

FREE STATE DEPARTMENT OF TREASURY

*An assessment of the slow  
improvement in the quality of  
education as a poverty trap in  
the Free State.*

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JEL Classification: I 24.

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## **Abstract**

This paper aims to inform policy-makers and development practitioners with evidence of the slow improvement in the quality of education and its impact in the labour market as a means to address poverty and inequality. Several aspects of education quality influencing attainment levels which are the main outcomes impacted by education were looked at. The analysis focused in mathematics and science results in Grade 12 and ANA results in lower grades for the quality of the education system. Results demonstrate that the slow improvement in the quality of education has a negative impact in the number of learners passing matric with mathematics and science. Therefore slow improvement in the quality of education has a direct impact in lower attainment levels of African youth with a direct impact in the low quality of the labour force. As a result of low quality labour from poor communities, many of them are unemployed, which makes it difficult for poor communities to advance to change their poor conditions of living and address the inequality of income.

Key words: Learners, educational outcomes, attainment levels, labour market outcomes.

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## **1. Introduction**

Since 1994 there has been a fundamental change to the education system, particularly with regard to fostering democratic values and alleviating poverty. The reforms that were done to the education system in line with the above statement, were in administration, governance and curriculum. The introduction of Outcome Based Education (OBE) or curriculum 2005 was to advance an inclusive education and the funding of the education system. However, OBE failed to improve the quality of the education system because it was viewed to have too many setbacks and as a result it was discredited by those who were supposed to implement it. By its design it was a resource hungry curriculum, which was more suited to the middle class and the elite at the expense of children from poor socio-economic background. One of the main draw backs was its lack of specified content, because it placed a huge burden on paper-work for educators which limited contact time with learners and insufficient teacher training especially in huge classrooms.. As a result of the unintended consequences, curriculum 2005 text books were under-utilised and it produced learners who were unable to read and write properly and consequently, it was replaced by the Revised National Curriculum Statement (RNCS). The RNCS was also replaced by Curriculum and Assessment Policy Standard (CAPS) which was implemented from 2012. CAPS is not an altogether new curriculum according to the Department of Basic Education (2012), but an amendment to the National Curriculum Statement which is more accessible and user friendly to teachers. It provides details on what content teachers ought to teach and assess, on a grade-by-grade and subject-by-subject basis. The plan within CAPS also carries an in-service training by educators and management.

The fundamental changes that happened to education in terms of the curriculum, administration and governance were a necessary consequence given the system's past history. However, after all these positive changes which were geared towards a better quality outputs, the resilient legacy of the past with low quality outputs is still with the historically black schools, which raises the question of, 'what can be done to improve the situation'?

The paper is divided into five sections and a conclusion. The first section is the introduction of the subject matter followed by section two which reviews literature on the quality of the education system. Section three reviews the current performance of the education system including the performance of mathematics and science subjects particularly in Grade 12. Section four reviews the educational attainment levels of the youth as a precursor to participation in the labour market. Section five is a reflection of labour market participation,

especially the youth, labour performance and economic performance. The conclusion, limitations of the study and policy considerations concludes the paper.

## **1.2. Background**

In today's judgment, education and schools are looked at as an opportunity for children to overcome the disadvantage of their social background by placing themselves on an equal footing with other races when entering the labour market. As a result education is seen as a crucial policy instrument against poverty as it may help the individual to access better jobs and earn better earnings and thus improve their standard of living. Which means that schools are judged by whether they offer children, especially from poor communities, real opportunities to excel academically and to reach a level of educational achievement that will provide an effective passage out of poverty (S. Taylor et al, 2013). In turn, educational achievement is a good predictor of performance on the labour market, because it acts as a way in which potential employers gauge the potential of their labour, hence attained qualifications are a main asset in worker competition for jobs. However, the participation of South Africa in international educational studies, using international agencies that have influence in educational policies as part of quality improvement for sustaining the demand for education, have realized that the country is lacking behind in terms of the quality of outputs it is producing. This realisation of a relative lack of quality has also been realized in the National Development Plan (NDP) and the New Growth Path (NGP) and it has labour market implications for future access to labour market especially for the poor learners.

## **1.3. NDP/ New Growth Path**

The NDP published by the National Planning Commission is acknowledged country wide as the road map for an improved education and an improved standard of living of the majority of South Africans. The document gives comprehensive reasons for the problems in education and the reasons for underperformance and a way forward in the system. According to the NDP report, the quality of education for most black children is poor. This assertion means that most children are denied future access to decent employment. It further reduces the earnings potential and career mobility of those who do get employed and limit interest. The report lists some of the structural and systematic factors that prevent learners from progressing in schools.

#### **1.4. Objective of the study**

The main objective of the study is to examine whether the current quality of the education system increases educational attainment especially of the youth and reduces unemployment and inequality among learners from poor communities in the Free State. Secondly, whether the quality of education perpetuates an on-going cycle of poverty because of a lack of participation of the poor youth in the labour market. Further, we wish to answer the question whether is there any real improvement in the quality and number of learners taking mathematics and science subjects in the province as a measure of quality of the education system. The main hypothesis is that both quality of the education system, education attainment and participation or access to the labour market are a necessary condition that will improve the social wellbeing and reduce unemployment and inequality, especially income inequality among the poor communities who are in the main the African majority. It should also be noted that labour market outcomes influenced by education are diverse and there are other ways through which education operates when generating its effects.

The quality of the education system in general is measured in terms of the efficiency and the effectiveness of it. The efficiency of the system is a measure of the system's outputs without wasting resources. The indicators of internal efficiency of the system are its dropout rates, repetition rates and the pass rates. The external efficiency of the system means that the system will be efficient if more learners receive higher earnings from future labour participation. Therefore, an increase in the quality of the education system should in turn lead to an increase in productivity and therefore an increase in economic growth rate. The effectiveness of the system is also related to students' cognitive skills, and traditionally these cognitive skills have been measured by using standardized test.

The answers to these questions should inform the Treasury Department, the Education Department and the government in general on policy debates about the slow improvement of quality in the education system as a poverty trap, and how best can educational attainments that lead to access to labour market be improved.

#### **1.5. Methodology**

For methodological guidance, the main source of data are tests provided by testing agents, SAQMEC and TIMMS South Africa on mathematics science and English language in lower grades for literature review. Trends of mathematics and science subjects in Grade 12 over a period of time from the Department of Education. For lower grades also the Annual National



Assessments (ANA) results from EMIS will be used, though the available data is at an inception stage, and inconclusive, it offers some insight into the lower grades performance and quality. Data from Statistics South Africa on employment and unemployment of labour especially participation of the youth in the labour market will be used to measure the impact of education on the labour market. However, the use of mathematics and science subjects in Grade 12 from EMIS data is a practical rather than an ideological choice which focuses on trustworthy nationally produced results and does not deny the importance of other subjects associated with the broader education.

## **2. Literature Review**

### **2.1. Educational studies conducted**

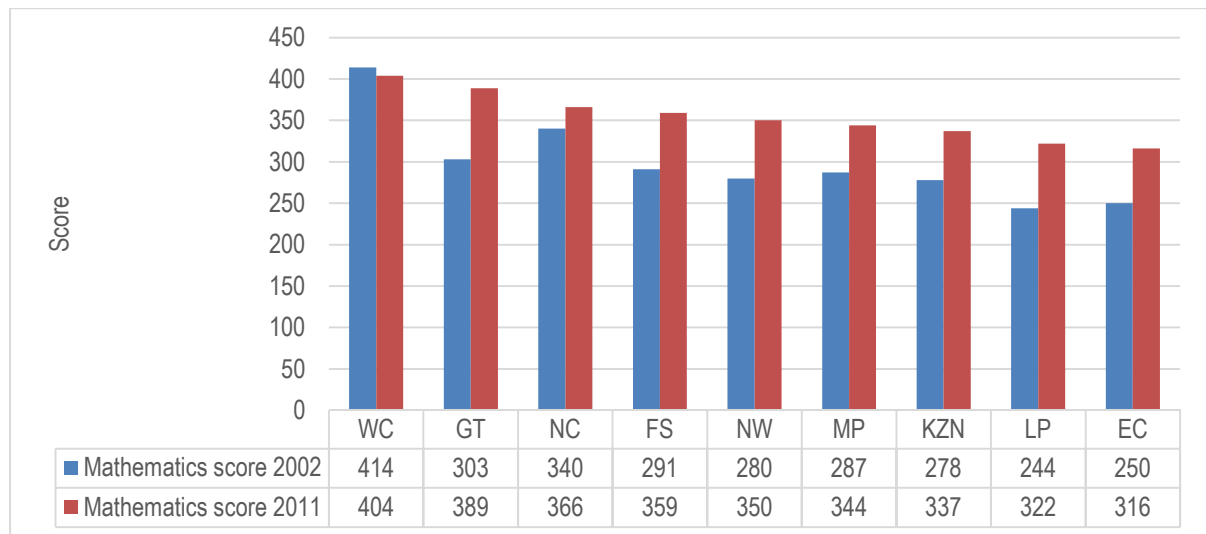
There has been numerous international and local studies conducted in South Africa to monitor the quality of education. The tests were primarily aimed at testing what pupils know in comparison with the rest of the country and/or the rest of the world, and the aim was to enable researchers and policy makers to assess the level of achievement of learners in the country and be able to compare it with the rest of the world. There are three main tests of educational achievement that South Africa participates in, and they are; TIMMS (Trends in International Mathematics and Science Study, 1995, 2002 and 2011), SACMEQ (Southern and Eastern African Consortium for Monitoring Educational Quality, 2000 – 2007 [Grade six numeracy and quality]) and PIRLS (Progress in International Reading Literacy study). Some of these tests like the TIMMS can be cascaded down to the provincial level. However, provincially there has never been any specific tests done internally or by an outside body to test the knowledge of Free State learners on record.

The results from TIMMS were that, in terms of the achievement scores for mathematics at the Grade 8 level internationally, five Asian countries achieved the highest test scores and they are, Korea, Singapore, Chinese Taipei, Hong Kong and Japan (Reddy, 2011). The five countries have achieved average scores above the international benchmark of 550, for both mathematics and science. At the Grade 8 level, the lowest performing countries who performed below the benchmark score (less than 400) are Saudi Arabia, Indonesia, Morocco and Ghana. South Africa, Botswana, and Honduras, administered the test at the Grade 9 level because the Grade 8 level was too difficult for learners and all three demonstrated low performances at the Grade 9 level achieving 397, 352, and 338 respectively (Reddy, 2011).

As shown by Reddy (2011) for science South Africa achieved 332, Botswana 404 and Honduras 369. Reddy further elaborates that one of the features of the mathematics and science scores is that the most proficient learners in South Africa approached the average performance in Singapore, Chinese Taipei, Republic of Korea and the Russian Federation. The provincial comparison is, however, discussed in detail because it gives a clearer picture closer to home of the achievements of learners.

### 2.1.1. TIMMS Data Sets

Figure 1: Mathematics score from TIMMS.

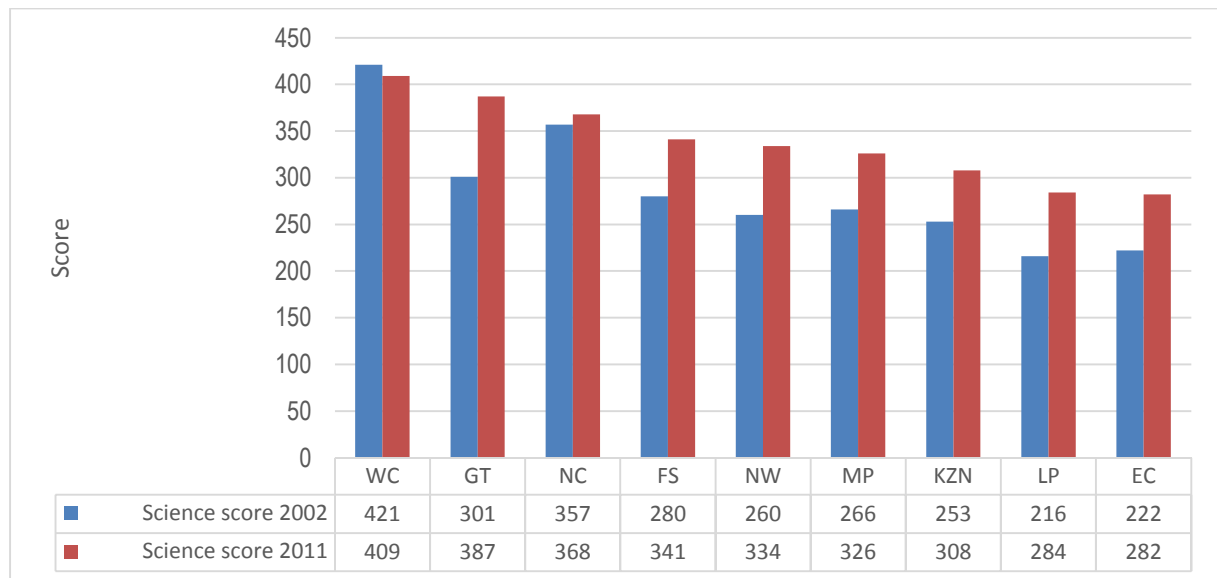


Source: Reddy et al. (2011).

The performance of learners in South Africa also differ according to provinces as evidenced by figure 1 above, however the race differences are not captured. The Western Cape, of which the majority of learners (about 68%) spoke the language of test, have performed better than the rest of the other provinces with just above the 400 average score. Followed by Gauteng and the Northern Cape with 389 and 366 respectively in 2011, and both have also shown some higher usage of the language of test at home especially the Northern Cape. The last three provinces are KwaZulu-Natal, Limpopo and Eastern Cape. Although all the provinces are low in international comparison, there is a great improvement in TIMMS 2011 in terms of the achievements. The average score increased in all the provinces, except for the Western Cape, with Gauteng recording the highest increase with 86 points, followed by Limpopo with 78 points and Free State at number 4 with 68 points. The Western Cape decreased slightly by 10 points.

The top three performing physical science provinces in figure 2 are the Western Cape (409), Gauteng (387) and Northern Cape (368), and the lowest performing provinces are KwaZulu-Natal (308), Limpopo (284) and the Eastern Cape (282). Free State (341) seemed to be in the middle of provincial performance. As was the case with mathematics results, the average scale score for science has increased in 2011 as compared to 2002. The highest increase in score was in Gauteng (86 points), followed by North West (74) and Limpopo (68), and the Free State increased by 61 points. There was a slight drop in the average scale of the Western Cape by 12 points and they were statistically insignificant according to Reddy (2011).

Figure 2: Physical Science score from TIMMS.



Source: Reddy et al. (2011).

The difference between the performance of the highest and the lowest performing provinces was 170 for mathematics and 205 points for science in 2002. The difference in 2011 was 88 points for mathematics and 127 points difference for science, which is a significant decrease. Reddy and Prinsloo (2011) found that if schools are ranked according to the different types of schools, independent schools achieved higher average scores in both mathematics and science followed by quintile 5 schools, followed by quintile 4 schools, quintile 3, quintile 2 and quintile 1 were very close to each other. The public schools score for mathematics was 348 and the independent school average was 474; for physical science the public schools score was 327 and the independent schools score was 479. Therefore, the more resourced schools relatively performed better. If the schools are classified according to their former pre 1994 classifications, the historically White schools performed better than the historically Black and Coloured schools.

### **2.1.2. SACMEQ Data Sets**

The SACMEQ II (2000) and SACMEQ III (2007) showed that there was no improvement in the South African Grade 6 Literacy and numeracy performance according to Moloji (2011) over the seven year period. The results showed that 63 percent of learners were not competent in reading levels 1 to 4 in 2007 compared to 66 percent in 2000 (Spaull, 2013; Moloji, 2011). In comparison with other countries that participated in the study, South Africa was ranked 10<sup>th</sup> out of the 14 education systems for reading and 8<sup>th</sup> for mathematics, behind much poorer countries like Tanzania, Kenya and Swaziland. The results of learners for mathematics were more differentiated across the eight levels were 35 percent of learners were at level 2 in 2007 compared to 44 percent in 2000 (Moloji, 2011). The South African results show that very few learners were displaying competencies at level 8 and this level also decreased when compared to 2000. In both 2000 and 2007, Western Cape and Gauteng had learners achieving scores above the SACMEQ mean (500) in both reading and mathematics as postulated by Spaull and Moloji. Half the Grade 6 learners in Limpopo province about 49 percent could not read a short and simple text and extract meaning, with the proportion varying for other provinces, while the Western Cape only 5 percent of learners could not read a simple text (Spaull, 2013).

### **2.2. The impact of socio-economic status on education**

The impact of socio-economic status (SES) on Free State learners is almost similar to that of South African learners in general terms, which is highly unequal and exacerbated by unequal racial and socio-economic status according to Taylor and Yu (2009). As a result of the unequal socio-economic status along racial lines, the performance of learners in South Africa and the province follow a similar pattern with low performances associated with low SES. The performance of schools is also segregated according to the historical separate education departments before 1994 and according to the different racial lines with former black schools performing disturbingly low and former white schools performing up to the expected standard. This explains the fact that more of the variance in student reading and mathematics score is explained by the school SES than by the student according Taylor et al (2009). This would imply that a critical dimension to understanding the overall performance of the South African students especially in PIRLS 2006 and as explained by Taylor et al is to focus on differences in school quality throughout the education system (2009). Since there is evidence of the role played by SES as a determinant of quality in the school system it is enough evidence to warrant an investigation into its role in the school system.

### **2.3. The importance of school socio economic factors**

There is an interplay between individual socio-economic status and school average socio-economic conditions. According to Taylor (2013) learners of identical socio-economic background tend to perform differently depending on which part of the school system they participated in and this fact was also mentioned by Reddy (2011). Taylor purports that learners accrue benefits through moving from poorly performing schools to more affluent performing schools or sub-system of schools. However, what is more of a concern is that there is very little effect of the learner's own individual socio-economic status in the majority of black schools. Similar findings were also reported in the PIRLS (2011) outcome, where they found that school characteristics impacted differently on learner achievements across the historically different school systems. Class size was not associated with large differences in learner achievement within the Afrikaans and English sample of schools, but class size in the African schools were associated with worse learner achievements in the majority of poor schools (Taylor, 2013). More frequent testing and class exercises were also linked to better performance within the African language sample, but not the Afrikaans and English sample (Taylor, 2013). What was not found to be clear in the PIRLS findings was the influence of teacher characteristics in the reading achievement.

However, there is intervention through the introduction of a five year plan for improving teaching and learning as announced on 5 November 2009 by the minister of Basic Education, Mrs. A. Motshekga. Despite several successes in secondary and post school provisioning, there is a need in addressing current problems of high unemployment rates both provincially and at a National level for the 18 to 35 year old cohorts in general. Focused strategies should be introduced and aimed at solving the high unemployment rates of the youth and of which some of them could be involved in some form of post school studies as also shown by Sheppard (2009)

### **2.4. The relationship between education and labour market outcomes**

There are various ways in which education has an impact on labour market outcomes and they include: years of schooling; schooling quality; educational attainment; attainment of a particular credential; individual's educational track record and many more other factors and relationships. According to Ionescu (2012), educational attainment has net effects on occupational status because higher education provides a substantial advantage over a high school qualification. On the hand a secondary school qualification and a post-secondary school qualification provides a better occupational status than a primary school qualification.

Another hypothesis from Ionescu (2012) is that attainment of a particular credential offers potential employers with more accurate information on a particular employee thus enhancing the employability of that particular employee. There is a general agreement from many researchers including Ionescu that investment in education facilitates the access to skills and thus enabling people to get better jobs or create one for themselves. Better educated people normally have lower unemployment levels which also decline with increasing levels of education according to Rose (2001) and Ionescu (2012).

### **3. Interpretation of Educational outcomes**

In this section we look at the education outputs from different grades as representing quality in the school system. And quality is a representative of the success of individuals in a school career. However quality is also affected by equity in educational spending. In short, analysis of educational fiscal policy is explicitly pro-poor in design and in practice. Schools are funded according to different quintiles, but what is significant is that, quintile 4 and quintile 5 can still raise a lot of money through charging school fees and as a result they still have an advantage of better resources as compared to the poor schools. An increase in the fiscal allocations to poor schools also needs some attention in terms of their overall performance.

#### **3.1. Annual National Assessment**

Since the PIRLS data sets outcomes has shown that continuous assessment especially in the South African school system can improve the results and quality considerably if employed, Annual National Assessment (ANA) was a direct response to that effect as an intervention strategy.

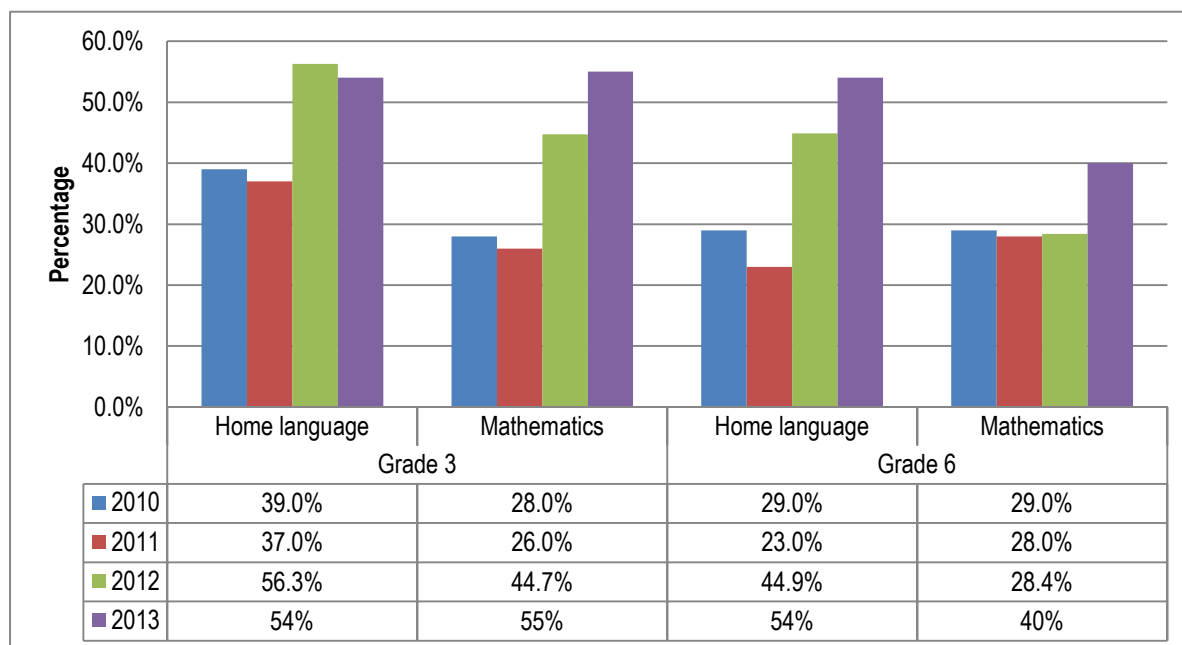
The Annual National Assessments are a set of nationally standardised assessments for mathematics, home language and first additional language (introduced in 2013) in Grade one to six and Grade nine. They are a hallmark achievement for The Department of Education and a response to earlier studies of learning deficits of most of the children nationwide. The ANA tested every single child in the country in Grade 1 to Grade six and Grade 9, and they also represent the largest data-gathering exercise in the country apart from the normal census. The main aim of ANA according to the Department of Basic Education is to identify the gaps in teaching and learning and improve the learning success levels of learners. The results of

the exercise are supposed to be used to compare primary schools, across provinces, districts, nationally and overtime.

Figure 3 shows that there is a sound improvement in the learner achievement in 2013 as compared to the three previous years both in grade three and six home language and mathematics. The 2013 Grade six mathematics statistics improved by 11.6 percentage points from 28.4 percent in 2012 to 40 percent in 2013. The home language in 2013 Grade 6 improved by 9.1 percentage points. The Grade 3 home language declined marginally from 56.3 percent in 2012 to 54 percent in 2013. Grade 3 mathematics improved by 10.3 percentage points from 44.7 in 2012 to 55 percent in 2013. The improvements in ANA achievements are welcomed but they need to be sustained and improved upon to levels above 50 percent.

ANA could help in producing high quality education at an early stage in primary level, which has also been proven by Fasih (2008), and it can generate the highest returns to education, both at primary level and all levels thereafter. This is because early investment in cognitive and non-cognitive skills produces high returns and lowers the cost of education by making education more efficient.

Figure 3: ANA results, 2010 to 2013.



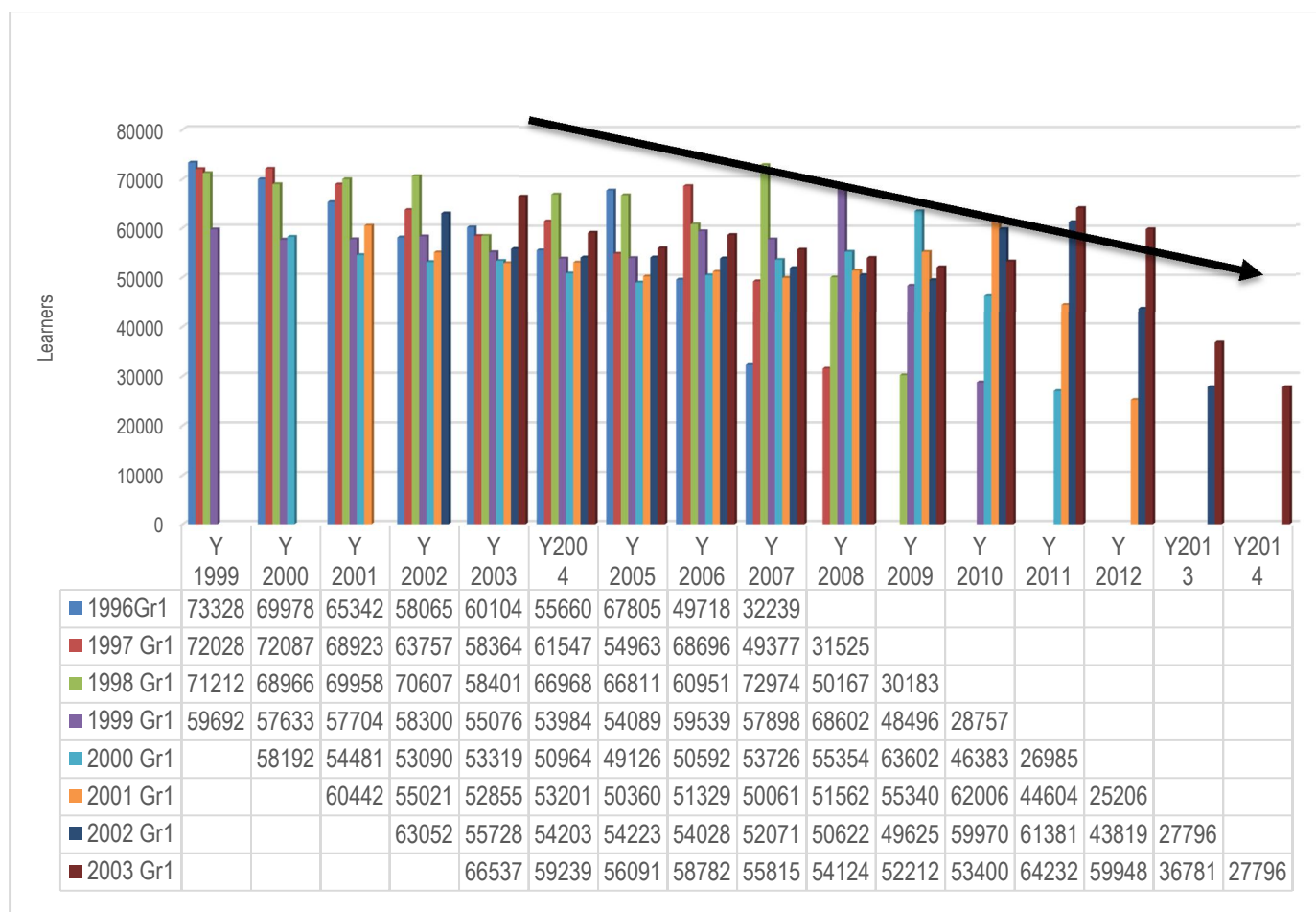
Source: Free State Department of Education. (2012, 2013).

*\*Note: Before 2013 results reflect only Home Language (literacy) not First additional language as split in the 2013 results, therefore 2013 should be interpreted with caution.*

### 3.2. Dropout rates and Retention rates in the system

Successes has been achieved with regard to providing primary and some secondary education for learners in South Africa. However the quality of the system is being compromised by the learners dropping out of the system in higher grades of secondary education. This is a matter of concern because a number of learners are able to reach secondary school but fewer learners are able to progress through the system and pass Grade 12.

Figure 4: Progression of Grade 1 cohorts to Grade 12, 1999 – 2003 and 2010 – 2014.



Source: Free State Department of Education, EMIS. (2012, 2013, 2014).

Figure 4 shows that the number of learners that started Grade 1 together decreases as they approach grade 12 for all of the years under review. In 1999 there were 59 692 Grade1 learners and in 2010 when that cohort reached Grade 12 only 28 757 learners were left in the normal school system, which is about 48.18 percent of learners remaining in the system as counted in Grade 12. The 2000 learner cohort when they reached Grade 12 only 46.37 percent of learners were counted in Grade 12. For 2001, 2002 and 2003 the number of learners



counted in Grade 12 were, 41.40 percent, 44.08 percent and 41.78 percent respectively. The drastic decrease in the number of learners sitting for exams in Grade 12 is a reflection of the inefficiency of the system to hold on to learners up to Grade 12. Many of the learners have dropped out of the system and a few of them might be traced to FET Colleges, though tracing them is made difficult due to data availability and learner identification system that is not up to standard. Some of the problems encountered in including learners from the FET colleges are that some of the learners in FET are either over age, have passed their grade 12 and are improving their pass levels, hence very difficult to count. However the role of the FET in the general education system is very important.

### **3.3. Grade 12 output**

More often attention is constantly given to matric pass rates because it is the yard stick used to measure quality of the education system throughout the country and to a certain extent compare the different provinces to each other. What is not measured and compared to each other in the same way as the matric results is the number of learners that dropout of the system. There is no direct measurement of dropouts in the system, and as a result the real output at the end of grade 12 is compromised to a great deal. The problems of dropout in the system are more profound from grade 10 to 12, not that other grades do not have the problem, but it gets a little out of control in those grades.

Table 1: Summary of Grade 12 pass rates, 2008 - 2014

	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Candidates who wrote	35716	30219	27416	25784	24265	27105	26404
Batchelor passess	6279	5987	5833	6768	6937	8961	7987
Percentage batchelor passess	17.06%	19.80%	21.30%	26.20%	28.60%	33.10%	30.20%
Total diploma passess	8598	8611	8109	8305	8553	10089	9754
Percentage diploma passess	24.10%	28.50%	29.06%	32.20%	35.20%	37.20%	36.90%
Free State pass %	71.80%	69.40%	70.70%	75.70%	81.10%	87.40%	82.80%

Source: Free State Department of Education. (2014).

Table 1 above is a summary of Free State grade 12 results from 2008 to 2014 and it shows the quality of the grade 12 pass rates. the batchelor passes which represents learners who qualify for university entrance in terms of the final marks that they receive has increased from 17 percent in 2008 to 33.10 percent in 2013, before declining slightly to 30.20 percent. This is an indication of an improved quality if viewed on its own. This is because the number of

learners that receive the bachelor passes a far fewer if we compared to those that started together in grade 10. Nevertheless the bachelor passes are a reflection of the good pass rates that the province had received in from 71.80 percent in 2008 to 87.40 percent in 2013 and 82.80 percent in 2014. The decrease in the number of learners failing grade 12 is significant enough to say that more learners are passing matric and is also evident in the attainment levels of the youth. Today's youth are becoming more educated than their parents, however the pace is slower because of the number of dropouts before they could reach grade 12.

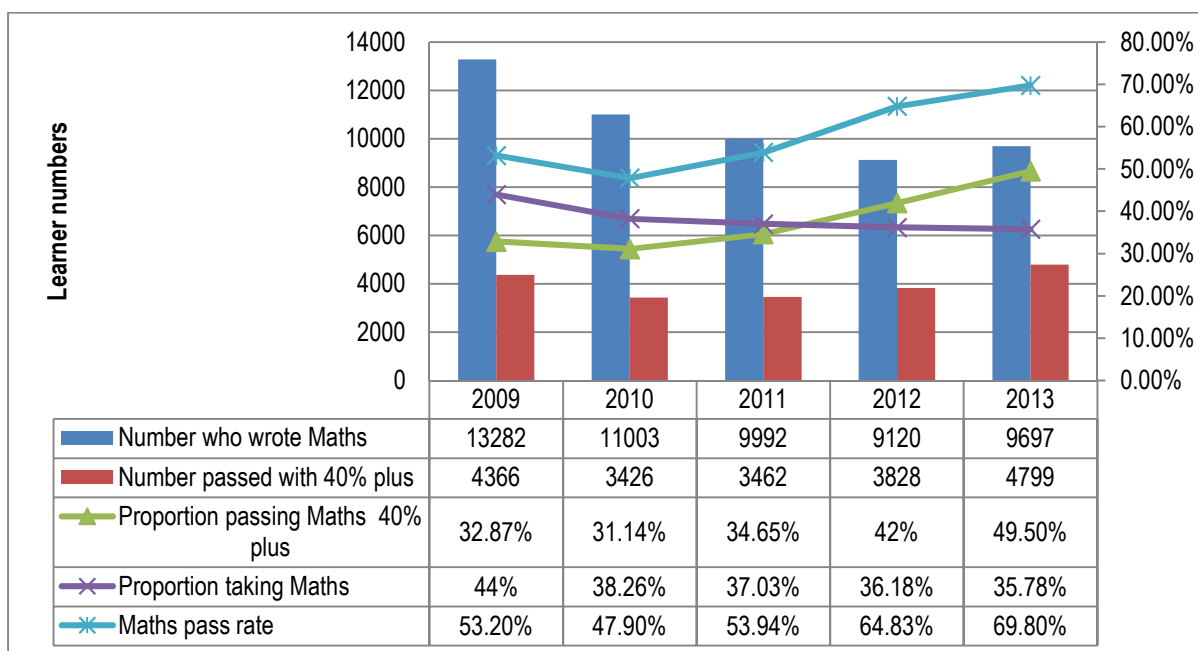
### **3.4. Grade 12 Mathematics and Physical Science output**

From a study that was conducted by Rose and Bets (2001), they found that Maths is the first step in an effort to look carefully at what schools are offering to students and how those offerings affect their long term economic and social wellbeing. Taking Mathematics at school has a direct causal effect of success in post school education and higher earnings later in life as postulated by Rose (2001). Therefore, performance in Mathematics has a very important role to play especially among the poor children because it explains part of the success of learners and their quality in post-secondary education.

Taken differently, the performance in Maths and science is one of the main indicators to assess quality of our education system. Mathematics is regarded as an essential tool in many fields in the modern world because of its adaptability and general usage in the modern world. Therefore, the performance of learners in Mathematics becomes an integral part of the quality of the education system of any country.

Figure 2 below depicts the performance of Free State learners Grade 12 in Mathematics from 2009 because it is the year of implementation of the new curriculum in Grade 12. Only Grade 12 mathematics results are captured because of availability and ease of analysis as compared to mathematics of other grades.

Figure 5: Mathematics pass rate, 2009 – 2013.



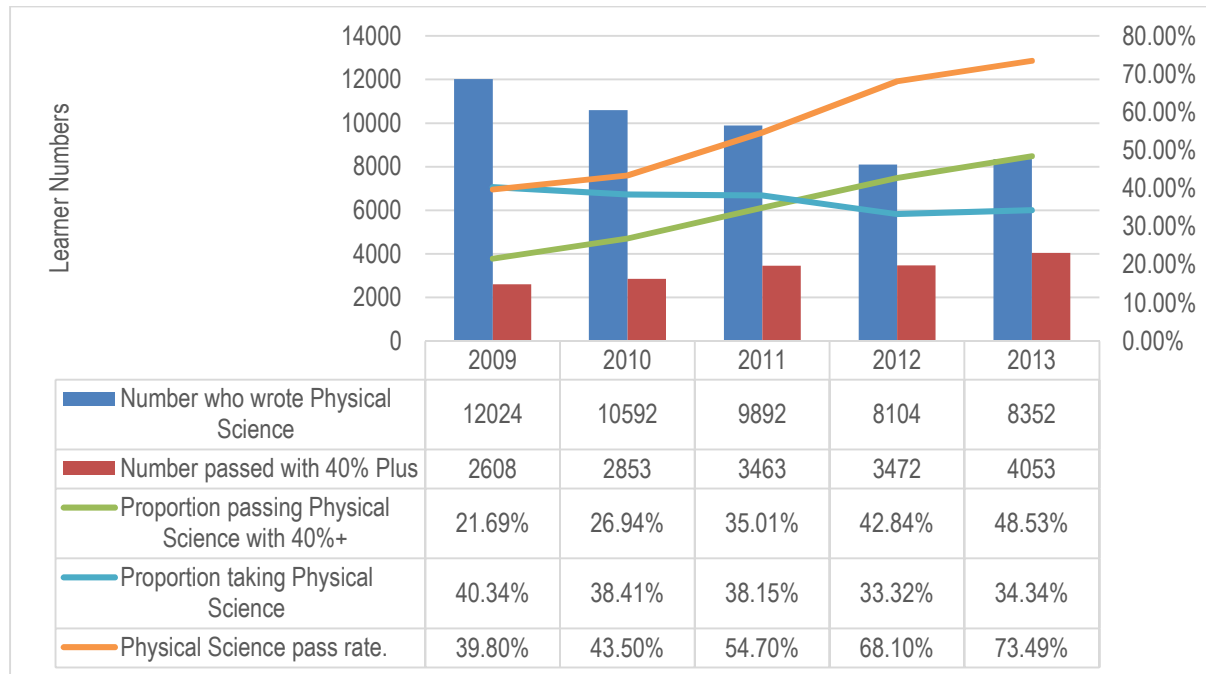
Source: Free State Department of Education. (2013).

According to figure 5 above, the number of learners taking Mathematics in the Free State has decreased from 13 282 in 2009 to 9 120 in 2012, before increasing slightly to 9 697 in 2013, which is a 31 percentage decrease for the period under review. The proportion of learners taking Mathematics in Grade 12 has declined from 44 percent in 2009 to 35.78 percent in 2013. The Department of Education is faced with a mammoth tasks of encouraging learners to take Mathematics and its related subjects as the number of learners enrolling for these subjects is declining. However, there is a great improvement in the number and the proportion of those passing Maths with 40 percent plus. The proportion passing Maths at 40 percent plus increased from 32.87 percent in 2009 to 49.50 percent in 2013, which is an increase of over 16 percentage points. The overall Maths pass rate increased from 53.20 percent in 2009 to 69.80 percent in 2013, which is an improvement of 16.6 percentage points. Mathematics pass rate and the proportion passing with 40 percent plus should encourage more learners to take the subject than they are currently enrolling. The Department of Education should put measures in place that will fast track more enrolments in Mathematics in Grade 12 by employing competent mathematics teachers at an early age or primary level where the mastery of the subjects is at its critical stage.

The Physical Science Grade 12 pass rate is also used instead of other grades of Physical Science because of things like different assessment standards used in those grades which

renders analysis and comparability problematic. Like in Mathematics the analysis starts in 2009 with the implementation of the new curriculum.

Figure 6: Physical Science pass rate, 2009 - 2013.



Source: Free State Department of Education. (2013).

Figure 3 shows Physical Science pass rate from 2009 to 2013, which follows a similar trend to that of Mathematics pass rate, figure 2. The number of learners taking science at Grade 12 in 2009 were 12 024 and decreased to 8 104 in 2012 before recovering slightly to 8352 in 2013. The proportion of learners taking physical science in Grade 12 decreased from 40.34 percent in 2009 to 34.34 percent in 2013 a decrease of 6 percentage points. The proportion of learners passing physics at 40 percent plus improved from 21.69 percent in 2009 to 48.53 percent in 2013, which is an increase of 26.84 percentage points. The increase in the proportion passing physics with 40 percent plus is an acknowledgement of the good work done by the Department of Education to equip all schools with laboratories and consequently the physics pass rate. The overall Physical Science pass rate improved from 39.80 percent in 2009 to 73.49 percent in 2013, an improvement of 33.69 percentage points. The good pass rate can be greatly enhanced by more learners enrolling for the subjects, which needs a little encouragement especially in lower grades. The department of education should start looking into reducing the fear of learners in taking physics and Maths as subjects while maintain and improving on the pass rate, especially the proportion passing physics with 40 percent plus.

### **3.5. The causal effects of Mathematics and Physical Science**

According to Falch, Nyhus and Strøm (2013) a number of scholars have studied the effects of Mathematics and Physical Science (science) related subjects in earnings. What they find was that the additional course work in Mathematics is correlated with success in college and later increases in earnings, especially for low-skilled students. It has also been proven by Rose and Bets (2001) that students who takes Maths at school are likely to complete their college or university studies. The reason is that the skills that they learn through Mathematics are more widely applicable to other learning areas and indirectly makes learners more productive. Mathematics teaches students more reasoning and logic that indirectly make them more creative. The more the learners can adapt to new learning methods and new ways of doing things the more they are able to cope with the demanding challenges of colleges and universities. Success in colleges and universities means that learners will be able to cope with the demanding job situations and therefore, more highly paid positions. Consequently, the more learners enrolling for Mathematics and Science subjects, especially those from the poor communities, the higher the probability of them completing their college or university studies.

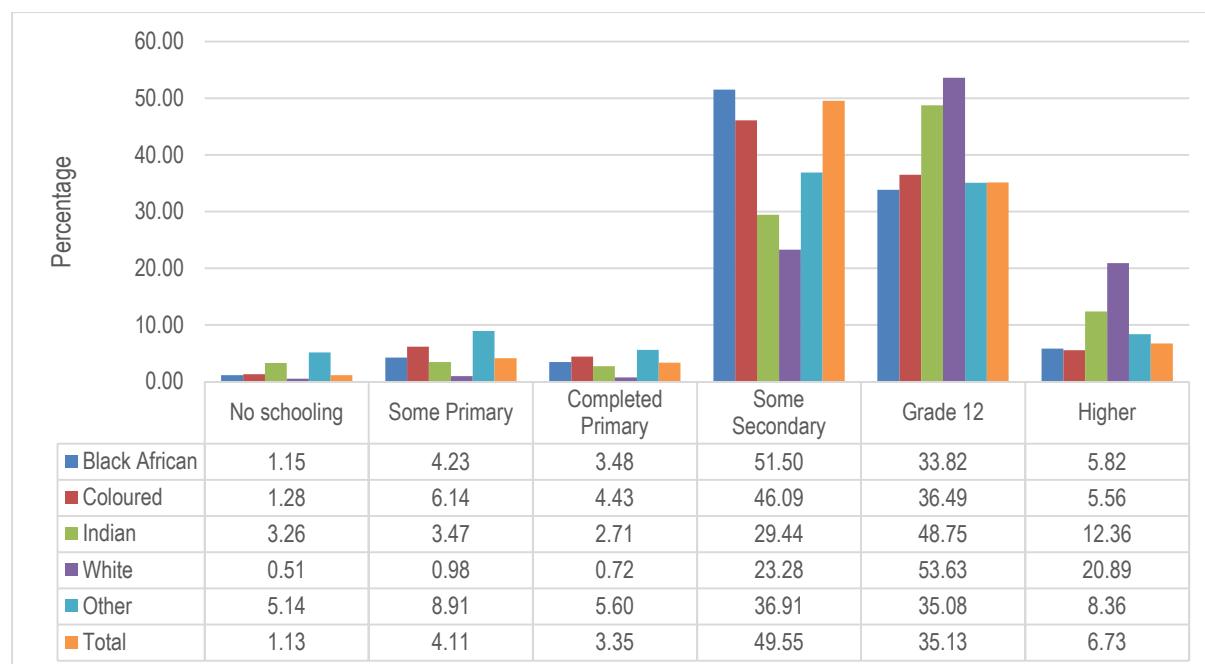
Learning and mastering mathematics and science at school is a precondition for a more sharpened cognitive effect. It is also imperative that schools should start looking into ways and means to prepare learners to start enrolling for Maths to increase the proportion from 35 percent to around 50 percent especially in poor communities in grade 10, and rigorously assist learners from grade 10 onwards. Assistance to learners could come in the form of having formal extra Maths classes, so that they cope from an early age at lower grades. It has also been proven that the more time spent studying mathematics the better it becomes and the lesser the fear to those who have doubts about enrolling the subject. It should also be taken note of that most of the learners who fear taking Maths at secondary schools are poor African learners. The reasons for not taking Maths are part and parcel of the past i.e. few educators who master the learning area, pressures associated with good matric pass rate, fear of the unknown, lack of motivation etc. As a result the majority that are affected are the poor. Some of the factors that add to the problem of fewer Maths learners especially from poor schools are educator related, like; educator absenteeism, educator accountability and levels of educator stress. However the latter factors related to educators will not be disentangle at this paper, even though they form part of the relevant variables or equation.

## 4. Free State Attainment levels.

### 4.1. Attainment levels of the 18 to 25 year olds in the Free State

The main focus in this section is to provide an overview of the education attainment of the youth in particular and of the Free State population in general, since their level of education impacts directly on their employability. Attainment levels plays a very important role in determining labour prospects. Having left school early and or having received a low quality education like most children from poor households which are in the main the African children, are less likely to obtain a stable and a rewarding job. A rewarding job is one of the most important source of income for the great majority of poor households, therefore a good employment is one of the core means to escape poverty. Poverty can perpetuate itself through low educational attainment as a result of low quality education and resulting in dismal labour market prospects. The attainment levels of the Free State reflects a dire situation for the poor households.

Figure 7: Attainment levels in the Free State, 18 – 24 year olds, 2011.



Source: Statistics South Africa, Census. (2011).

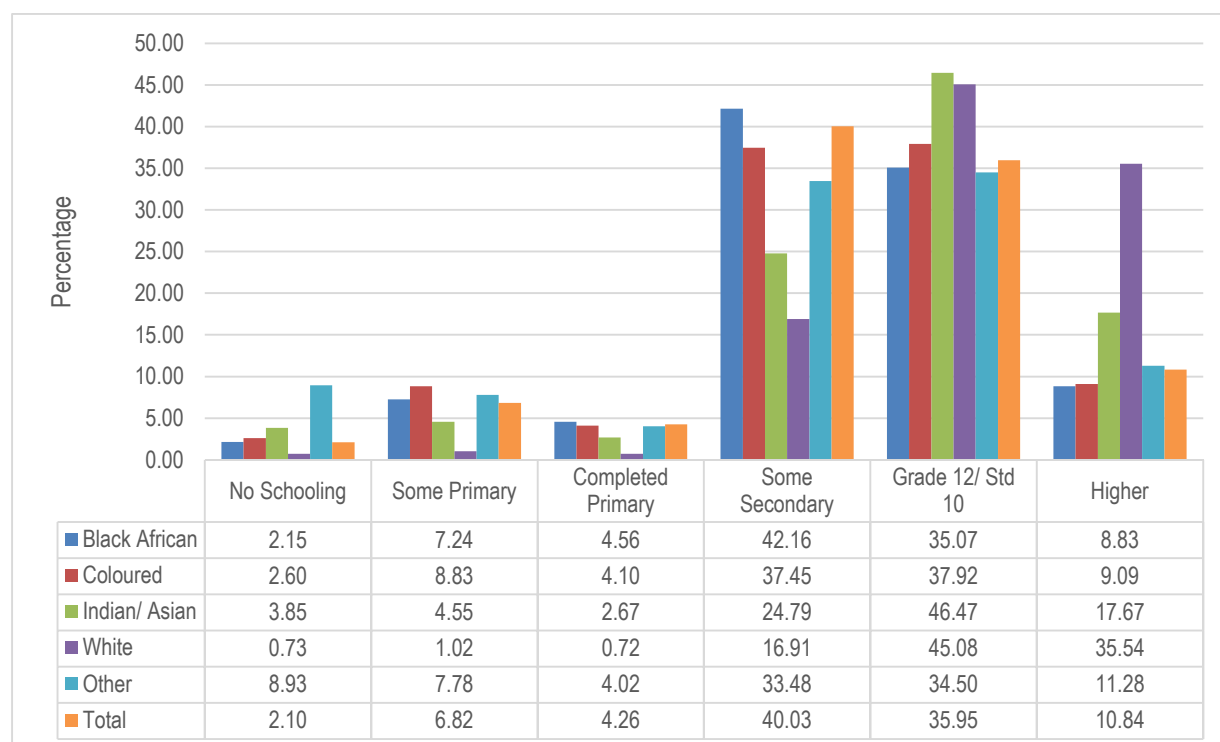
According to figure 7, the Free State attainment levels of the 18 to 24 year olds is dominated by persons with some secondary education within the overall population at 49.55 percent. The share of those with primary and no schooling at all is shrinking rapidly in this age group of the population if we compare census 2001 and census 2011. The focus is more on a younger

generation than the whole of the population in order to gauge the impact of the education system on youth and their participation in the labour market. The share of the youth with some secondary education and below is dominated by the African population with 60 percent plus, followed by the Coloured group with 57.94 percent. The share of the white population with some secondary and below accounted for 25.49 percent. However the share of the African population with grade 12 is at 33.82 percent followed by the Coloured community at 36.49 percent. The share of the White community with grade 12 is at 53.63 higher than the Indian community at 48.75, though the numbers of the Indian community in the province are very small. There is a disturbing after grade 12 attainment levels or success rate where the White community are at 20.89 percent as compared to the African community with a meager 5.82 success rate after grade 12. The low attainment levels of Africans at grade 12 in the age group 18 to 24 and beyond is also a reflection of a vicious circle impeding their social mobility at an early age. Therefore attainment levels of the African youth population are the lowest after grade 12 at 33.82 percent as compared to 53.63 percent of the white population

#### 4.2. Attainment levels of the 25 to 35 year olds.

The attainment levels of the 25 to 35 year olds are more stable than their 18 to 24 counter parts who still have some members studying or enrolled at an educational institution.

Figure 8: Attainment levels in the Free State, 25 – 35 year olds, 2011.



Source: Statistics South Africa, Census. (2011).

Figure 8 shows that the majority of the people in the 25 to 35 age group (54.21 percent) in the Free State have attainment levels below matric, dominated by those with some secondary education at 40.03 percent in 2011. However a sizeable number of the youth have completed secondary education at 35.95 percent and that number is slowly increasing. The White population youths are showing higher completion rate of grade 12 at 45.08 percent, which is almost closer to 50 percent. This higher completion rate of grade 12 gives the White youths an advantage to further their education because the success rate in completing grade 12 is higher than the rest of the other youth groups. This success rate of completion of grade 12 by the White youths is also a reflection of the quality of education that they receive in either private schools or former model C schools that they attend. Whilst on the other hand the completion of grade 12 by the African population is lower at 35.07 percent, though increasing if we compare with census 2001 (starting from a very low base), which puts the majority of African youths at a disadvantage because not all that complete grade 12 will have a chance to go to higher education institutions due to various reasons among them the availability of funds. The share of the coloureds with grade 12 is slightly higher than that of the African population at 37.92 percent in 2011. The Indian share of the population who completed their grade 12 is closer to that of the White population but slightly higher at 46.47 percent, also a reflection of the quality of schools that they attend among other things.

The overall share of the African population completing grade 12 and higher education is increasing at a very slow pace when comparing census 2001 and 2011, because many of learners do register for higher education but do not complete their studies. However there are substantial declines in the proportion of the Africans and the overall population below the primary levels. One of the positive effects of the current education landscape is that the youths especially the African youths are more educated than their elders.

## **5. Education, labour market and economic performance**

### **5.1. The influence of education on labour market outcomes**

There are numerous well established findings from the human capital model and earnings function literature that both educational quality and educational attainment are positively correlated with employability and earnings. The precise manner in which educational attainment affects a nation's economic activity and social welfare is a subject of debate among economists, sociologists and others according to OECD report 2011. The idea that educational attainment is likely to influence a nation's output of goods and services and



therefore its earnings ability rests to a large degree on the acceptance of schooling as a process that enhances the individual's skills in the work place. The individual therefore views education as an investment (in order to increase his or her earning potential). Therefore if greater amounts of educational attainment were to raise the skills of workers, they could also be expected to increase the amount of goods and services and therefore their employability and earnings potential. Consequently there is a link between educational attainment, economic performance and labour market performance.

The simple human capital model according to Taylor (2011) suggests that education improves an individual's productivity, which is rewarded in the labour market with higher earnings. It predicts a diminishing marginal returns to education, i.e., each additional year of schooling yields a smaller return in the form of higher earnings. However according to Taylor from Lam (2011) the South African labour market does not conform to the theory in totality. Returns to education prior to grade 12 are very low and strongly increases with the completion of matric and each year of schooling thereafter (Taylor, 2011). This kind of notion is true for the youths of the Free State because many of the learners did not complete their grade 12 and as a result remains in the lower bound of the earnings table if they do get employed. The higher numbers of poor learners who did not complete their grade 12 could be as a result of poor quality education prior to grade 12 (for an example, progression prior to matric where a child can only fail once per phase). For those that have managed to complete their matric, few have made it through the Higher education system with a qualification further complicating the situation for the African youths.

## **5.2. Links to the broader Economic performance.**

The difficulty in linking the broader employment outcomes and the economic performance is the observed earnings distribution due to unobservable worker skills, and those due to job – matching frictions or labour market inefficiencies according to Fasih (2008). In simple terms, if the unobservable skills of the workers are very important in earning more wages in order to decrease poverty, then education will be key in improving the individual incomes. Yet if the earnings differential are due to sorting process among firms, then the implications will be to deal with industrial structures. It is not an easy process to identify which of the two processes are dominating in the provincial context, because they are both active at different levels of the labour market. One view of estimating workers skills is to look at the types of jobs that are being created in the economy, together with how these jobs are linked to expansion and or contraction of the economy. This kind of breakdown will need a sectoral breakdown of the labour force survey and according to the different races. This will give an outline of the demand

of education or workers skills over time and changes in the relative supply of workers with different education levels and the relative returns to those level. The second part that affect the link between labour and the broader economy deals with market inefficiencies which has to deal with labour regulations and unionization of labour in dominant sectors of employment. Unionization of labour has an influence in negotiations, determining market outcomes of labour to an extent that they can value particular skills and education above other things, thus influencing the level of labour education needed.

### **5.3. Economic performance of the Free State**

The overall macroeconomic context of the province is extremely important in understanding the demand for labour. Good jobs are dependent on a number of enabling factors, among others; investment climate, financial markets, global economy and many others. All these factors together have a huge influence in job creation, which determines which skills are needed. The Free State economy has always relied heavily on the primary sector i.e. agriculture and mining, which is in decline for a number of years now. Because the province relies heavily on the primary sector which is in decline, the provincial GDP lacks that of the national economy for the better part between 2008 and 2013. The provincial growth rate averaged less than 3 percent over 2008 to 2013 against an unemployment rate of about 32 percent in quarter three of 2014. Meaning that the provincial economy cannot absorb as many of the new entrants as possible thus further exacerbating the problem of unemployment in general and which affects the poor mostly.

### **5.4. Youth unemployment.**

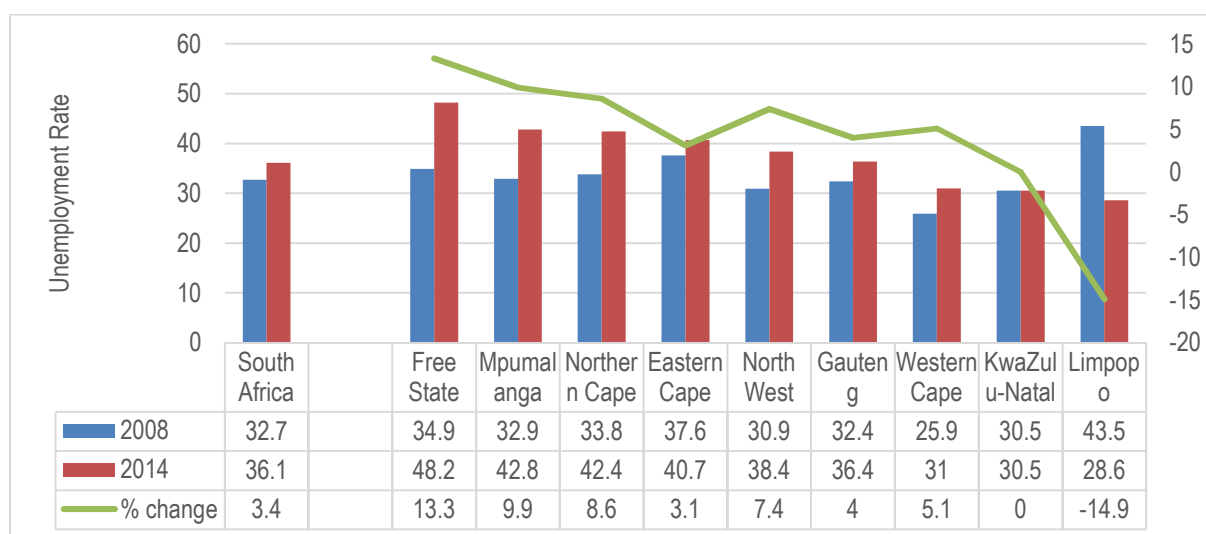
As a result of the relationship between educational attainment and labour market participation it would be appropriate to look into two basic measures of economic performance: unemployment rate of the youth and labour force participation rate of the youth. Whilst the educational attainment is likely to increase an individual's general position in the employment market, by making him/ her more attractive to potential employers. Higher levels of educational attainment may be associated with better labour market information and more effective job search techniques, thereby reducing the likelihood, or the duration of unemployment according to OECD (2011) report. On the other hand, higher levels of education might also contribute to unemployment due to individuals reservations on higher wages because of a wider range of salaries and options available from which an individual can choose from, thereby extending periods of search unemployment as shown in OECD (2011) report. However the balance of many of the factors associated with unemployment will determine the

actual relationship of educational attainment and unemployment in the economy. In most cases low levels of educational attainment are usually, but not always associated with higher levels of unemployment.

Some of the reasons why low attainments are associated with high levels of unemployment are that employers are becoming more selective with some levels of educational attainment when making their hiring decisions. This is more of screening applications from a more qualified labour pool on the basis of their educational attainment. As a result the least educated would be worse off because of the fact that their place in the hiring queue is pushed back as more persons acquire higher levels of education. Another factor is that manual labour is being replaced by mechanization which require some form of educational attainment and specialization which increases minimum requirements for lower end workers. The majority of the low attainment levels among the youth are the African youth (according to figure 7 & 8) and as a result they are the hardest hit by unemployment.

StatsSA (2014) postulates that young women were less likely than young men to get a job, and that unemployment was worst among African youths and least among white youths. Nationally unemployment rate for the youths aged 15 to 34 rose from 32.7 percent in 2008 to 36.1 percent in 2014 according to figure 9. Youth unemployment was more than double the rate of adult unemployment which was estimated at 15.6 percent in 2014. Bagraim reported in The New Age of June 2014, that youth unemployment is a direct results of poor education. Accordingly the victims are young African youths who received inferior education. The resultant youth unemployment is reflected in the market place.

Figure 9: Unemployment rate among youth 15 – 34 years, 2008 – 2014.



Source: Statistics South Africa. (2014).

Figure 9 illustrate unemployment rate among the youth aged 15 to 34 years of age in the period 2008 to 2014. Among all the provinces Free State is ranked highest with a youth unemployment rate of 48.2 percent in 2014, up by 13.3 percentage point from 34.9 in 2008. Kwa-Zulu Natal is at 0 percentage points indicating that there are things that they are doing to halt the unemployment of the youth. Whilst Limpopo has had a negative growth rate of all the provinces indicating that there are things that they are doing right even though not explained in the figures, because they have decreased from 43.5 percent to 28.6 percent. A general trend of youth unemployment in the country is that of increasing unemployment with a percentage change of 3.4.

Within the youths, higher levels of educational attainment are associated with lower unemployment rates, though the importance of educational attainment diminishes with age and experience to a certain level. As a result of the constant changes in economies and labour markets following the 2009 recession, together with increasing applications of technologies, educational attainment seems to have become even more important for the youth.

### **5.5. Educational attainment and Labour force participation rate of the youths in the Free State**

As the educational attainment of the population in general rises, its labour force participation rate also rises. This means that the expected increase in earnings potential associated with higher levels of education contributes to higher participation rates of the labour force especially the youth. According to the OECD report (2011), the labour market activity for those with the lowest education level has in general always been affected by their higher incidence of unemployment and as a result it has always lead to withdrawal from the labour market.

### **5.6. Post-secondary participation in education**

Participation in post-secondary education is difficult to estimate or measure from the available Department of Higher Education and Training (DHET) databases, because these data bases do not include all the post-secondary provisioning a fact also recognised by Sheppard (2009). Private and distance provisioning were omitted in most of the available datasets prior to 2011. However Censuses provide a more holistic base for ascertaining participation. However most of the information available is not broken down into age cohorts, for the sake of determining the different participation rates of cohorts.

## **5.7. Limitations**

There are data limitations to conclusively demonstrate the effects of low quality education in earnings and employability in the South African context. Attempts to measure the impact of educational quality on labour market is also affected by a large racial employment and wage gaps that are very difficult to capture especially their influence in the labour market or as a factor in the equation. As a result of the influence of racial employment and the wage gap there is a very large unexplained component of the labour market that may be assumed as labour market discrimination. This labour market discrimination could in fact be inadequate level of skills for specific jobs or organizational fit as determined by either psychometric testing or recruitment tests. Nevertheless there is an element of discrimination in some form or another that might have an influence on the labour market especially to the detriment of the African youths.

Another drawback to the study is using educational attainment as a proxy for labour force qualifications is that nearly all the available attainment data are presented in terms of formal qualifications. This kind of presentation neglects the skills and competencies that are acquired in the course of employment through informal education (provided by employers) and training and other forms of further education and training which do not lead to formal credentials. For such kind of skills to be accounted for, additional definitions and measurement is needed for the purposes of internal and external comparisons.

The youth unemployment especially from poor households in South Africa also has many dimensions that go beyond education and training solutions or the different race groups. Some of these dimensions are part of larger picture of the labour market demand side or the structural nature of our labour market, outside the control of schools and training institutions. For an example policies that favour the increase in the cost of labour like minimum wages across the board in certain industries.

Overall it is very difficult to point out the precise nature of the relationship between educational attainment and labour productivity because the evidence is definitive. The relationship appears to depend in part on the real productivity enhancing value of the quality of schooling; on the other hand on education acting in other ways through screening, sorting and socialization, as a mechanism for the allocation of labour as proposed by OECD (2011).

## **6. Policy Recommendations**

### **6.1. Policy considerations**

- Drawing from the analysis of the influence of educational attainment levels (specifically proficiency in mathematics and physical science) among the youth in the FS on unemployment and inequality, to improve quality education with the potential of reducing high unemployment rate among the youths in the FS and close the gap, this study suggests the following policies for consideration; firstly, the problems in the quality of education should start as early as in grade 3, especially among the poor schools in mathematics and in English first additional language. Therefore efforts to improve the quality of education should start as early as in Early Childhood Development sites.
- The problems in the quality of education are evident as early as in grade 3, especially among poor schools in mathematics and in English first additional language. Therefore efforts to improve the quality of education should start as early as in Early Childhood Development sites (ECD).
- The ANA provides a deeper insight into the extent of quality problems in primary education and should be strengthened to provide accurate assessment information to learners, parents and Educators and stakeholders. Therefore a reliable assessment and feedback will reduce many of the problems associated with grade progression and reduce learner dropouts in the long term as problems will be addressed as they happen per grade.
- Instill the confidence of learners in learning Mathematics and science in schools. Acquire more competent educators in the teaching of mathematics and introduce extra classes for mathematics as compulsory for learners achieving below 50 percent in the first quarterly exams for an example.
- Finding ways and means to reduce dropouts in especially African schools in a holistic way. This will include reducing the number of learners that are hold back especially in grade 10 due to their low readiness for the next class. This can include increasing contact time with learners and or upgrading the level of knowledge of mathematics and science educators.
- Finally, Free State education Department must proactively tackle the (low) quality of education among poor schools and learners to reduce the income inequality in the long run, though not the only solution to the problem of inequality. This will reduce the policies aimed at affirmative action and replace those with expanding the economic participation of the youth.

## **7. Conclusion.**

The quality of education is one of the main determinants of good labour market outcomes as it prepares individuals for future labour participation. The analysis of ANA results has highlighted that the quality of education outcomes in primary level is well below the 50 percent average mark in mathematics and language of learning in most of the grades. A fact that has also been highlighted by SACMEQ, TIMMS and PIRLS in their examination of the South African education system. ANA is a step in the right direction that needs to be elevated to outside moderation on a continuous basis so as to increase its credibility as a quality measuring tool in the lower grades. The resultant outcomes will be a more reliable tool that can identify the deficiencies within individual schools that needs remedial action with a view of increasing mathematics and language of learning pass rates and in turn quality, especially of the poor. The improved reliability of the ANA system will enhance accountability between the various stakeholders and promote a more reliable assessment practices that will in the long run reduce high dropout rates in secondary education. More reliable assessment will also contribute to high self-esteem in learners and more enrolments in mathematics and science subjects in secondary schools.

The current proportion of learners taking mathematics and science subjects in grade 12 is slowly deteriorating whilst the proportion passing with 40 percent plus is improving. This raises a concern on why enrolments in those two key subjects is not increasing, which can necessitates another research into the problems associated with mathematics enrollments especially within the poor communities.

The quality of performance in mathematics and science subjects which are regarded as gateway subjects to further education and training is losing

However a small proportion (about 10 percent) of young people have access to high quality public education, mainly in the former model C schools, where they can acquire high-level cognitive skills and move on to universities, and thereafter enter the professional and managerial skill labour force. The other 80 to 90 percent of the young people attend schools that produce weak cognitive skills who are unable to access low cognitive and manual skill jobs or join in the ranks of the unemployed.

Good labour market opportunities in South Africa and the province in general require an economy that is operating well with in macro-economic stability and efficient labour market. There is also a need to research the educational supply of labour and the demand for labour

against a country's macroeconomic situation and labour market policies. The province needs more tertiary education graduates because of its reliance on the primary sector and especially its natural resources for the manufacturing process, and these should be more into the science field.



## References

- Bagraim M. (2014). *Education system Blamed. The New Age*, 09 June 2014.
- Falch T, Nyhus OH, Strøm B. (2013). *Causal Effects of Mathematics*, working paper series No. 12/2013, Department of Economics; Norwegian University of Science and Technology. Norway.
- Fasih T. (2008). *Linking Education policy to Labor Market Outcomes*, The World Bank, and Washington DC. [Online] <http://www.worldbank.org>. [accessed: 16/01/2015].
- Free State Department of Education (2014). *Information & Statistical Reports*. Bloemfontein.
- Ionescu AM. (2012). *How does Education Affect Labour Market Outcomes*. Alexandru Ioan Cuza University of Iasi. [Online]: Available from: <http://www.reaser.eu> . [Accessed: 22/12/2014].
- Karmel T, Misko J, Blomberg D, Bednarz A, Atkinson G.(2014) *Improving Labour Market Outcomes Through Education and Training*, February 2014, Paper no.9. Australian Government. [Online]. <http://www.aihw.gov.au/closingthegap>. [Accessed: 8/11/2014].
- Piraino P. (2014) *Intergenerational Earnings Mobility and Equality of Opportunity in South Africa*. August 2014, ERSA working paper 448.
- Moloi MQ, Chetty M. (2011). *Trends in Achievement Levels of Grade 6 Pupils in South Africa, Policy Brief, June 2011. SACMEQ*. [Online]: Available from: <http://www.sacmeq.org>. [Accessed: 09 05 2014].
- OECD. (2012). *Chapter 2. Educational Attainment of the Labour Force*. OECD Publishing. [Online]: Available from: <http://www.oecd-ilibrary.org/employment>. [Accessed: 03/10/2014].
- OECD. (2013). *Economic Survey: South Africa*. OECD Publishing. [Online]: Available from: <http://dx.doi.org/10.1787/econ-surveys-zaf-2013>. [Accessed: 03/07/2014].
- Spaull N. (2011). *South Africa's Education Crisis: The quality of education in South Africa 1994 – 2011*. Report commissioned by CDE, October 2013, Johannesburg.
- Taylor S, van der Berg S, Burger R. (2013). *Low quality education as a poverty trap in South Africa*. University of Stellenbosch. [Online]: Available from: <http://www.svdb@sun.ac.za>. [Accessed: 31/03/2014].
- Taylor S, Yu D. (2009). *The importance of socio-economic status in determining educational achievement in South Africa*. University of Stellenbosch. [Online]: Available from: <http://www.ekon.sun.ac.za>. [Accessed: 03/31/2014].
- Sheppard C Dr. (2009). *The State of youth in South Africa: Trends in education attainment*. Nelson Mandela University, HSRC.

Statistics South Africa. (2014). *National and Provincial Labour Market; Youth*. Q1: 2008 – Q1: 2014. Statistical release, P0211.4.2. Pretoria

Reddy V, Prinsloo C, Arends F, Visser M, Winnaar L, Feza N, Rogers S, Van Rensburg J. (2011). *Highlight from TIMMS 2011, The South African perspective*, HSRC. HSRC Press. [Online]: <http://www.hsrc.org>. [Accessed: 5/23/2014]