
2011	98.80%	97.70%	99.20%

Source: Own calculations using GHS, 2002 to 2011

Note: Enrolment amongst the Indian population is similar to that of whites, but due to small sample size this group is not reported here.

It is important to establish the proportion of learners who remain in the education system beyond the compulsory schooling age. For those aged 16 – 18 a different pattern is evident across the race groups. According to Figure 8 and Table 2 below, approximately 86% of Black and White learners were enrolled in education institutions in 2011 compared to only 69% of Coloured learners. Since coloured households are on average more affluent than black households, the reasons for the lower coloured enrolment must go beyond poverty-related factors. Social Surveys (2010) research suggests that possible reasons for Coloured youth dropping out of school include family pressure to seek work, substance abuse and gang involvement.

Figure 8: Enrolment of 16-18 year olds

Source: Own calculations using GHS, 2002 to 2011

Note: Enrolment amongst the Indian population is similar to that of whites, but due to small sample size this group is not reported here
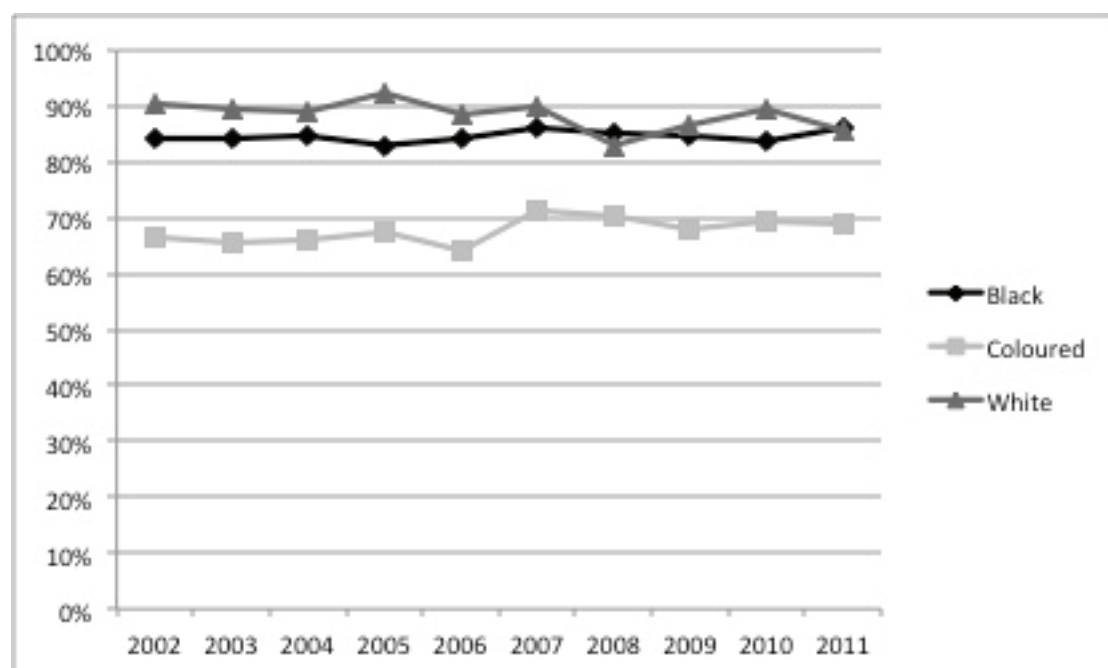
Table 2: Enrolment of 16-18 year olds

GHS year	Black	Coloured	White
2002	84.20%	66.50%	90.60%
2003	84.40%	65.60%	89.60%
2004	84.70%	66.00%	89.10%
2005	83.00%	67.30%	92.20%
2006	84.40%	64.00%	88.70%
2007	86.20%	71.50%	89.80%
2008	85.30%	70.30%	83.00%
2009	84.60%	67.90%	86.60%
2010	83.80%	69.20%	89.30%
2011	86.30%	69.10%	85.60%

Source: Own calculations using GHS, 2002 to 2011

Note*:* Enrolment amongst the Indian population is similar to that of whites, but due to small sample size this group is not reported here

Despite the substantial difference in the enrolment rate amongst 16- to 18-year-olds between black and coloured youths, there is no significant difference in the proportions of black and coloured youths that ultimately attain matric. Figure 9 shows the proportions of 23- to 24-year-olds in 2011 that have attained matric. For both black and coloured youths, that proportion is about 44%. For Indian and white youths the proportion is considerably higher at around 83% to 88%.

Figure 9: Proportion of 23 – 24 year olds with matric by race
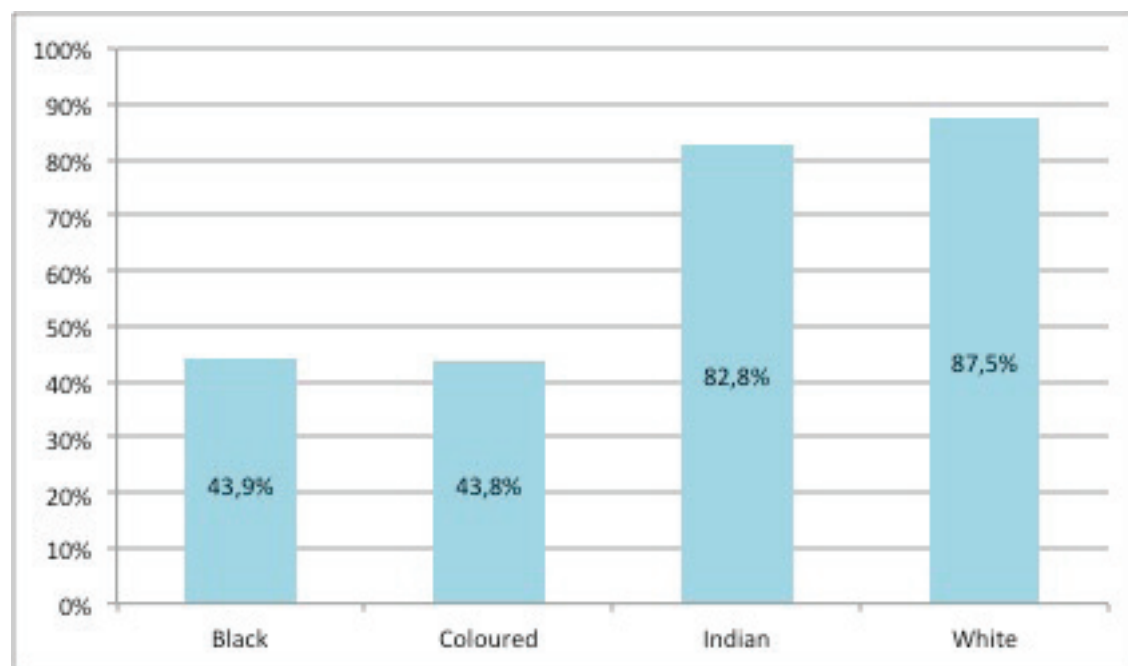
Source: Own calculations using GHS 2011

Taken together, Figures 8 and 9 indicate that although black and coloured children achieve similar amounts of education, black children spend a longer amount of time in the school system in the process. Information collected in the National Income Dynamics Study (NIDS) corroborates this finding. The following table using NIDS data shows the mean age at which people exited formal education, separately by race and for various categories of educational attainment. The table is restricted to those aged 14 to 27. For example, the mean age amongst black people who dropped out with either grade 10 or grade 11 was 18.9 years. In comparison, coloured people who only achieved grade 10 or grade 11 had a mean age of 17 and a half when they dropped out. The same pattern applies for black and coloured people who dropped out of school with only primary education or only lower secondary education. In other words, amongst black and coloured children who dropped out of school without attaining matric, black children had spent far longer in the school system.

Table 3: Age at school completion by race and highest level of education (14 -27 year olds)

	Black	Coloured	Asian/Indian	White
Primary	15.36	14.92	12.10	14.64
	(280)	(60)	(2)	(3)
Lower Secondary (grade 8-9)	16.98	15.69	14.40	16.51
	(409)	(99)	(4)	(8)
Upper Secondary (grade 10-11)	18.90	17.51	16.71	17.01
	(739)	(98)	(6)	(6)
Matric (grade 12)	18.94	17.97	17.79	17.77
	(924)	(112)	(13)	(24)

Source: National Income Dynamics Study 2010-2011, Wave 2 [dataset]. Version 1

Notes: Number of observations in parenthesis; the estimates for the Indian and white population are not precise due to the small number of whites and Indians in the sample with these relatively low levels of educational attainment.

The tendency for children to spend many years in school and yet not to attain a matric certificate can be regarded as a

key system inefficiency. Apart from the private costs to individuals associated with spending additional years in school (including the opportunity cost of foregone wages), the cost to the state per matric graduate will be considerably higher than optimal if children spend many years in school without completing matric. A positive side to this analysis is that this particular inefficiency appears to have been reduced in recent years. Table 4 reports similar information to that in Table 3, but this time for an older age cohort – those aged 28 to 35. This table shows that the mean age of black people dropping out of grades 10 and 11 was 19.7 years. This is the better part of a year older than those from the younger generation who dropped out with the same level of education.[2] Unfortunately, however, reducing the extent of over-aged enrolment only shifts the problem from the education system to the labour market – as Burger, Van der Berg and Von Fintel (2012) demonstrate, the reduction of repetition and over-aged learners in the late 1990s contributed to a noticeable increase in labour force participation and unemployment.

Table 4: Age at school completion by race and highest level of education (28-35 year olds)

	Black	Coloured	Asian/Indian	White
Primary	15.07	13.12		
	(60)	(9)	(0)	(0)
Lower Secondary (grade 8-9)	18.44	16.28	14.00	
	(77)	(17)	(2)	(0)
Upper Secondary (grade 10-11)	19.66	19.84	18.31	15.79
	(217)	(16)	(3)	(4)
Matric (grade 12)	19.73	18.05	17.86	17.60
	(258)	(26)	(6)	(5)

Source: National Income Dynamics Study 2010-2011, Wave 2 [dataset]. Version 1

Number of observations in parenthesis

3.4 Enrolments per grade, survival rates and drop-out rates

Figure 10 depicts the numbers enrolled in selected grades since 1994. Grade 1 is typically the largest grade and this is due to the high rates of repetition in this grade, sometimes linked to the enrolment of under-aged children. The sharp drop in grade 1 enrolments in 1999 and 2000 was due to a specific event in which the age-of-entry policy changed so as to raise the appropriate age of school entry (Notice 2433 of 1998). The effect of this policy was a temporary drop in the numbers entering school: children who previously might have entered in the year in which they turned six were now not allowed to, while other children of the appropriate age under the new policy had already entered in the previous year. Since this policy was announced late in 1998 it would appear that it was partly implemented in 1999 and more universally applied in 2000; hence the low enrolments for those two years.

The gradual decline in grade 1 enrolments since 2004 probably reflects lower repetition rates together with the possibility that many children now spend a year in Grade R and then a year in Grade 1 rather than two years in Grade 1. Therefore, declining enrolments in Grade 1 in a context where the age-specific enrolment rate has increased (as demonstrated earlier) must be viewed as an improvement in the internal efficiency of the education system.

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2   *The age of completion may be slightly underestimated in Table 3 (but not in Table 4) due to the younger age range. However, the trend of declining over-aged enrolment is well enough documented to provide assurance that the decline observed in Table 4 relative to Table 3 is not entirely driven by this factor.*

Another noteworthy feature of Figure 10 is the large gap between grade 10 enrolments and grade 12 enrolments. In fact this gap has increased in recent years. To a large extent this gap is caused by high drop-out rates in grades 10 and 11. However, it is also caused by high rates of repetition in these grades. It is interesting to note that prior to 2003 there were always considerably more grade 4 learners in the system than grade 10 learners. However, since 2003 there have always been more grade 10 learners enrolled than grade 4. This is not what one might expect given that a proportion of children drop-out of school after each grade. Therefore, what we observe is a queuing phenomenon in grades 10 and 11: more children are nowadays retained in the school system until grades 10 and 11 but at that point the impending matric examination induces many schools to not promote weak students any further. Many such students spend a few years in grades 10 and 11 before dropping out.

Figure 10: Enrolments in selected grades since 1994
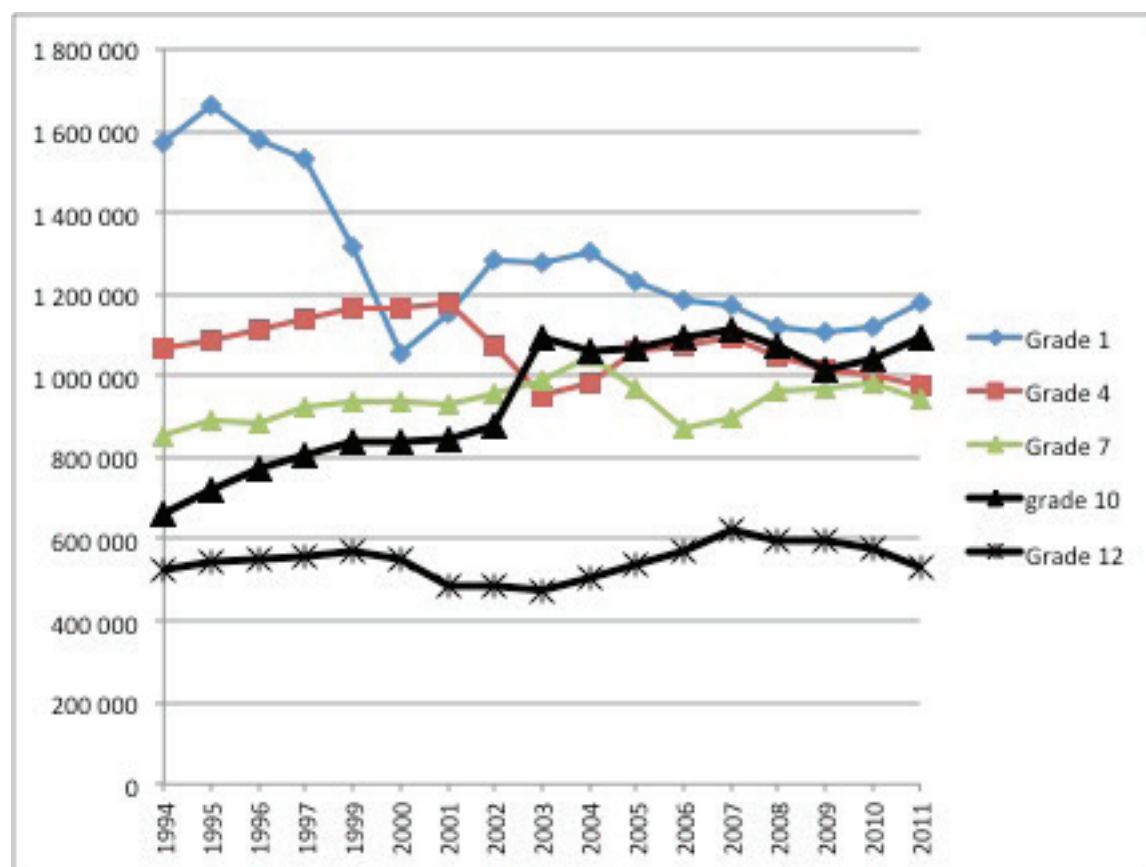
Source: DBE administrative data

Note: Data for 1998 is not available

We construct drop-out rates (and conversely survival rates) for each grade using GHS data to further investigate these patterns. Table 5 shows drop-out rates and survival rates for three age cohorts (those born during 1981-1983, those born in 1984-1986 and those born in 1987-1989) in order to identify whether there are discernible time trends in these outcomes. Data for each of these cohorts was taken from different years of the GHS to ensure that they were of the same age when measured. The table shows for every 1000 children born into each of the three cohorts how many reached each subsequent grade. This indicates the survival rate to each grade and conversely the drop-out rate after each grade.

**Table 5: Survival rates and drop-out rates associated with each grade**

GHS years	2003-2005		2006-2008		2009-2011	
Birth Cohort	1979-1981		1982-1984		1985-1987	
Birth	Survival per 1000	Percentage dropping out with this grade attained	Survival per 1000	Percentage dropping out with this grade attained	Survival per 1000	Percentage dropping out with this grade attained
Zero education	1000	2.0	1000	1.8	1000	1.1
Grade 1	980	0.3	983	0.2	989	0.2
Grade 2	977	0.4	980	0.4	987	0.3
Grade 3	973	0.9	976	0.5	985	0.6
Grade 4	964	1.3	971	1.1	979	0.9
Grade 5	951	1.8	961	1.6	970	1.3
Grade 6	935	3.1	945	3.1	957	1.9
Grade 7	906	5.2	916	5.2	939	3.7
Grade 8	858	7.5	868	7.4	904	5.7
Grade 9	793	11.1	804	11.3	853	9.9
Grade 10	705	18.5	713	17.5	769	17.5
Grade 11	575	27.6	588	28.3	634	28.3
Grade 12	416		422		455	

Source: Own calculations using GHS 2003-2011

For the most recent cohort in Table 5, those born between 1985 and 1987, we see that 989 children per 1000 completed grade 1. As seen in the table, the dropout rate increases with each grade level. Indeed, the drop-out rates peak in grades 10 and 11: 17.5% of those who attain grade 10 achieve no more education, and 28.3% of those who attain grade 11 do not attain matric.

When comparing trends between the three age cohorts it is encouraging that for most grades the drop-out rates have decreased somewhat over time. For example, 904 per 1000 people in the most recent cohort attained grade 8 while only 858 per 1000 amongst those in the oldest cohort achieved grade 8. Survival to achieving a matric also increased from 416 per 1000 to 455 per 1000. This observed increase is probably partly a reflection of the fact that more recent cohorts contain fewer over-aged learners. For example, amongst those born during 1979 – 1981 some 22 year-olds may have still been completing matric at the time of the survey, thus causing the estimate of 416 per 1000 achieving matric to be a slight underestimate. The best way to estimate grade 12 attainment is therefore to use household survey data and to restrict the analysis to an age category that is old enough to be unlikely to contain many members still completing grade 12 but young enough so as to reflect relatively recent trends. Figure 11 shows the proportion of people aged 24 to 27 with grade 12. It is possible that certain respondents claiming grade 12 only participated unsuccessfully in grade 12 and therefore that these estimates are upwardly biased by a few percentage points. At least this should not bias the trend over time which suggests a moderate increase in grade 12 attainment.

Figure 11: Proportion of 24-27 year-olds with grade 12
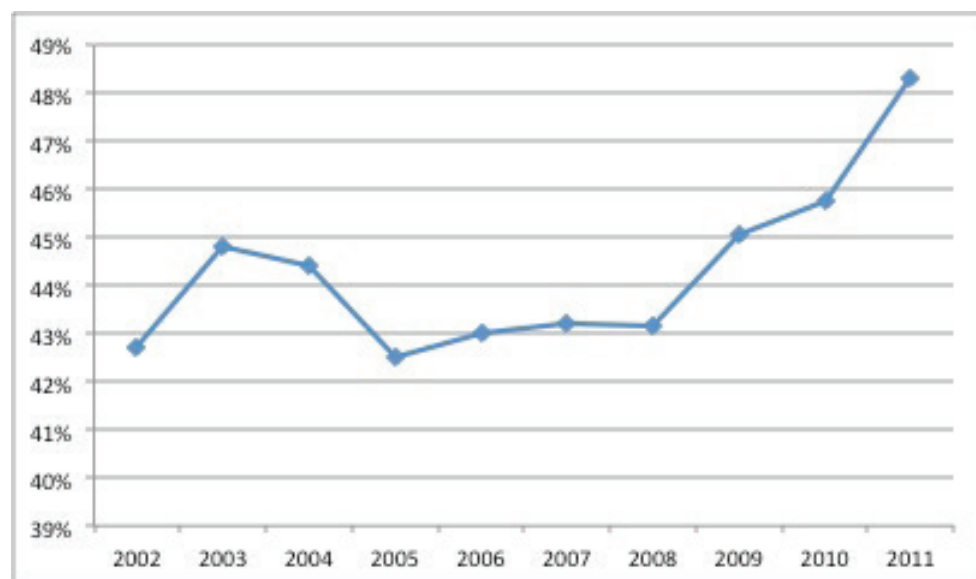
Source: Own calculations using GHS, 2002 - 2011

4. GRADE REPETITION

Policies on grade repetition differ from country to country. Some countries such as England, Japan, Korea, Ireland, Finland, Sweden, Norway and Denmark seldom use repetition and instead support automatic promotion with additional support for weaker learners. By contrast, grade repetition is widely practiced in many African countries, such as Botswana, Ghana, Kenya, Uganda, Swaziland, Lesotho, Namibia and Zambia, Asian countries including Bangladesh, India, Cambodia and Western countries such as Australia, France, Germany, New Zealand, the USA and Canada (Ndaruhutse, 2008).

The practice of repetition is premised on the idea that learners who repeat a grade will receive remedial support to ensure that they master certain foundational skills that are needed before one can progress to more advanced skills. At lower grades, this argument perhaps holds most weight since certain foundational numeracy and literacy skills are clearly necessary for success in higher grades. At higher grades, repetition is viewed as a method to prevent schools from graduating learners who lack the basic skills necessary to be productive members of society (Martinez and Vandergrift, 1991 cited in DOE, 2008). However these assumptions have been contested and continue to be tested by on-going research.

Grade repetition can be measured through the Annual School Survey (ASS) which is undertaken by the Department of Basic Education in the nine provincial education departments. It is conducted in every ordinary school (both public and independent) in the country. Table 6 shows the percentage of repeaters as calculated from the ASS over the 2010 to 2012 period.[3] In 2012, close to 10% of learners enrolled in the schooling system were repeaters. The ASS data also confirms the patterns identified earlier, namely that repetition is more prominent in Grades 10 and 11 as compared to other grades.

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3 *The figures for earlier years are not reported as there was a change in the way repetition data was collected in 2010, making earlier figures incomparable with those since 2010.*

The percentage of repeaters in Grade 1 was also found to be high in comparison with most other grades. Interestingly, the ASS figures for Grade 1 repetition are considerably higher than that found in the General Household Surveys. This difference could be attributed to over-reporting of Grade 1 enrolment in the ASS, which the Department has found to be an existing phenomenon. High repetition rates in Grade 1 could also be attributed to educators holding back learners whom they feel are too young or not mature enough to progress to Grade 2.

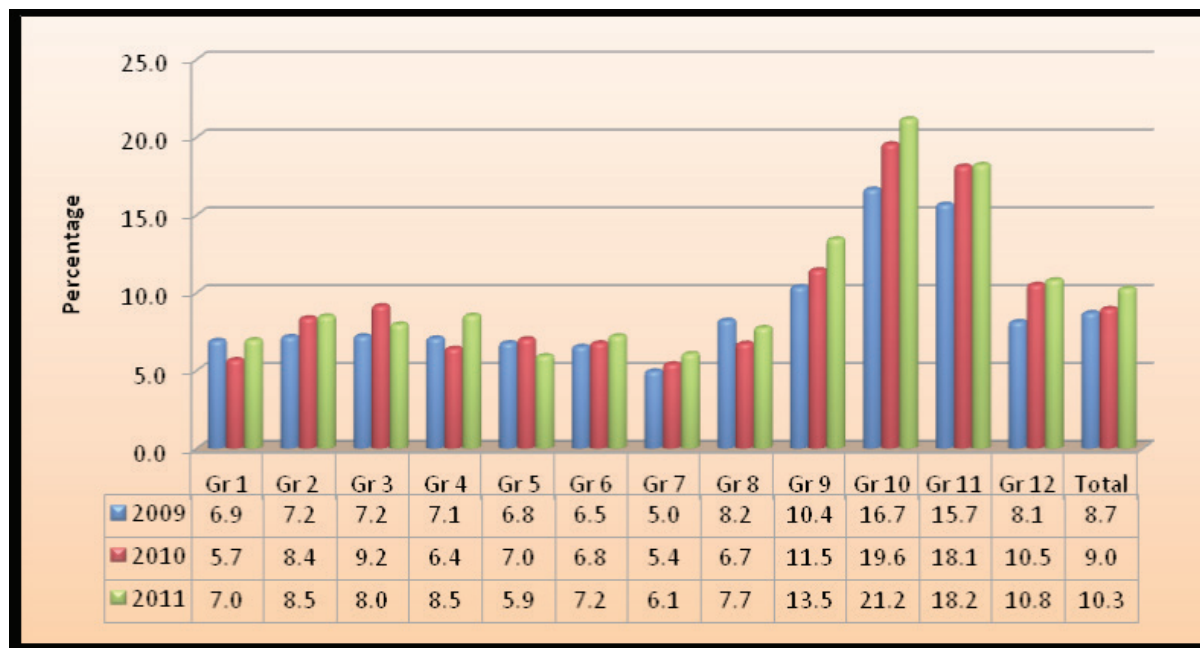**Table 6: Percentage of repeaters by grade: 2010 to 2012**

Grade	2010	2011	2012
1	13.1	13.1	11.5
2	8.5	8.6	7.4
3	7.6	7.6	6.3
4	8.2	8.3	7.4
5	6.5	6.3	5.9
6	5.2	5.3	5.3
7	4.1	4.0	4.2
8	8.1	7.4	7.0
9	13.0	14.2	14.8
10	24.4	22.3	21.2
11	24.3	22.0	18.0
12	8.4	7.5	4.9
National Average	11.0	10.7	9.8

Source: ASS 2010 - 2012

The GHS also collects information on grade repetition thus providing a source to check the reliability of ASS data. Figure 12 shows the percentage of repeaters[4] for each grade as obtained from the 2009 to 2011 GHS. ouseHoHo. Data on the percentage of repeaters for previous years cannot be obtained from the GHS, since the question on repetition was only introduced in 2009. Figure 12 shows that overall, at both primary and secondary levels, over 10% of all learners enrolled in schools in 2011, were repeaters. The GHS data also reveals that grade repetition is highest in Grades 10 and 11, with over 21% of Grade 10 learners in 2011 being repeaters.

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4   *The percentage of repeaters is calculated by dividing the number of learners who are repeating a grade, by the total enrolment of learners in that grade, in the same year.*

Figure 12: Percentage of repeaters by grade: 2009 to 2011

	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 6	Gr 7	Gr 8	Gr 9	Gr 10	Gr 11	Gr 12	Total
2009	6.9	7.2	7.2	7.1	6.8	6.5	5.0	8.2	10.4	16.7	15.7	8.1	8.7
2010	5.7	8.4	9.2	6.4	7.0	6.8	5.4	6.7	11.5	19.6	18.1	10.5	9.0
2011	7.0	8.5	8.0	8.5	5.9	7.2	6.1	7.7	13.5	21.2	18.2	10.8	10.3

Source: Statistics South Africa, GHS, 2009 to 2011: Calculations undertaken by DBE

Figure 13 provides one more source of information about the trends in repetition rates over time. It shows the proportion of grade 6 children that reported having repeated at least once in the 2000 SACMEQ survey and in the SACMEQ 2007 survey.[5] This statistic is shown for South African learners as well as for grade 6 learners in all the other SACMEQ countries. The levels of grade repetition observed in 2007 were lower than the levels that were recorded in 2000. This would indicate that between the late 1990s and the mid 2000s there was a decrease in the amount of repetition in South African primary schools. One factor that may have contributed to decreased grade repetition over this period was the introduction of the policy stipulating that schools may retain learners at most once per phase of schooling.

Figure 13: Percentage of learners having repeated at least once by grade 6 in SACMEQ 2 and 3

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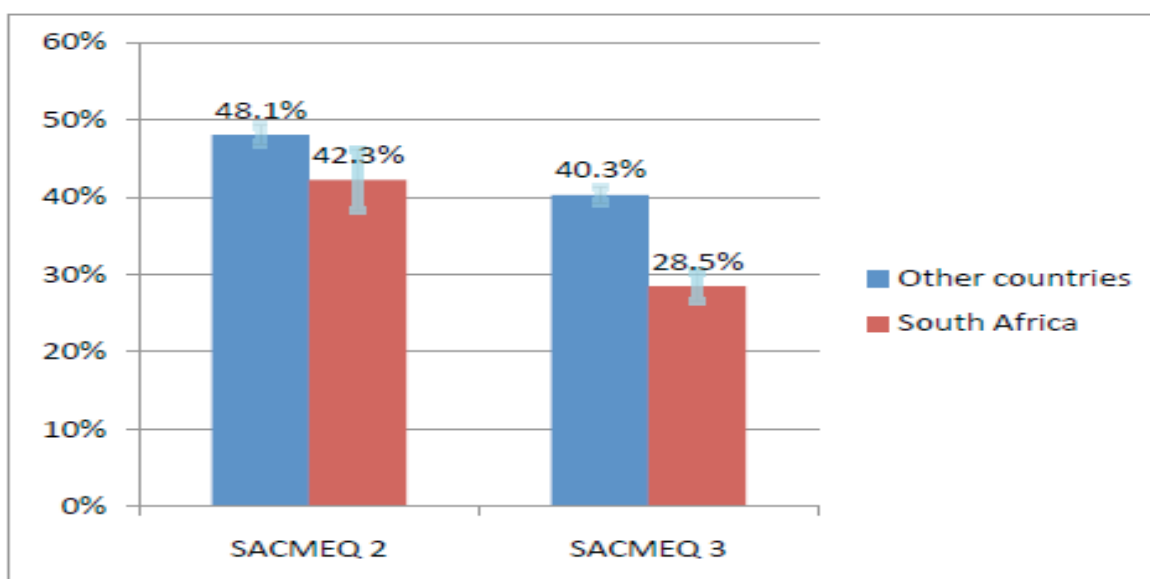
5   SACMEQ stands for Southern and Eastern African Consortium for Monitoring Educational Quality and is a survey of grade 6
     mathematics and reading achievement in 15 Southern and Eastern African education systems.

High rates of grade repetition can be viewed as inefficient because the result is that learners spend more publicly funded years in school in order to attain particular educational outcomes. However, repetition can be an effective intervention if it is well targeted and accompanied by suitable remedial practices. Given the large classes and systemic problems of underperformance in the school system it is unlikely that grade repetition has a sufficiently remedial nature in South African schools. Kremer and Holla (2008) argue that the research using Randomised Control Trials (RCTs) indicates that remedial interventions such as extra reading classes outside of the normal school day can improve learning at relatively low cost. However, if grade repetition is not sufficiently remedial it may well do more harm than good.

Moreover, evidence suggests that in many schools grade repetition is not well targeted, i.e. some learners who should not repeat in fact do repeat and other learners who should repeat are promoted. For Grade 12 learners there is a nationally standardised and externally evaluated matric examination that determines the passing of Grade 12. For other grades, the decision about whether or not to promote a learner is made at the school level. Schools make use of assessments carried out during the year, end of year examinations and evaluations by teachers.

A paper by Lam, Ardington and Leibbrandt (2010) finds that grade progression in many of the schools attended by black learners is poorly linked to actual ability and learning. In fact, they argue, grade repetition is something of a lottery. Using data from the Cape Area Panel Study, Lam *et al* find that grade repetition is only weakly linked to performance in cognitive tests and that failing a previous grade had no significant effect on the probability of passing the matric exam for black learners.

Analysis of the SACMEQ 2007 data confirms that repetition is often not clearly linked to the level of performance of learners, especially in provinces with high rates of grade repetition. Figure 14 shows the percentage of learners repeating grade 6 in each province according to the SACMEQ data. The provinces with the highest amount of repetition were Limpopo, Northern Cape and Eastern Cape. This graph should be interpreted in conjunction with Figure 14, which shows for each province, the correlation between the mean mathematics score of schools (in Grade 6) and the proportion of learners in each school that had repeated at least one grade. Not only is repetition most prevalent in the Eastern Cape, but the extent of repetition in schools is very weakly correlated with school mathematics performance indicating that repetition is largely random in this province. The same is true of Limpopo to a lesser extent.
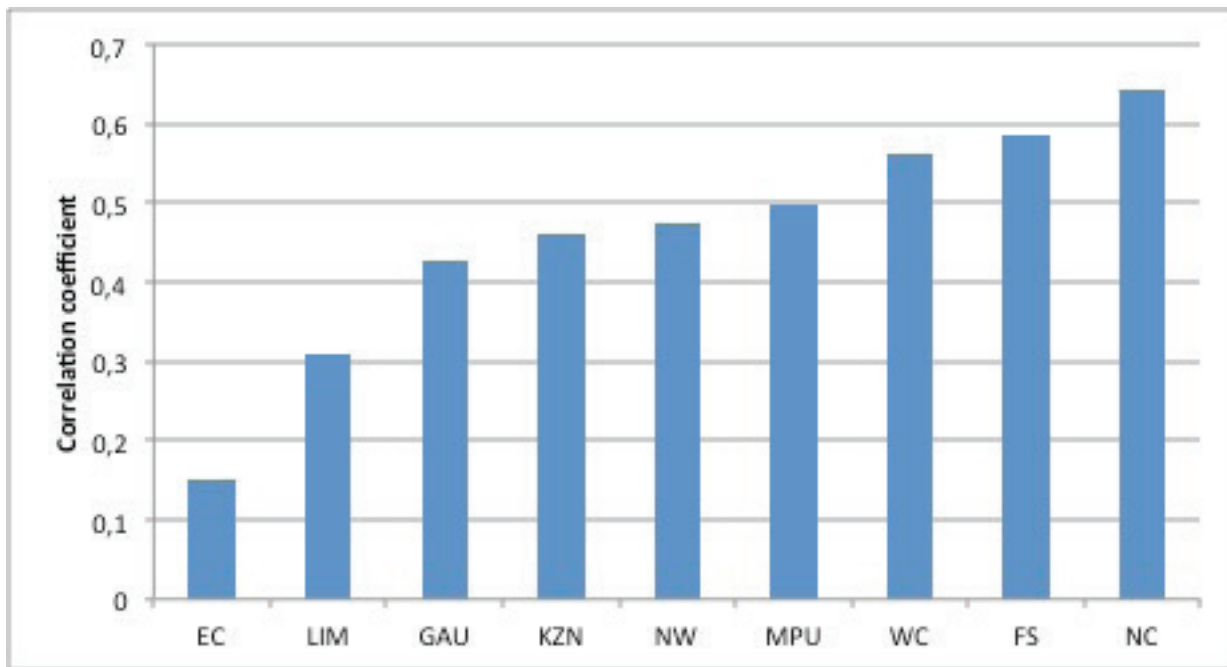
Figure 14: Percentage of learners repeating Grade 6: 2007
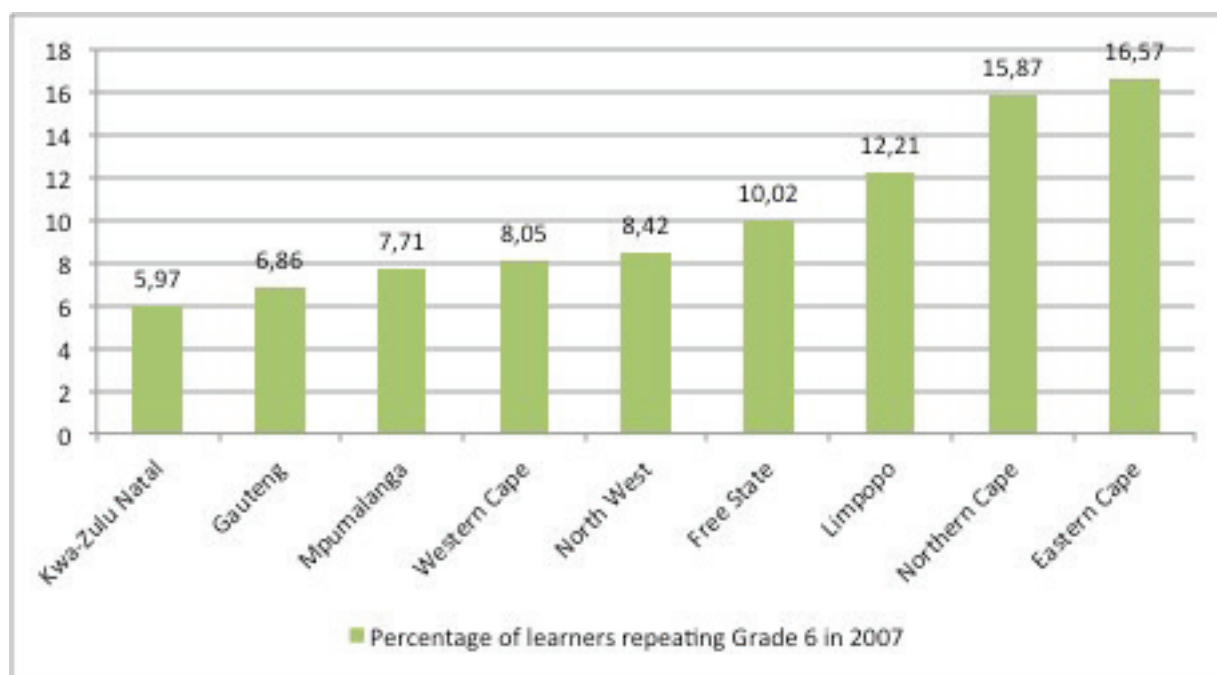
Source: SACMEQ 3 data, DBE calculations

Figure 15: Correlation between school mean mathematics score and extent of repetition in the school

Random grade repetition is clearly inefficient but it also contributes to, and is symptomatic of, other problems in the school system. It creates a perverse incentive for children against working hard, and serves as an incentive for weak learners to remain longer in the school system in the false hope that they may eventually pass matric. This is consistent with the pattern observed earlier in this report that many black learners drop out of grades 10 and 11 at age 18, 19 and 20. Random grade repetition also points to problems in the setting and grading of assessments by teachers, and raises questions about teacher content knowledge and the quality of school management. Van der Berg and Shepherd (2010) found evidence of weak assessment practices through comparing school-based continuous assessment marks with those obtained in the matric examinations. They found that continuous assessment marks were typically overly lenient and not well correlated with matric marks. Thus, irrespective of what the ideal amount of repetition should be in the system, when repetition practices are poorly informed this must be having a harmful impact.

5. INEFFICIENT SUBJECT SELECTION

Inappropriate subject selection in Grade 10, which contributes to poor results in Grade 12, is another symptom of weak assessment practices in schools. Figure 16, taken from Taylor *et al* (2011), illustrates the poor subject selections that occur. The figure is based on a unique dataset that was created by taking individuals who participated in TIMSS in grade 8 in 2002 and identifying them in the matric datasets of 2006 and 2007, if indeed they reached matric. The figure shows kernel density curves depicting the density (measured on the vertical axis) of TIMSS grade 8 mathematics scores at every level of achievement (distributed along the horizontal axis). TIMSS mathematics scores are expressed on a scale with an international mean score of 500 and a standard deviation of 100 points. Density curves of grade 8 mathematics scores are shown separately for historically black schools (ex-DET), historically coloured schools (ex-HOR) and historically white schools (ex-HOA). For each historically different group of schools separate curves are shown for those learners who went on to take mathematics as a subject in matric (either on the Higher Grade level or Standard Grade).

Within the historically white and historically coloured schools, those learners who took mathematics in matric were in grade 8 already identifiable as stronger in mathematics than those who did not take mathematics in matric. In historically black schools, however, the distribution of grade 8 mathematics performance amongst those who took mathematics in matric was hardly distinguishable from the distribution amongst those who did not take mathematics.

It is therefore mystifying what informed the decision to take mathematics to matric – clearly this decision was not informed by the true mathematics ability of learners. It is likely that learners, parents and teachers lacked an accurate source of information about the mathematics proficiency of learners, something which school-based assessments are supposed to provide. This points again to weak assessment practices in historically black schools.

Figure 16: TIMSS performance by former department and participation in matric results
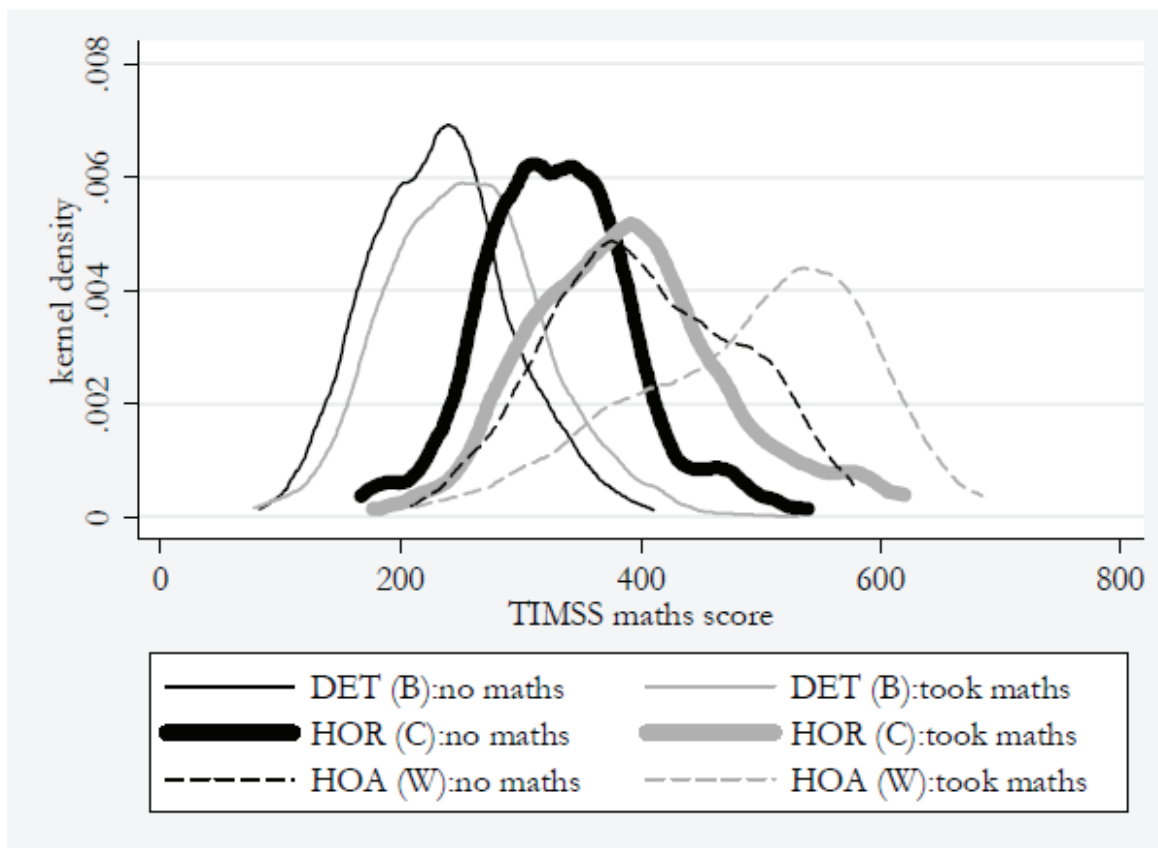
Source: *Taylor et al (2011: 27)*

Gustafsson (2011) demonstrates that sub-optimal subject choice contributes to failure in the matric examination that could easily have been avoided. According to Gustafsson, if 24% of learners that took mathematics in 2009 had switched from Mathematics to Maths Literacy, they would have passed the Grade 12 examinations.

Analysis of trends in matric mathematics outputs since the introduction of the National Senior Certificate in 2008 shed further light on the inefficiencies in subject choices. Table 7 shows that although the mathematics pass rate has been fairly stable since 2008, the proportion of matriculants taking maths declined from 56.10% in 2008 to 44.19% in 2012. This would not necessarily be a bad thing if the reason were that schools were gradually adjusting to the new NSC system and realising that too many learners were taking mathematics who should rather be taking maths literacy. However, if this were the case one would expect the mathematics pass rate to be improving as weaker candidates increasingly opt for maths literacy. But the pass rate was fairly stable between 2008 and 2011. The result was that the proportion of all matric candidates that passed mathematics declined from 25.60% in 2008 to 21% in 2011, as the final column of Table 7 shows.

Increasingly, learners seem to be opting for maths literacy. The fact that the maths pass rate has not improved in response to this may reflect that it is not predominantly weaker candidates who are now opting for maths literacy, as one might have expected. This may imply that schools are not doing a good job of sorting between stronger and weaker learners and helping them choose optimally between mathematics and maths literacy. Simkins (2010) also found that many matriculants who failed mathematics could have passed maths literacy and, conversely, that many students who took maths literacy could in fact have passed mathematics.

Table 7: Trends in matric mathematics since 2008

	Numbers wrote maths	Number passed maths	Maths pass rate	Proportion taking maths	Proportion passing maths
2008	298821	136503	45.70%	56.10%	25.60%
2009	290407	133505	46.00%	52.60%	24.20%
2010	263034	124749	47.40%	48.80%	23.20%
2011	224635	104033	46.30%	45.30%	21.00%
2012	225874	121970	54.00%	44.19%	23.86%

Note: This does not include IEB candidates

The results from 2012 are encouraging in that the mathematics pass rate increased substantially as did the proportion of all matriculants that passed mathematics. Figure 17, which shows percentage plots of mathematics scores in 2008 and 2012, provides further encouragement. The figure shows that the numbers of learners achieving at scores from about 30% through to the top scores was much the same in 2012 as it was in 2008. However, there were far fewer learners achieving at very low levels in mathematics in 2012. It would therefore appear that weak candidates are now being more effectively guided to take maths literacy. This can be considered an improvement in efficiency regarding subject selection.

Figure 17: Percentage plot for matric mathematics performance in 2008 and 2012
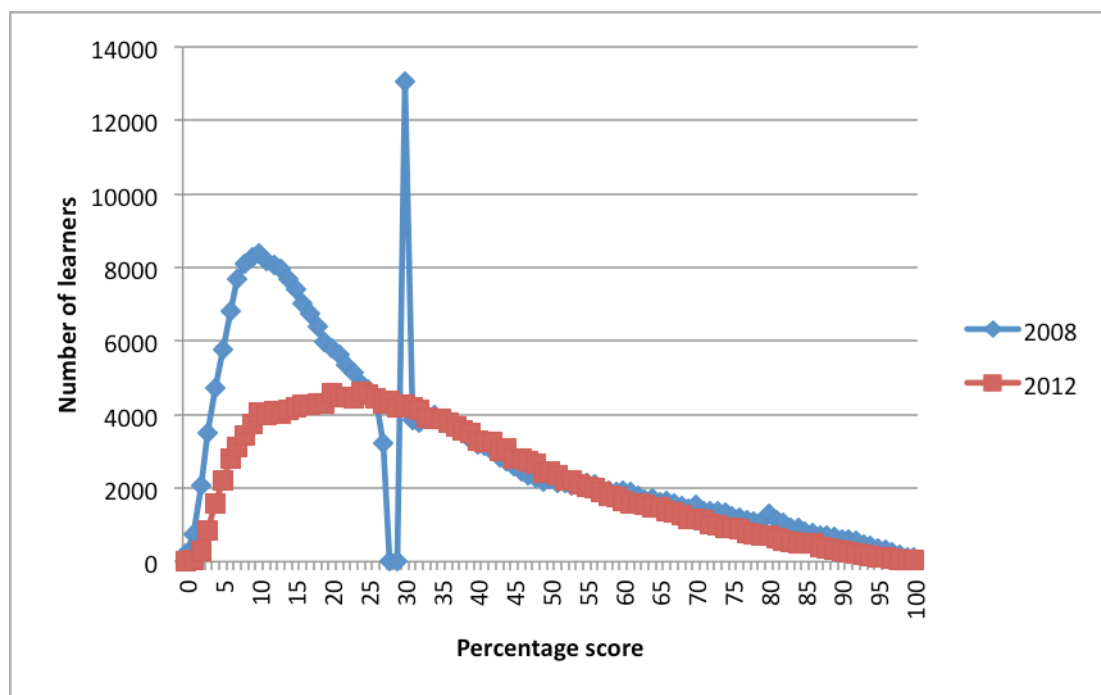

Source: Calculations courtesy of Helen Perry (2013)

6. "EFFECTIVE ENROLMENT": MEASURING ACCESS TO *QUALITY* EDUCATION

The various inefficiencies discussed so far, such as weak assessment practices, random grade progression and queuing in grades 10 and 11, are undesirable in and of themselves. More significantly, however, they are symptoms of a more fundamental inefficiency in the school system of low quality in the early grades despite high learner retention.

Much of the analysis thus far has focussed on measures of access to education, such as enrolment rates. Spaull and Taylor (2012) propose a new measure that combines access with education quality. This measure called "effective enrolment" combines age-specific enrolment rates obtained from household survey data with test score data. The "effective enrolment rate" is the proportion of children in an age-specific population (including those attending school and those not enrolled) that reach a basic level of literacy or numeracy. Figure 18 shows both simple enrolment rates (the percentage of the age-specific population attending school) and the effective enrolment rates for a selection of African countries. Test score data is obtained from the SACMEQ 2007 survey of grade 6 literacy and enrolment rates for the grade 6-aged population are obtained from a repository of household survey data provided by Filmer (2010).

Figure 18: "Simple" versus "Effective" Enrolment in a selection of Southern and Eastern African countries
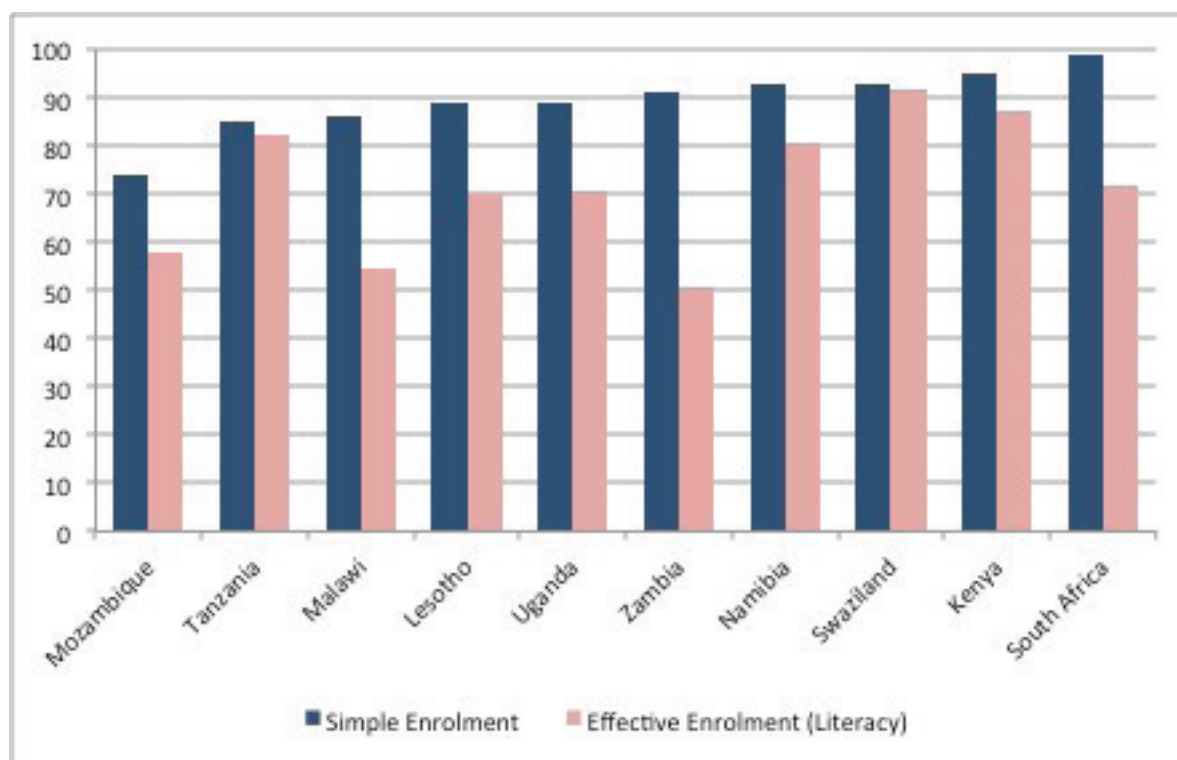

Source: Enrolment data from Filmer (2010), Literacy achievement data from SACMEQ 2007. The method of calculating "Effective Enrolment" is taken from Spaull and Taylor (2012).

Figure 18 shows that South Africa has the highest age-specific enrolment rate amongst the selected countries. However, the effective enrolment rate is fairly average in comparison with the region. The gap between South Africa's high simple enrolment rate and its effective enrolment rate indicates that a large proportion of South African children are in school but have not learned to read at a level described by educational experts as "basic reading". In other words these grade 6 children are still at a "pre-reading" or "emergent reading" level (Hungi *et al*, 2010).

The widespread failure of South African children to reach basic thresholds of literacy and numeracy has been echoed by other international tests such as the various TIMSS and PIRLS studies as well as the DBE's own Annual National Assessments (ANA). As Figure 19 demonstrates, approximately 95% of grade 5 children in schools that took the PIRLS 2006 survey of reading achievement in one of the African languages performed below the lowest benchmark category. According to Trong (2009: 104) children performing at this low level can be considered to be "at serious risk of not becoming literate."

It stands to reason that If learners have not attained basic reading skills after five or six years of schooling they are unlikely to catch up to the levels required by the curriculum in later grades. The most likely outcome for these learners is to drop out of school prior to attaining matric. This low quality of learning in the early grades combined with the lenient and random grade progression, as described earlier, is what causes the pattern of queuing and then drop-out in grades 10 and 11.

Figure 19: Proportions at various levels of reading competency by "sub-system"
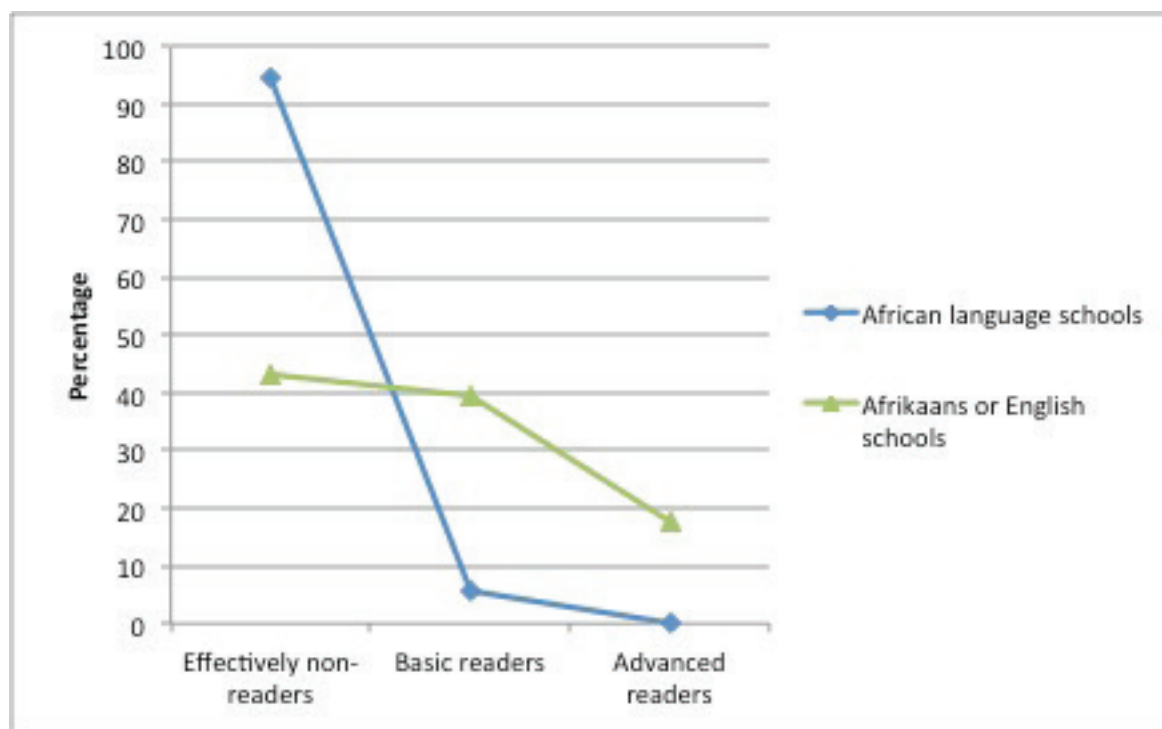
Source: Own calculations using PIRLS 2006

On a more optimistic note, the most rigorous and recent available evidence regarding trends over time in the quality of learning in South Africa points to a considerable improvement between 2002 and 2011. Figure 20 describes South Africa's performance in the various TIMSS studies between 1995 and 2011. In the earlier TIMSS surveys South Africa participated at the grade 8 level while in the most recent survey grade 9 learners participated. Fortunately, in 2002 both grade 8 and grade 9 learners participated, thus allowing comparability across the years. Figure 20 shows an essentially flat trend in grade 8 mathematics performance between 1995 and 2002. Between 2002 and 2011, however, there was a considerable improvement in the mathematics performance at grade 9 level. The same was true for grade 9 science achievement (not shown in the graph below). Encouragingly, the improvements were largest amongst historically disadvantaged schools (HSRC, 2012).

Figure 20: South Africa's performance in TIMSS since 1995
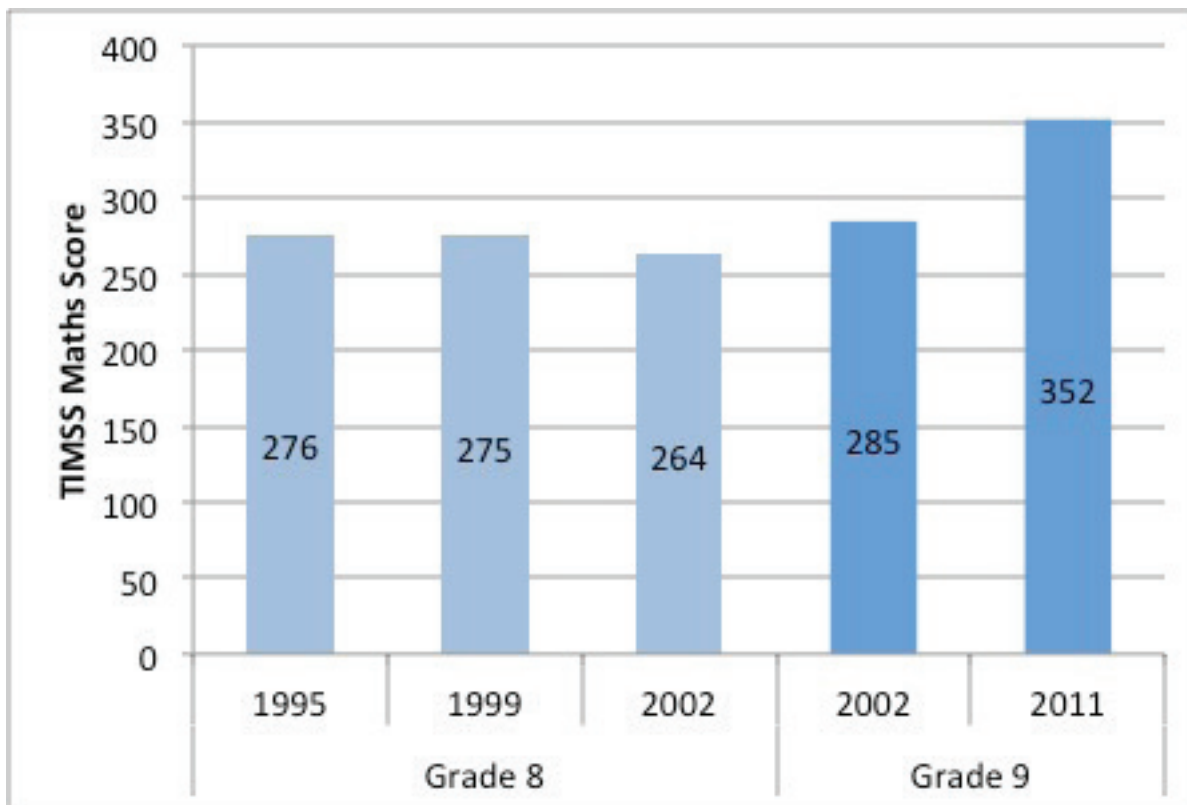
Note: The TIMSS scores were set on a scale with an international mean of 500 points and a standard deviation of 100 points.

This section makes the point that low quality of learning throughout the school system, especially in the early grades, represents the fundamental underlying cause of various other inefficiencies surrounding, for instance, grade repetition and drop-out. However, a full discussion of the reasons for this low quality of learning outcomes is beyond the scope of this report.

7. POLICY RECOMMENDATIONS TO ADDRESS SYSTEMIC INEFFICIENCIES

The analysis in this report has highlighted certain inefficiencies that can relatively easily be addressed. These include sub-optimal subject choices, random grade repetition and the associated weak assessment practices in schools. On the other hand, the deeper problem of low quality learning outcomes will require much more fundamental change and improvement.

The Annual National Assessments (ANA) represent a significant step in the right direction towards strengthening school-based assessment practices. One of the core purposes of ANA, as outlined in the "Action Plan to 2014", is to expose teachers to better assessment practices. The introduction of ANA needs now to be complemented by guidance for teachers in how to use ANA in formative assessment and as a diagnostic tool. At the grade 9 level, ANA should be used, amongst other assessments and considerations, to inform subject choices for grade 10 to grade 12. Another purpose of ANA as set forth in the Action Plan is to empower parents with important information about their children's performance. This will help raise awareness of low learning outcomes before that realisation is brought on by the matric examination, and will in turn promote local accountability and the prioritisation of learning at the primary school level. In the pursuit of these objectives, care should be taken to avoid potential unintended consequences of ANA. For example, if the stakes of such testing are high this can lead to a narrowing of the enacted curriculum coverage as teachers focus predominantly on the content of the test. On the other hand, in an environment where curriculum coverage has been shown to be poor (e.g. Taylor, 2011), such "teaching to the test" may still lead to more teaching than previously.

There may also need to be teacher development initiatives aimed at improving the assessment practices of teachers and at improving their content knowledge. It may be that weak content knowledge is an underlying cause of weak assessment practices. There is sufficient evidence of weak content knowledge amongst South African teachers to warrant attention (e.g. Taylor and Taylor, 2013).

This report's analysis of grade repetition practices supports the policy limiting repetition to once per phase for a learner. However, schools and teachers require better guidance regarding the repetition decision and how to ensure that repetition is sufficiently remedial in nature rather than another year of the same. The long and controversial debate around tracking or streaming practices has seen recent studies providing empirical support for such practices. Kremer and Holla (2008), for example, argue that the evidence from randomised experiments shows that tracking can be an effective way to raise achievement levels across the ability distribution. In part, this can be viewed as an alternative to grade repetition. Admittedly though, this requires a lot from teachers – expert judgement to identify children at different levels of proficiency as well as the ability to devote sufficient attention to different groups simultaneously. With large classes this may be especially challenging.

The observed phenomenon of queuing in grades 10 and 11 and then substantial drop-out of these grades into various forms of unemployment presents a conundrum for social policy. Unless there is a dramatic increase in the demand for relatively low-skilled labour in the economy it will be necessary to increase the number of school graduates with qualifications that are rewarded in the labour market. Lowering the standards of the matric examination will only serve to erode its value in the labour market. Currently, those dropping out of school without attaining matric are left with no meaningful qualification despite having spent numerous years in the school system. There remains, therefore, a need to raise the status of non-academic pathways to the labour market, such as through FET colleges, learnerships and other forms of technical training. Currently, the numbers graduating through these channels are far too low and the effectiveness of such programmes in helping poor students to participate successfully in the labour market is an under-researched matter.

The most important, though difficult, way to address the conundrum of large numbers of weakly performing students reaching and then dropping out of grades 10 and 11 is to improve the quality of learning in the early grades. Early interventions in primary school, Grade R and ECD centres, to improve the acquisition of reading, basic literacy and basic numeracy are the most cost-effective ways to improve outcomes later on in school. Current DBE and provincial initiatives to do so should be redoubled and research should be conducted to establish the most cost-effective interventions in the early grades. In this way, the improvement of education quality will serve to increase the value of the already substantial achievements that South Africa has made to ensure that all children have access to schooling.

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Efficiency Report

Dr S Taylor
Researcher and advisor in the office of the DG
Tel: 012 357 4156
Email: taylor.s@dbe.gov.za

Ms R Pillay
Assistant Director: RCME
Tel: 012 357 3658
Email: Pillay.r@dbe.gov.za

Mrs N Mohohlwane
Assistant Director: RCME
Tel: 012 357 4519
Email: mohohlwane.n@dbe.gov.za

Mr N Vilakazi
Data Analyst: RCME
Tel: 012 357 3354
Email: vilakazi.n@dbe.gov.za

Department of Basic Education
222 Struben Street, Pretoria, 0001
Private Bag X895, Pretoria, 0001, South Africa
Tel: (012) 357 3000 • Fax: (012) 323 0601

Private Bag X9035, Cape Town, 8000, South Africa
Tel: (021) 486 7000 • Fax: (021) 461 8110

Hotline: 0800 202 933

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