A NOTE ON MATRIC RESULT TRENDS

Stephen Taylor, 11 January 2012

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Executive Summary

Despite the improved matric pass rate in 2011, the media correctly pointed out that one needs to look beyond the pass rate to the numbers achieving various matric outcomes. Many commentators have taken the opportunity to remonstrate about all the unwelcome aspects of schooling outcomes in South Africa. Some have highlighted that an unacceptably low percentage of those who begin school ultimately pass matric mathematics. It was also pointed out that the number of matric candidates declined fairly substantially from 2010 to 2011, and that the number passing mathematics declined even more substantially. This note examines these numbers more closely, investigates what factors may underlie the numbers and consequently considers what these trends imply about the changing quality of schooling in South Africa. **The key findings are:**

1) Any increase in the numbers passing mathematics since 2007 must be attributed to the change to the NSC in 2008 and not to a trend of improving quality.

2) Many learners are not making optimal choices about whether to take mathematics or maths literacy in matric.

3) The low numbers writing and passing matric in 2011 was largely attributable to the policy change in 1998 according to which the appropriate age of school entry was increased. The matric 2011 cohort was smaller than any of the other preceding or subsequent cohorts. The class of 2012 will be our second smallest cohort. Thereafter, the numbers pick up again.

4) When one calculates, for recent years, the ratio of matric passes to the number enrolled in grade 10 two years earlier, and the ratio of matric passes to the number enrolled in grade 2 ten years earlier, it would appear that the proportions passing matric have been improving.

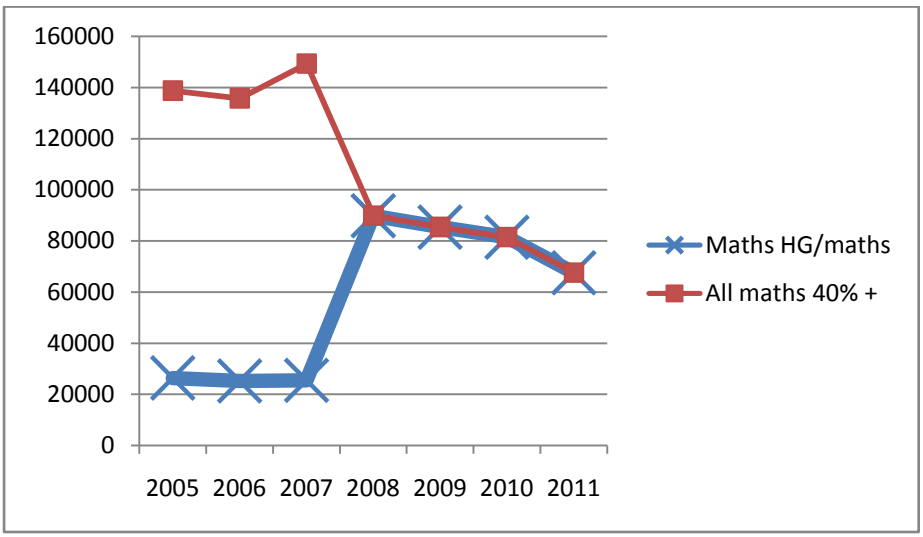
5) An inter-provincial analysis of these ratios reveals large gaps between the provinces. The Eastern Cape stands out as having a very low conversion rate of grade 2 enrolments into matric passes.

Mathematics outputs

A first key point when considering trends in mathematics outputs is to remember the change to NSC that occurred in 2008. Mathematics Higher Grade and Standard Grade were replaced with mathematics and maths literacy, and all students now had to take one of these two subjects. If one were to compare mathematics passes since 2008 with Higher Grade Mathematics passes prior to that it would appear that the number of matric mathematics passes has roughly quadrupled between 2007 and 2008. This "trend" is depicted by the blue line in Figure 1. This assumes that the old Higher Grade was of a comparable standard to the current mathematics. On different (and arguably more justifiable) assumptions, one might compare the number of mathematics passes in 2007 – higher Grade *and* Standard Grade – with the number of mathematics passes under the new system. In this case, the number has declined, as the red line in Figure 1 shows. Of course neither of these comparisons is valid: the data clearly show a structural break in 2008 and we know that mathematics under the NSC is not comparable to either Higher Grade or Standard Grade. One can therefore speak about trends prior to the change and since the change but not across 2007/8.

Charles Simkins (2010) has tried to equate the mathematics Higher Grade marks of 2007 with the mathematics marks of 2008. He found, for example, that 40% on Maths HG was roughly equivalent to 54% for mathematics in 2008. He also found that simply through making mathematics of some sort compulsory the number achieving the equivalent of 40% on HG was more than doubled. Doubling the number achieving the equivalent of 40% for HG maths is a positive achievement of the NSC, but this was not achieved through improving the quality of education in general, or the quality of maths teaching in particular.

Figure 1: Numbers achieving various maths passes since 2005



What can also be said is that the numbers passing mathematics of some sort (including maths literacy) is now substantially higher than prior to 2008. If one regards 30% for maths literacy as a minimum benchmark for being numerate then the system is now producing more graduates who we know are at least somewhat numerate. (Of course there may be people who did not take maths under the previous system and who would have achieved 30% for maths literacy but their numeracy was not observed.) Figure 2 shows the numbers passing some form of mathematics since 2005. The increase that can be seen cannot be attributed to improving quality but to a policy change that forces all students to take some form of mathematics.

Figure 2: Numbers passing (with 30%) some form of mathematics

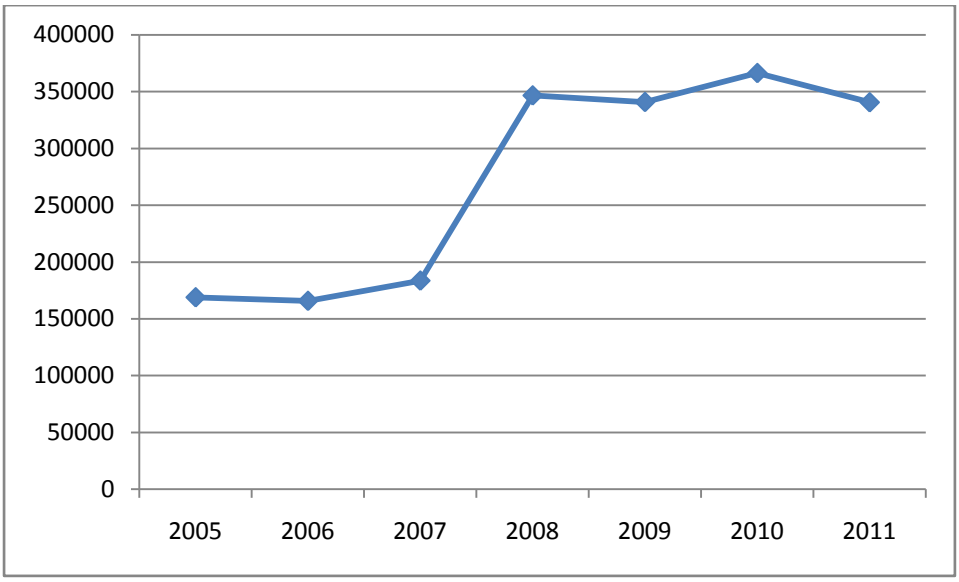


Table 1 shows that although the mathematics pass rate has been fairly stable since 2008, the numbers taking maths have declined over the last two years. Moreover, this is not merely because there have been fewer matric candidates overall in the last two years – the proportion of matriculants taking maths has steadily declined from 56.1% in 2008 to 45.3% in 2011. 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.[1] However, if this were the case one would expect the pass rate to be improving as weaker candidates increasingly opt for maths literacy. But the pass rate has been fairly stable since 2008. The result is that the proportion of all matric candidates that passes mathematics has declined from 25.6% to 21%, as the final column of Table 1 shows. This must be cause for concern.

[1] Gustafsson (2011), for example, estimates that the 2009 matric pass rate could have been about 15 percentage points higher if learners had chosen different subject combinations; in particular switching from mathematics to maths literacy was the most common such switch.

Table 1: Mathematics outputs since 2008

	Numbers wrote maths	Number passed maths	Maths pass rate	Proportion taking maths	Proportion passing maths
2008	298821	136503	45.7%	56.1%	25.6%
2009	290407	133505	46.0%	52.6%	24.2%
2010	263034	124749	47.4%	48.8%	23.2%
2011	224635	104033	46.3%	45.3%	21.0%

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. This is in line with other research showing that weak assessment practices in many South African schools leads to sub-optimal subject selections. Taylor *et al* (2011) found that within historically black schools the scores of grade 8 learners in the TIMSS 2002 mathematics test bore no relation to whether those learners went on to take mathematics in matric or not.

What should we conclude about the numbers passing matric?

Although the matric pass rate has improved for the past two years, the numbers writing matric have decreased and the number passing matric in 2011 was down from 2010. Table 2 reports these numbers since 2008. The concern with this trend is twofold: From the point of view of the economy's needs the education system seems to be producing less skills; and if the reason for the lower numbers is that children are being held back from matric then the education system is doing worse at providing education to our children. This is why it is important to consider how many of the overall cohort of children starting school go on to achieve various matric outcomes. This has been pointed out in the press but the analysis of such cohort success rates has been weak and inaccurate and there has been no analysis of whether the trend is improving or deteriorating.

Table 2: Matric passes since 2008[2]

	Numbers wrote matric	Number passed matric	Matric pass rate
2008	540562	341505	63.2%
2009	560129	342532	61.2%
2010	546653	373126	68.3%
2011	504368	356242	70.6%

Next I present a cohort analysis looking at the proportions of grade 10 learners that go on to pass matric and the proportions of grade 2 learners that go on to pass matric. First, there are a number of revelations through simply examining enrolments in recent years. Figure 3 depicts enrolments in selected grades since 1994. Several points can be made from the figure:

1) It is clear that there is a lot of attrition between grade 10 and grade 12. For example, there were 1115961 grade 10 enrolments in 2009 but only 534498 grade 12 enrolments two years later in 2011 – roughly half. Some of this, however, would not be attrition but a reflection of high grade repetition in Grade 10.

2) The gap between grade 10 enrolments and grade 12 enrolments has been widening substantially since 1994. This trend is largely due to decreasing grade repetition in earlier grades combined with high grade repetition in Grade 10 which causes a bulging of grade 10 enrolments. This accounts for the trend of more children reaching grade 10, many of whom then drop out prior to matric.

3) Prior to 2003 there were greater numbers enrolled in grade 4 and grade 7 than in grade 10, but since 2003 there have been greater numbers enrolled in grade 10 than in these grades. This confirms point 2 above. An important trend according to household data is that more and more youths are attaining grade 10 and to some extent grade 11. But this cannot be said of grade 12 attainment. This points to a policy contradiction: We encourage youths to stay in school until grade 12 but we do not provide the kind of qualitative improvement that will get them ready for the matric exams.

4) **In 1999 and 2000 the numbers enrolling in grade 1 dropped substantially**, by about half a million. Crucially, it is these cohorts who make up the bulk of the matric class of 2011. This was due to a change in the policy stipulating age of entry into grade 1. According to Notice 2433 of 1998, it was stipulated that children should only be allowed to enrol in grade 1 if they turned seven in that calendar year. Therefore children who previously might have entered in the year in which they turned six were now not allowed to. The policy change was announced in October 1998 and schools were expected to

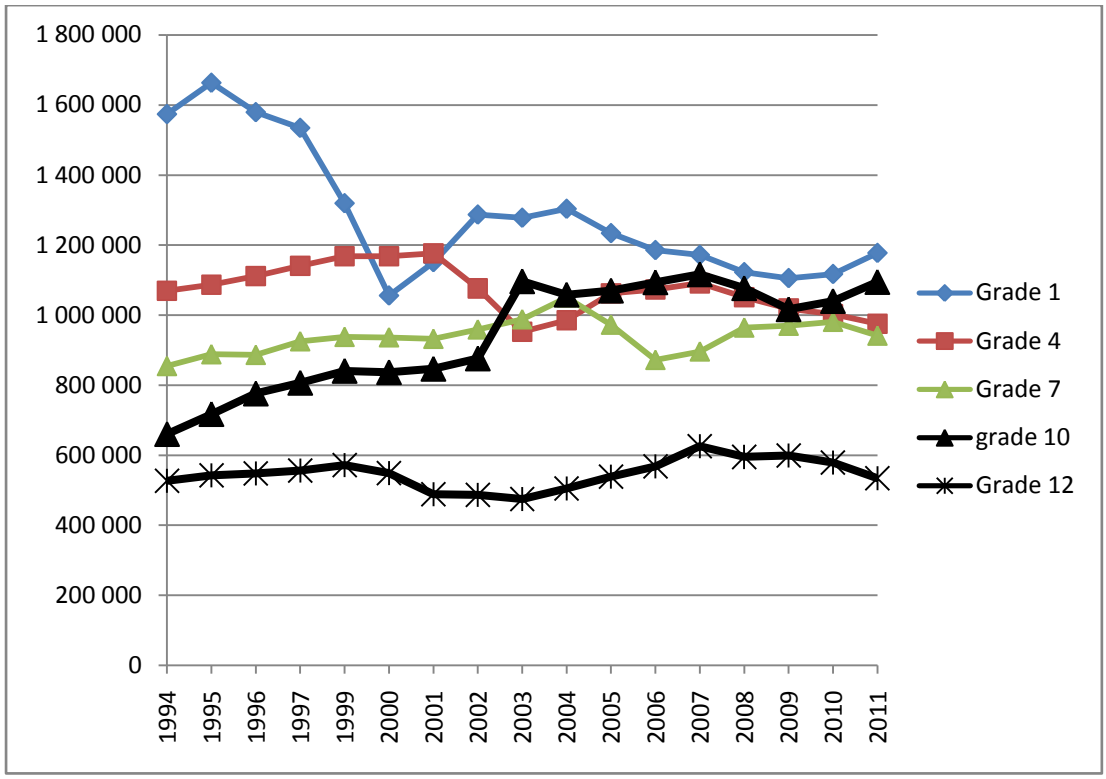
[2] Note that in this analysis only full-time candidates were included. In addition to the typically quoted numbers, I have included IEB matric passes. This results in about 8000 additional passes each year. That is why the pass rates are slightly higher than the official pass rates. The reason for this adjustment is that the analysis uses matric data together with enrolment data, which includes IEB learners. Thus, I avoid comparing Apples with Oranges.

comply by January 2000. This would explain why grade 1 enrolments declined somewhat in 1999 and then again even more so in 2000. The reason why numbers declined as the policy was phased in is that some children who turned 7 in the 2000 calendar year had already entered in the previous year under the previous policy.

5) The drop in grade 1 enrolments in 1999 and 2000 can be traced in higher grades in later years. One can see a drop in numbers for grade 4 between 2001 and 2003, and a drop for grade 7 between 2004 and 2006, and a drop for grade 10 between 2007 and 2009, and a drop in grade 12 between 2009 and 2011. Thus fewer candidates in matric 2011.

6) There may also be demographic reasons for declining cohort sizes, as evident in the lower numbers enrolled in grade 1 and 4 since about 2004. These changes will not be felt in the matric examination for several years still. In fact, judging by grade 10 enrolments in 2010 and 2011, one can expect slightly larger matric cohorts in 2012 and 2013.

Figure 3: Enrolments in selected grades since 1994



Note: Data for 1998 is not available.

Figure 4 provides another perspective to show just how exceptional the matric class of 2011 was. The line for 2011, for example, shows the number enrolled in grade 1 in 2000, grade 2 in 2001, and so forth until grade 12 in 2011. Similarly, each line represents a matric "cohort", although strictly speaking these are not cohorts due to repetition which causes dropping out of a cohort and dropping into a cohort. This repetition explains why the differences in enrolments across the various "cohorts" were large in early grades and converged towards grade 12. Despite this, it can be clearly seen that all through the years, the

matric 2011 cohort was smaller than any of the other preceding or subsequent cohorts. The class of 2012 will be our second smallest cohort. Thereafter, the numbers pick up again.

Figure 4: Quasi-cohorts (2006 to 2014)

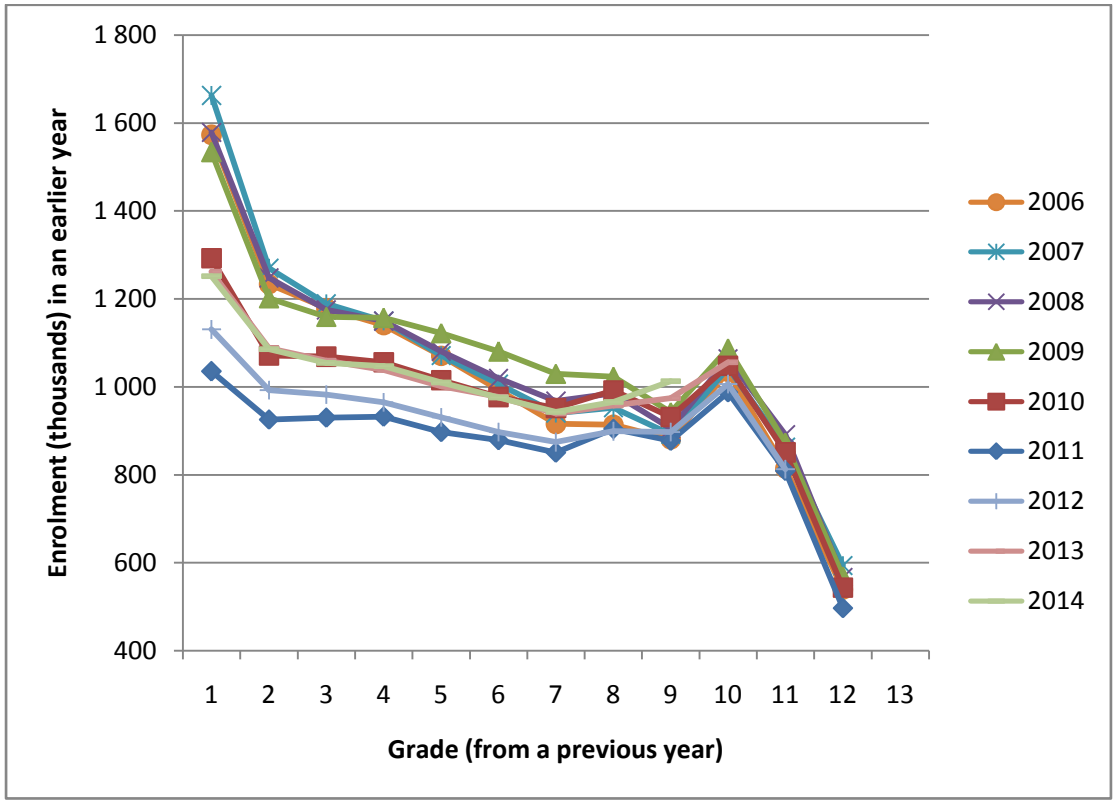


Table 3 shows what could loosely be called "success rates" (and "maths success rates") calculated as the number passing matric (and the number passing matric mathematics) as a percentage of the number enrolled in grade 10 two years earlier. These statistics will be slightly lower than the actual proportion of youths achieving matric passes due to the bulging phenomenon in grade 10. For example, the most recent estimates from household survey data suggest that at least 40% of youths attain matric. The focus in Table 3 should therefore be on the trend rather than the actual figures. The table shows that the Grade 10 "success rate" has been steadily increasing over the last four matric cohorts, as has the proportion receiving bachelor passes. While this should be viewed as a positive trend, it is somewhat discouraging that the proportion of grade 10 learners going on to pass matric mathematics has been declining. This is due to more learners opting for maths literacy rather than mathematics, as observed earlier.

Table 3: The ratio of grade 10 enrolments to matric passes (expressed as a percentage)

	Grade 10 (2 years prior)	Grade 10 ratio	Grade 10 maths ratio	Grade 10 Bachelors ratio
2008 (2006)	1093 297	31.2%	12.9%	9.8%
2009 (2007)	1115 961	30.7%	12.4%	9.8%
2010 (2008)	1076 527	34.7%	12.0%	11.7%
2011 (2009)	1016 360	35.1%	10.7%	11.9%

Table 4 presents similar "success rates" (and "maths success rates") except now they have been calculated as the number passing matric (and the number passing matric mathematics) as a percentage of the number enrolled in grade 2 ten years earlier.[3] The large amount of repetition that occurs throughout the school trajectory unfortunately makes these estimates rather crude, and again downwardly biased. I.e. this is not the proportion of grade 2 children that end up passing matric, but the ratio of grade 2 enrolments in one year to the number passing matric in another year.

The trend appears to be very positive. However, one must caution that this upward trend is likely to be inflated due to the 1999 policy change combined with repetition throughout the grades. The smaller cohort that would have been in grade 2 in 2001 would have been added to each year through repetition. Although this cohort would have lost repeaters downwards each year the number of repeaters gained would have been larger given that the previous cohorts were larger. The "grade 2 maths success rate" seems stable, although the same upward bias probably masks an actual declining trend.

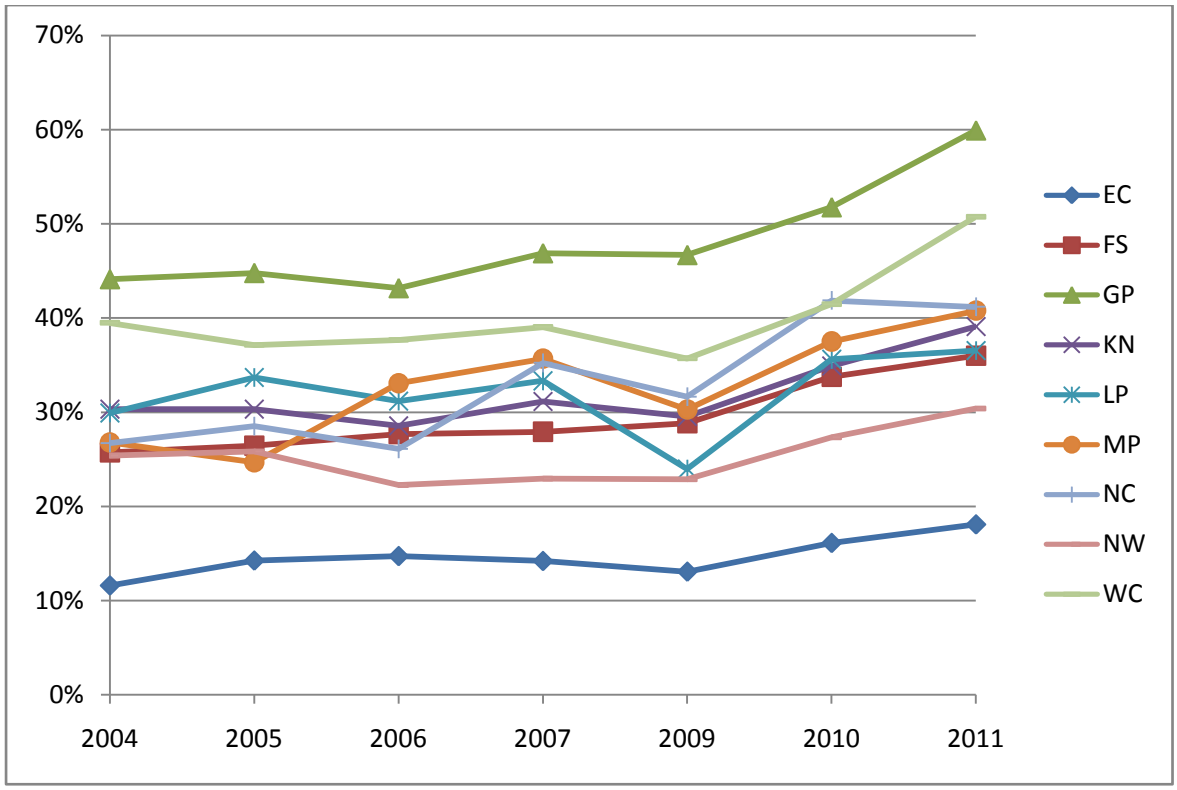
Table 4: The ratio of grade 2 enrolments to matric passes (expressed as a percentage)

	Gr. 2 (1999, 2000, 2001)	Grade 2 ratio	Grade 2 maths ratio
2009 (1999)	1223 529	28.0%	11.3%
2010 (2000)	1090 765	34.2%	11.8%
2011 (2001)	944 977	37.7%	11.5%

Figure 5 shows "grade 2 success rates" over a longer period and for each of the provinces. In most provinces these rates appear to have been fairly stable between 2004 and 2009 and then to have increased in 2010 and 2011 – probably largely due to the upward bias explained above. There are also substantial differences in the success rate between provinces. The Eastern Cape stands out as having a very low conversion rate of grade 2 enrolments into matric passes. It is also interesting that according to this statistic Gauteng seems to be performing better than the Western Cape. Other data show that there is quite a bit of learner migration to the Western Cape (probably due to the perception of better schooling). Therefore, the difference between Gauteng and the Western Cape could be even greater. Household data provides a similar picture: The Gross Enrolment Ratio (GER) for Grades 10 to 12 is 67 in the Western Cape, which is well below that in any of the other provinces. The national GER is 95.

[3] Grade 2 was used rather than grade 1 because there are always high rates of repetition in grade 1 causing larger enrolments.

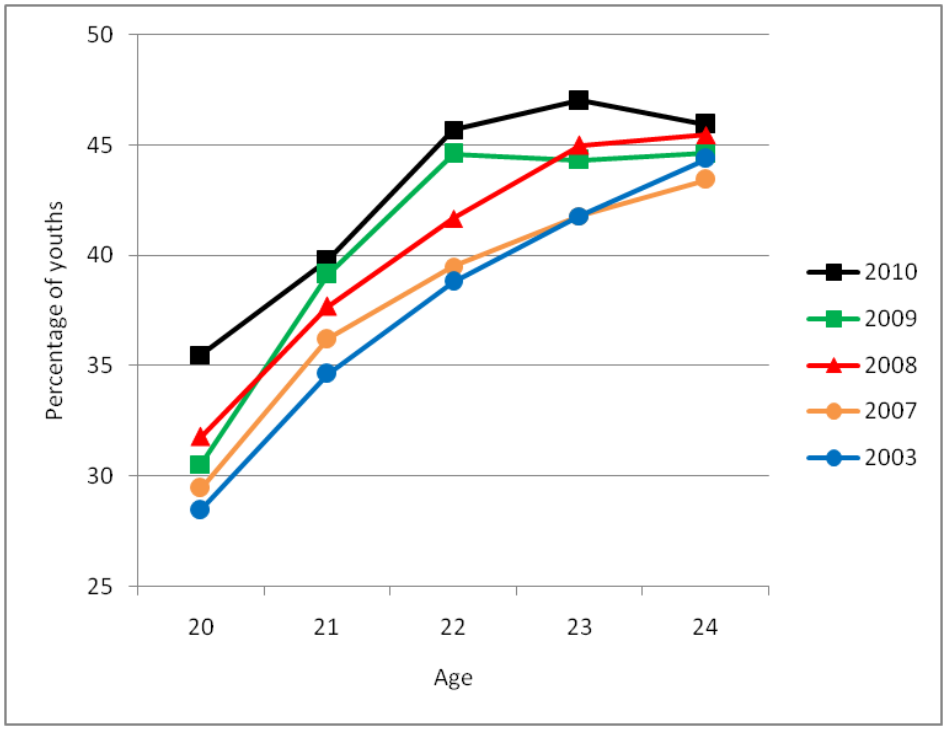
Figure 5: The ratio of grade 2 enrolments to matric passes by province



One should note that changes to provincial borders in 2005 will cause an additional slight bias in the above Figure, except for the 2004 estimates. Provinces that gained people would have had additional matriculants who were not in the original cohort of grade 2's. The cohort success rate for these provinces would therefore be slightly upwardly biased. The reverse will be true for provinces that lost people. Gauteng, the Northern Cape, KwaZulu-Natal and Mpumalanga all gained people in 2005. The Eastern Cape, Limpopo and the North West lost people. There were no changes to the borders of the Western Cape and the Free State. The gains and losses were, however, relatively small compared to the overall populations of the provinces. Therefore one would not expect the estimates in Figure 5 to be substantially affected. Indeed, the estimates for most provinces appear to be fairly stable between 2004 and 2006.

Although the above statistics are useful for interpreting the current matric results, it is worth considering how many youths ultimately attain matric according to household survey data. Repetition does not confound the estimates obtained from household surveys. Figure 6 demonstrates that the percentage of youths attaining a matric has been increasing in recent years. The percentage of 24 year-olds that attain matric now appears to be over 45%. This estimate is probably an overestimate because respondents often say that they have passed matric when in fact they have only attended it. The true figure is therefore probably closer to 40%. Of course matric results from the last few years will only start to affect these statistics in years to come. This household data analysis therefore cannot say anything about the matric class of 2011.

Figure 6: Grade 12 attainment amongst youths



Source: General Household Survey dataset.
Note: For the above graph youths with FET college qualifications were all considered to have a Grade 12 certificate. In reality some do not, though the figures in this regard cannot be extracted from the GHS. However FET graduates are treated in the analysis, the overall picture shown by the graph remains (in the age range in question only around 2% of youths say they have an FET college qualification).

References

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