LEARNING DEFICIT GAPS IN GRADES 7 TO 9 MATHEMATICS AND ITS CONCOMITANT CONSEQUENCES IN UNIVERSITY LEVEL STUDIES

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ABSTRACT: This paper attempts to investigate in what way the accumulation of learning deficit gaps that has plagued particularly the grades 7 to 9 learners, and to what extent they have overcome such impediments concretely or superficially in their later years of study. An instrument in the form of a test, which consists of questions from the schools grades 7 to 9 mathematics curriculum, has been designed to probe learners' subject knowledge gaps acquired in mathematics. A cohort of 217 first year Engineering and Health students that had obtained more than 60% in the National Senior Certificate examination for mathematics and who had enrolled at the University of Johannesburg formed part of this survey. It is anticipated that the insurmountable learning gaps accrued in mathematics at school level will reveal itself in their performance in mathematics at tertiary level. The collected data were analyzed statistically and expressed as a percentage for each question, to underpin conceptual misunderstanding. The results of this survey revealed that students lacked understanding of fundamental concepts, meaning that the schooling system has not fully empowered them and that they were carrying with them knowledge gaps that are essential for their academic progression. In particular, learning deficit gaps acquired between grades 7 to 9 were the root cause for their underperformance in mathematics at tertiary level.

Keywords: learning deficit gaps, knowledge skills, accumulation and empowering

1. INTRODUCTION

South African learners acquire learning deficit gaps early in their schooling careers and this manifests itself later in their studies. According to Spaull (2013), "the gap between what they should know and what they do know" grows over a period of time. These learners, due to the gaps in their learning, will fall further and further behind in their studies until such time that remediation is virtually impossible. The teacher must play a pivotal role in the learners' education and is the one who will have a direct influence on the pupils' learning. For this to happen, the teachers themselves must be competent and knowledgeable in the subjects they are specialized to teach.

Evidence suggests "the quality of an educational system cannot exceed the quality of its teachers" (Spaull, 2013). According to the research undertaken by the Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) done in 2007, South African teachers have the least "competence" and "knowledge" in mathematics in sub-Saharan Africa. Results from the study, showed that 5% of the top grade 6 learners did better than 20% of bottom grade 6 educators in a mathematics test that was designed for the learners. In 2007, SACMEQ lll also undertook a study to test the grade 6 mathematics-teacher content knowledge in Africa. Interestingly, South African teachers performed worse than 8 other African countries (Spaull, 2012), and marginally better than 5 other African countries. As stated in that report, most of South African primary schools are performing worse than the poorer African countries. Ariellah Rosenberg, head of educator empowerment at ORT, has the following to say about South African teachers, "teachers have patchy content knowledge", and during his school visits, he found that "teachers were only teaching the parts of the curriculum that they are comfortable with" (NGO Pulse, 2013). Teachers must ultimately take the flak for the dismal performance of the learners and not be totally abdicated from their

primordial duties. However, reference needs to be made of the fact of the inequality of the education system, which divides the poorest South African schools in quintiles 1-4 and the richest school as quintile 5.

Naturally the most affluent learners and more suitably qualified teachers go to quintile 5 schools. Learners, under the care of mediocre teachers in poorer schools tend to acquire learning deficit gaps in mathematics as early as grade 3, with only 16% of the learners are performing at grade 3 level of competence. Extrapolating this learning deficit gaps linearly, reveals that grade 10 learners are 4 years and grade 12 learners are 4.5 years behind their peers in quintile 5 schools (Lewin, 2007; Spaull, 2013). These results are in par with Annual National Assessments (ANA) assessments, where the pass rate for grade 9 was 14% with only 2% of the learners obtaining more than 50% (Money-web, 2015). These cumulative learning deficits gaps grow in time and there comes a stage where between grades 10 and 12 and after some earlier years of condone at least 50% of the learners quit school due to the lack of confidence and competence at that grade-appropriate level. This will imply that remediation at that grade level is virtually impossible. Of every 100 learners that began their schooling career in grade 1, 50 of them drop out between grades 10 and 12 and 40 will pass the National Senior Certificate (NSC) examination and of those that pass the NSC examination only 12 will qualify for university admission (Spaull, 2013).

The aim of this paper was to investigate how the learning deficit gaps acquired by learners between grades 7 to 9 have permeated through those that have passed and qualified for university admission. Further, it would be interesting to see if the learners who have mastered the subject through extensive interventions made at grade 12 level (for learners and educators) in mathematics or if they are still carrying these learning deficits in their higher education studies. Further a comparative case study is made of grade 6 learners and grade 6 educators in Botswana and that of South Africa with the hope of identifying best practices and harnessing them.

2. METHODOLOGY AND DATA COLLECTION

A survey in the form of a test, consisting of topics from the grades 7 to 9 curriculum, was compiled and then circulated to the senior members of the teaching fraternity for comments and feedback. Topics such as exponents, word problems, ratio and proportion, inequalities, algebraic manipulation and geometry formed part of the mathematics test. The test probed conceptual and procedural understanding of sections covered within the mentioned grade band. Edited and suited version of a non-standardized test was then administered among 217 first year students during the orientation week (prior to lectures) at the University of Johannesburg. A heterogeneous group of students from mixed quintiles (1-5) secondary school backgrounds formed part of this cohort. These students were registered for qualification programmes in Engineering and Health Sciences. The test also required students to give their grade 12 mathematics marks (however, the accuracy of this cannot be guaranteed). These tests were then carefully marked in search of content knowledge gaps. Students were required to do calculations for each question, and marks were appropriately awarded for each step. Each question was then analyzed in terms of percentages.

The format of the mathematics test is given in table 1 below.

Table 1: FORMAT OF MATHEMATICS TEST

Grade 12 marks for Mathematics: ……

Answer the following questions as fully as possible.

1. The following are solutions given by learners to three exponent problems. Check if the solutions are correct, or if they are incorrect, correct it by providing the correct solutions.

1.1 $(2)^{-4} = -8$

1.2 $3^6 x 3^{-4} = 9^{-24}$

1.3 $\frac{10^{-2}}{10^{-4}} = 1^2$

2.1 Solve for x if 2(2x-6) > x + 3

2.2 Draw a number line that represents the solution of 2.1, where x is a real number.

2.3 Solve for x in the equation: 5x -3 =12 and then find the solution of 2x + 7.

3. Without the use of a calculator, find the solution of 3.1 $\frac{65^2-25^2}{65+25}$ 3.2. $\frac{4.5}{3/4}$

4. The sides of a triangle are given as: 4x; 3x +2; 5x -3. If the perimeter of the triangle is 35cm, what will be the length of the shortest side in this triangle?

5. John earns R42 480 per month. He splits his earnings in the ratio 7:5 and then saves the lesser amount. How much does he save in a year?

Which grade/s in your opinion between grades 1-9 was the most confusing for your mathematical development? .....

3. RESULTS AND DISCUSSION

The following table gives the summary of the students' performance.

QUESTION	% CORRECT
1.1	87
1.2	70
1.3	73
2.1	70

2.2	13
2.3	78
3.1	24
3.2	32
4	49
5	20

Table 2: Performance of learners in the mathematics test

Students have done well in the exponent section of the test due to the fact this section is extensively done in grades 11 and 12 and most recently studied (due to the fact that the orientation week is held in January in the year of commencement of their studies). In some instances, students were directly cancelling the base number 10 in question 1.3. The following steps outline the procedure followed by students: $\frac{10^{-2}}{10^{-4}} = \frac{1^{-2}}{1^{-4}} = 1^2 = 1$. However, students seem to have considerable difficulty with most of the other sections, except algebraic manipulation, and it would appear that they have carried some of the learning deficits gaps encountered in primary school into their secondary schooling. These results also suggest that students appear to do well in section for which there is sufficient exposure at school level. Baseline knowledge on integers and real numbers seems to be really lacking. Only 13% of this cohort of students were able to represent $x > 5$ on a number line for x as an element of real numbers. Students were able to correctly manipulate the inequality question 2.1 with much ease. Most students represented the solution as integers on the number line. In an attempt to solve the question 3.1, most students got the correct answer but followed the wrong procedure, such as: $\frac{65^{2-1}-25^{2-1}}{65+25}$ = 65-25 = 40. In such instances they were not given any marks for such a result. It is surprising to note that students that have got this answer have actually got between 70% and 80% (the survey also requested their NCS marks) in their NSC examination for mathematics. Good NSC results in such a range could easily grant them admission in Engineering or the Pure Sciences in the Higher Education sector. Further, following a similarly incorrect method, students were cancelling the base numbers 65 and 25 between the numerator and denominator in question 3.1 to get 40. Answers of this nature are indicative of shallow teaching that is taking place in the schooling sector. In question 3.2 most students cheated by using a calculator. If only a final answer was given, marks were not awarded, since workings were required for this and other questions. Students have had absolutely no idea how to solve the question on ratio and proportion (question 5), in the form of a word problem. It is expected that those students that achieved high NSC results in mathematics should have at least got this question correct. The inherent fear that students have for word problems, is quite noticeable.

At a Mathematics Skills Workshop for Grades 1-12 held on the 14th March 2015 in Gauteng, the following handout was given to teachers as a working document to improve the quality of teaching and learning in the classroom through an interventional process.

GRADE	2014 Actual % Target	2014 Actual Pass % performance
1	90	92
2	90	96
3	90	94
4	95	92
5	95	92
6	95	92

7	75	87
8	65	53
9	60	51
10	50	51
11	60	57
12	77	72

Table 3: Gauteng Mathematics District Results for 2014

The results of table 3 indicates that there appears to be 3 differential ranges of performances; with grades 1 to 6 performing very well, grades 8 to 11 performing at an average level and grade 12 performing unusually well in mathematics. The most probable reason for the latter is that more senior teachers are teaching grade 12 and the department has put more resources and interventional initiatives to produce better results. The reason for us choosing grade 7 to 9 is 2-fold; firstly it is the intermediary grade between primary school and high school (generally taught by junior teachers) and secondly there appears to be a slump in grades within a band. The expectation of the department in terms of projection targets (for Gauteng learners) appears to be achieved for most grades from 1 to 7, but whether they are at an appropriate grade level is questionable. The results of the Annual National Assessment (ANA's) for the same cohort of students paints a bleak picture, as can be seen in table 4 (obtained from the Handouts from Educational District) (DBE, 2014).

GRADE	2014 NATIONAL PERFORMANCE	2014 GAUTENG PERFORMANCE
1	68	73
2	62	66.1
3	56	60.3
4	37	44.5
5	37	44.9
6	43	53.9
9	11	12.4

Table 4: 2014 ANA Results

There appears to be a clear difference between the students' performance when one demarcates the junior and secondary performance results. These results indicate that learners in grades 4 to 6 are struggling with mathematics and their learning deficit skills are further transferred to the senior phase (grades 7 to 9), with grade 9 being the most problematic grade with achievements of only 11%. Students in this band gap can only fail once and thus if they failed again they will have to be pushed through, which is an unsound educational policy. This means that students can fail the test and yet pass the grade (iol, 2014). It does not matter what they get in a test but passing is guaranteed. Passing a grade does not reflect real learning in the classroom, since these examinations are internally set by the teacher at his competence level, with no external evaluation, standardization or moderation. It can be said that the only standardized examination that takes place is in grade12 National Senior Certificate (NSC) examination. The NSC students in Gauteng appear to be doing much better than the national average. These results are a more reliable indicator of the performance of the students in mathematics. Between grades 10 and 12, at least 50% of the students are left with no option but to quit and they see no reason in continuing their studies. These students are carrying with them learning deficit gaps of at least 4 years and crossing that barrier is a mammoth task. For these students remediation seems almost impossible. But for those that pushed through the system, the learning deficit gaps appears to resurfaces later in their lives, as can be seen in their performance in table 4. It might be that the results are tweaked to make

the school appear good to the department. It is unrealistic how these same pupils who are achieving more than 70% pass rate in grade 12 when the national average of grade 9 students is 11% for the ANA assessment. Realistically speaking only 26.6% of this cohort of students actually qualifies for Bachelor degree studies (Govender, 2013). In international bench-marked tests, South African students are doing equally badly. According to the World Economic Forum (WEF), South Africa was ranked 143 out of 144 countries for mathematics and science, as issued by the Global Competitive Report (Money-web, 2015). According to Trends in International Mathematics and Science study (TIMSS), it was found that the test that was designed for grade 8 learners was too difficult and hence it was offered to grade 9 learners with the hope of getting better passes. Results of such a test done in 2011 revealed that 76% of the learners "still had not acquired a basic understanding about whole numbers, decimals, operations or basic graphs" (Spaull, 2013). Interestingly for students that have written the NBT test, the median mark between the performance in the NBT test and the NSC mathematics examination is roughly 30% for the students studying at the University of Johannesburg. The average marks for first year students studying mathematics at the University of Johannesburg in the field of Engineering (diploma) is roughly 50%. The results in table 4 are justified in terms of students carrying learning deficit gaps in the later stages of their studies. This has serious implications for competencies required for the 21st century technological innovations.

3.1 The impact of learning deficit gaps in Higher Education

Table 5 below gives the enrolment numbers of students engaged in Science and Technology studies of three randomly chosen universities in South Africa for the years 2000 to 2012 (CHET, 2013).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UCT	41	40	40	39	39	41	43	42	41	41	41	42	43
UJ	30	27	28	27	27	30	32	33	32	32	30	30	30
WITS	50	48	48	47	49	50	48	46	46	45	45	48	47

Table 5: Student enrolments in Science and Technology (as a percentage of the total cohort) for University of Cape Town (UCT), University of Johannesburg (UJ) and University of Witwatersrand (WITS)

The reason why WITS and UCT have better enrolments in Science and Technology related studies compared to UJ is that the students with good symbols in mathematics and science are opting for medical and actuarial science fields of study which are not available at UJ. Whilst these enrolments show reasonable participation rates, the average student participation from the 23 South African universities is 17% and the projected participation rate in the year 2030 is 25% (MacGregor, 2014). The graduation rates, however reveals a high attrition and a low graduation rate for most universities, which can be seen in table 6 below (CHET, 2013).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UCT	21	22	23	25	24	28	25	26	25	25	21	22	23
UJ	21	21	20	19	20	22	24	23	23	21	21	21	23
WITS	21	20	19	17	19	21	21	21	21	19	22	23	22

Table 6: Student graduation rates of UCT, UJ and WITS.

Table 6 indicates that students with good symbols in the gateway subjects such as mathematics and physical science are falling by way side. This table indicates that whilst many universities may have a good participation rate, their attrition rate is high and their graduation rate is low. UJ appears to have a reasonable graduation rate in spite of the fact they might be getting a smaller quota of the available students that are in the upper end of the pass rates from the post-schooling sector. The reason for low graduation rates÷ might be that students that enroll at some of these universities do not have the right funding to get them through or it could be a lack of academic preparedness in terms of learning deficits they carry or that they are not getting sufficient support from the universities they are enrolled at. One way or the other appropriate academic preparedness is a crucial factor in this regard, where learners are enrolling for courses for which it is too hard for them to cope, together with the lack of suitable skills that is desired of Higher Education studies. Once the students fail in a particular field of study, they hop from one field to another and eventually landing up taking a much easier curriculum programme route. The graduation rate among all undergraduate students in South Africa's 23 universities is 15% (iol, 2013), which is probably the lowest in the world. According to the Higher Education South Africa (HESA), 35% of all first year students drop out after their first year of study, 20% drop out in their second or third year of study and only 15% of these students finish their degree in the designated time (Strydom et al., 2010). This is indicative of the fact that these students were not adequately prepared at high school level and provides a further testimony to the learning deficit gap. According to Nicolene Murdoch, the president of the South African Association for Institutional Research (SAAIR), "the highest failure rates were in the maths and science programmes which covered medicine, science, technology and business studies" (iol, 2013). She made a further comment that students tended to struggle with "anything with a maths component". According to Murdoch, a pass rate of 50% is ideal but the department of basic education is realistically aiming much lower. The most popular fields of study in South Africa are Business Management, followed by Science, Engineering, Technology and Humanities (iol, 2013). Universities are faced with the dilemma of addressing the articulation gap that exists between secondary school and universities. In this respect support programmes such as bridging, extended and foundation are the only way that universities pursue to assist students to improve their performance. In the case of bridging programmes, disadvantaged students are given a second opportunity to improve their National Senior Certificate (NSC) results and thereby making them legible for university admission in the main stream. Thashlin Govender from the Michael and Susan Dell Foundation, in his article states that: "students-even top performers-educated in a deeply dysfunctional primary and secondary system often arrive at university with massive academic deficits" (Govender, 2013). He also states that the failure is even worse when parsed by race, "most primary and secondary schools that have historically served black students continue to perform at apartheid-era levels".

3.2 Comparison of learner outcomes and teacher profiles in Botswana and South Africa for grade 6- A case study (Carndy et al., 2012)

The reason why Botswana and South Africa are used in the comparison is because both countries are not poor and that both countries spend about the same amount per capita on the schooling of a learner. Further, Botswana is used as an example to see how they tackled a similar problem that South Africa is currently experiencing and how they have tried to overcome such difficulties to the best of their ability. The main findings of the research are:

1. Grade 6 learners in Botswana achieve higher mathematics marks than South African learners.

2. The curriculum of both countries is similarly aligned, but the way it is followed is of consequence to their performance in mathematics.

3. In Botswana, the teachers have better content subject knowledge and have better teaching skills. In this way they set more competitive tests and are able to deliver more effective lessons than South

African teachers. The number of mathematics lessons taught per year in Botswana is higher than that taught in South Africa. Because of this Botswana is able to achieve more grade 6 learning gains.

4. Grade 6 classes are much smaller in Botswana compared to South Africa. The interesting piece of information here is that they have a standardized mathematics textbook for grade 6 learners.

5. Teacher accountability has been prioritized through teacher appraisal and competency test given to teachers in Botswana over the last thirty years and regularly modified in pursuit of excellence.

6. Botswana has a teacher training college which is active and vibrant in pedagogical training, whereas South Africa relies on universities to undertake such training.

7. Teachers in Botswana are well remunerated compared to South African teachers and this is a good strategy to develop high quality teachers.

8. An instrument was devised in Botswana to measure teacher mathematics competency and subject knowledge. In this respect, teachers are given a 24 item questionnaire test, that consists of grade 6 mathematics problems (content knowledge), issues that grade 6 learners face when they attempt to solve a mathematics problem, general pedagogical knowledge (classroom management and quality of instructional modes) and the same (similar) problems that the grade 6 learners encounter in a test. Their competency is evaluated from the outcome of this test.

9. Teacher absenteeism is not an issue in Botswana, but is a serious one in South Africa for both learners and teachers. Teachers in South Africa must take their quota of leave each year and once that has been exhausted, sick leave kick in. Every opportunity is utilized to make extra money at the expense improving subject skills and pedagogical knowledge.

10. To measure teacher's mathematical knowledge, the following combined instruments are used:

(a) A teacher questionnaire, which includes a test of grade 6 mathematic knowledge

(b) A principal questionnaire, and

(c) Videotaping of a grade 6 mathematics lesson taught by the teachers who filled the questionnaire.

11. Teachers in South Africa are teaching content knowledge in mathematics, 2 to 3 grades below grade 6 levels. Lessons in grade 6 are pitched at a grade 3 level, hence the growth in the learning deficit gaps. Teachers in South Africa present problems of a low cognitive demand and teach what they are competent to teach. We therefore cannot expect our students to do well in any international bench-marked tests. Students' subject knowledge cannot exceed that of the teacher.

12. Teachers with greater mathematics knowledge are better teachers and are better equipped to answer a wider array of grade 6 mathematics problems. Better teaching and better classroom management as well as more classes are yielding greater student learning output, and a better coverage of the curriculum. This is seriously lacking in South Africa; where many issues such as large classes, discipline, absenteeism and textbooks are some mitigating distractors for the teacher for not delivering his/her lessons in the desired way.

South Africa can learn a lot from best practices of the Botswana educational system, where the teacher has been given the highest priority. Interventional measures which are focused only at the exit level of schooling are ~~a~~ poor ways to judge the quality of an educational system. In this respect other issues such as teacher training, teacher evaluation of proficiency, classroom management, standardized textbooks, and exemplar questions for all grades, more lesson time and well-resourced classrooms are parameters that can go a long way to uplift the moral of teachers and remove the stigma of South African mathematics being the lowest in the world.

5. CONCLUSION

The insurmountable learning deficit gaps that the learners accrue early in their primary schools grows linearly into senior phase and higher, especially in a gateway subject such as mathematics. These learners fall so behind the particular grade curriculum that they find themselves in a quagmire but with no option to quit. Fewer and fewer students are taking the gateway subject mathematics (59% in 2013 in 2013 and 42% in 2014) (Equal Education, 2015) in school and this is a cause for great concern as mathematics is a pre-requisite for many science related courses at university. But for those that manage to go through the system, they carry with them learning gaps that cannot be camouflaged in higher education studies. According to The New Age (newspaper) report on the 20th May 2015, it is reported that "the number of higher education first years dropping out has dropped to 19% from 50% in the past five years". It is further reported that "some of the challenges faced by first years is making that transition into the new environment". The universities will uphold its standards and try every interventional method to bring these learners in par with university expectations. In some cases the educator in the schooling sector, who can be regarded as paramount person in change, can be blamed for their lack of pedagogical content knowledge and its ramifications. Evidences of learning gaps in mathematics are well documented in internationally bench marked tests. The reliable validity of the National Senior Certificate results can be questioned in the face of high- dropouts and low graduation rates at tertiary institutions. Internationally bench-marked tests such as TIMSS indicate our educational system is dysfunctional, and learners will not be able to compete on a global competitive market, which is a serious concern for educational practitioners or policy makers. South Africa needs to follow best practices of equally resourced countries such as Botswana and put interventional measures to uplift each and every grade of schooling instead of the exit grade only.

SOME RECOMMENDATIONS AND THE WAY FORWARD

1. **Teachers**: In most schools newly qualified mathematics teachers are always given junior grades such as grades 8 and 9, while the senior classes (grades 10 to 12) are reserved for experienced teachers. Due to inexperience, they are unaware of the learning deficits these learners have acquired in their primary schooling. Further, due to large class sizes, they are continually trying to maintain discipline and thereby forgetting their primordial task of instilling competence and confidence to their learners in mathematics. Disciplining of students and the time wasted is a major reason for students doing badly and having a low morale in the subject. Teacher and student absenteeism could also be a mitigating factor for underperformance. These teachers must be assigned mentors and their progress must be continuously tracked by heads of departments and district facilitators. Ideally senior teachers should be involved in the shared responsibility of teaching these learners. Attending of subject workshops is a must for improvement of skills and content knowledge.

2. **Syllabus**: The mathematics syllabus for grades 8 and 9 is too vast, and coupled to this is that there is no standardized textbook for these grades. Therefore model questions and curriculum topics are not consistently pursued nationwide. Teachers could be setting tests of low cognitive demand for the students to pass. On the aspect of geometry, students are able to grasp base line topics on surface areas and perimeters of 2-dimensional structures but once introduced to 3-dimentional figures, they are totally lost. Due to lack of time, no attention is given to self-discovery and practical investigation. The only assessment that most schools are adopting is in a form of a test, thereby neglecting important issues such as self-discovery, project work, assignments, skills testing, out-door activity, research work and practical investigation. The reintroduction of these interventions will reaffirm mathematics on a solid footing and give its rightful place in society.

3. **Calculators**: Calculators are very widely used in the primary school. The effect of this is that learners do not get a firm grip of the number concept. The repercussions of this is that they appear wanting once there is a restricted use of the calculator in higher grades. The oral testing of bonds and skills testing should be reintroduced and the use of a calculator should be highly restricted, except for the section on trigonometry at higher grades.

4. **Standardized tests**: Besides the ANA tests, there are no either standardized tests for grades 7 to 9. Too much emphasis is placed on the progress and the success of the senior grades. The department of Basic Education should be involved in the compiling standardized tests for these grades (nation-wide and for lower grades) as well as giving them equal importance they deserve compared to the senior grades. This will appear to be the only solution as a way forward to our ailing mathematical society. At least the ANA tests should also undergo external accreditation.

5. **School management and accountability**

The principal as the head of the school should take accountability for every aspect of the school governance. He should be strict on those that are getting absent regularly, for example on a Monday and Friday of a week. He should ensure that teachers are completing the school syllabus timeously and pitched at an appropriate level by constantly liaising with the heads of departments. Teachers need to be accountable to the principal, the teachers need to be accountable to the parents, the principal need to be accountable to the parents, governing body and the department, students need to be accountable to the school and their parents, the principal is to ensure the school is run in a proper manner by enforcing policies and the principal needs to ensure financial stability of the school. With these structures in place, learning will take place in a safe and encouraging environment that will foster learner performance.

6. **General**: One of the major reasons reason for South Africa performing badly in internationally bench-marked tests is the insurmountable learning deficits they carry with them as they progress from one grade to another. The lack of a grade appropriate text book, lack of support from senior staff and facilitators, lack of model question papers, lack of discipline, lack of a concerted effort to put lower grades in par with the senior grades, lack of properly coordinated inter-school networking, poorly paid teachers (mathematics), lack of properly skilled (trained) mathematics teachers, persistence absence of teachers and students from school are some of the reasons for the unpopularity of mathematics in South Africa. Unfortunately, these teachers are lambasted to produce better results and the only way they could achieve this is by tweaking the results to appear as if the teacher is working very hard. The only way forward in our opinion is to begin at grass roots level and everything else will take care of itself, a quick fix to solve this problem by compartmentalized interventions will not work and further exacerbate the situation. Each phase should have a properly compensated subject (grade) head and not just appointed by the principal. Too many department officials are appointed for political reasons and not for educational reasons *per se*. Each teacher should have an assistant teacher to take care of discipline and to complement each other in teaching.

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