DEMYSTIFYING MATHEMATICS: *LET'S KEEP OUR WORLD ALIVE*

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INTRODUCTION

The theme of the 2014 AMESA Conference is: 'Demystifying Mathematics'. According to the MacMillan Dictionary, the thesaurus entry for **"demystify"** is as follows: To make something that is difficult easy to understand, especially by explaining it clearly.

If one looks at mathematics education in South Africa, there seem to be serious challenges in making mathematics easy to understand with catastrophic implications for the growth of South Africa's economy and poverty reduction.

In this paper I intend to highlight a few of the challenges facing mathematics education in South Africa as reported on by researchers and education specialists.

Can we go on like this?

What is 21st century teaching and learning calling us to?

The Maths & Science Leadership Academy (MSLA), in partnership with the Northern Cape Department of Education and various other partners, is playing a vital role in Kimberley in addressing some of the challenges facing maths and science education and in equipping youth for success in the 21st century.

It is hoped that through sharing good practices and MSLA's vision for the future, we may grow the circle of excellence.

As inspired mathematics teachers:

- *let's rekindle the fire of passion for what we do*
- *let's strive to become world class maths teachers*
- *let's take ownership where we have failed*
- *let's change what can be changed*
- *let's ensure a bright future for our youth*
- *let's acknowledge the importance of our role as mathematics teachers in growing the economy and reducing poverty levels*

Together, let's start building the world we want - let's keep our world alive!

SA's MATHS CHALLENGES

According to a press release by the South African Institute of Race Relations:
NOT ADDING UP: TOO FEW MATHS TEACHERS TO SATISFY DEMAND,
J Snyman:

> A total of 84 high schools across the country did not offer mathematics for grade 10, 11 and 12 in the 2012 academic year primarily as a result of a shortage of suitably qualified maths teachers.
>
> … The number of pupils taking mathematical literacy now outstrips the number of pupils taking mathematics. In 2008 (the year the NSC was introduced), 35 000 more pupils took mathematics than took mathematical literacy. By 2012 this ratio had reversed with 65 000 more pupils taking maths literacy than mathematics.

Dr Martin Prew, a visiting fellow at Wits University's school of education and an education development specialist is of the view that:

> Schools keep pass rates up by limiting subject choices - sacrificing our poorest pupils' futures.
>
> … It appears that, in pursuing the goal of high pass rates, pupils' life chances are being stunted. This, at best, is an unintended consequence of central pressure to be able to boast being the best-performing province in the country. As a result universities cannot train adequate engineers, South African industry and commerce are starved of skills they desperately need and the development of the country is subsequently slowed.

The Centre for Development and Enterprise **(CDE)** is one of South Africa's leading development think tanks, focusing on critical development issues and their relationship to economic growth and democratic consolidation.

CDE INSIGHT (October 2013), focuses on: MATHEMATICS OUTCOMES IN SOUTH AFRICAN SCHOOLS. What are the facts? What should be done?

This report by J McCarthy and R Oliphant is a summary of two specially commissioned research papers for CDE, both independent studies of the state of schooling in South Africa as of early 2013, carried out by university-based experts N Spaull and C Simkins.

A brief summary of the report is as follows:

> South Africa is significantly underperforming in education, particularly mathematics teaching and learning. Mathematics teaching is often poor quality, with teachers not able to answer questions in the curriculum they are teaching, one indicator of the challenge. Often national testing is misleading as it does not show the major gap at lower grade levels. Of the full complement of pupils who start school, only 50 percent will make it to Grade 12 and only 12 percent will qualify for university entrance. Fundamental reforms are needed in the public sector.

> Business leaders need to incorporate an understanding of private education and other market experiments and schooling innovations in their overall perspective and priorities for intervention and reform. (Page 1)

The report makes specific reference to the findings in the 2011 Trends in International Mathematics and Science Study (TIMSS), highlighting the teaching of mathematics in South African schools as being amongst the worst in the world and citing teacher complacency as being a major problem in addressing the situation.

> The 2011 TIMSS showed that South Africa performed worse than any other middle-income country. The average South African Grade 9 learner is 2 years' learning behind the average Grade 8 learner from 21 other middle income countries in mathematics (and 2,8 years behind in science).
>
> … In the recent TIMSS 2011, 89 percent of South African Grade 9 teachers felt 'very confident' in teaching mathematics, in stark contrast to teachers in Finland (69 percent very confident), Singapore (59 percent very confident) and Japan (36 percent very confident), the best performing countries. This is particularly at odds with Grade 9 student performance, where 32 percent of South African students perform worse than random guessing on the multiple choice questions. (Page 7)

THE CLASS OF 2013 ACHIEVED THE HIGHEST MATRIC PASS RATE (78.2%) SINCE 1994.

In the article, BEHIND THE MATRIC RESULTS: THE STORY OF MATHS AND SCIENCE, by G Campbell and M Prew, great concern is expressed about the performance in these two gateway subjects. The two critical issues being: the drop in the number of learners writing these subjects and the quality of passes achieved.

> Several international studies and the Annual National Assessment (ANA) results indicate that the problem with mathematics has its roots in primary school, where many learners fail to gain basic mathematical skills.

The 2013 ANA results showed only 39% of Grade 6 learners and 2% of Grade 9 learners achieving above 50% in mathematics.

Learners are not taught the basics in Grade 7 - 9 (Senior Phase) as it is assumed learners have mastered these basic mathematics concepts by the end of Grade 6.

ACCORDING TO THE REPORT, THE REASON FOR THE DROP IN PERFORMANCE IN GRADE 9 IS:

> a direct consequence of compounding backlogs and increasingly inventive ways learners use to beat the system and dodge detection, with dire consequences for individual learners and the system.

HOW IS THE PROBLEM DEALT WITH AT SECONDARY SCHOOL LEVEL?

> Secondary schools often deal with the problem in two ways. They try and stop all but the most able learners selecting to do mathematics and physical science in grade 10, and also hold back (or "warehouse", as some teachers refer to the practice) learners in the mathematics stream who fail grade 10 or grade 11 exams.
>
> Then, in grade 11 and 12, teachers attempt to ensure that the NSC results are good by cramming and question-spotting in extra classes, Saturday schools and through private tutor programmes. This often leaves learners with the ability to pass the NSC but with no depth to their knowledge – a fact that is only discovered at tertiary level.

Figures from the Department of Basic Education show that of the 562 112 full-time candidates who wrote the National Senior Certificate (NSC) in 2013, only 43% sat the maths paper.

A total of 97 790 of these students (40.5%) achieved a pass mark in mathematics of 40% and above.

Just 26.1% achieved a pass mark of 50% and above.

A dismal 15.6% achieved 60% and above.

According to the 2013 Organisation for Economic Co-operation and Development (OECD) Country report on South Africa:

> … To redress 'catastrophically high unemployment among the youth… [51 percent in the fourth quarter of 2012] …education remains… the critical problem'.
>
> The OECD argues that South Africa's educational outcomes are 'aggravating the excess supply of unskilled labour and worsening income inequality. (CDE Insight, October 2013. Page 10)

CAN WE GO ON LIKE THIS?

TEACHING AND LEARNING FOR THE 21ST CENTURY

Andreas Schleicher (OECD Education Directorate), in his article: THE CASE FOR 21ST- CENTURY LEARNING, inspires a new way of thinking – a call to change of mind set – if we are to prepare our learners to be successful in the 21st century. May we take his powerful message to heart and, indeed, into our maths classrooms.

Our world is fast changing and so, too, must our way of teaching and learning change if we are to address the challenges of the future.

Schleicher states that there are two facts why knowledge and skills are important to the future of our economies.

Firstly, from a jobs perspective, it pays to study.

21st century learning, however, goes deeper than skilling up.

> It is about how knowledge is generated and applied, about shifts in ways of doing business, of managing the workplace or linking producers and consumers, and becoming quite a different student from the kind that dominated the 20th century. What we learn, the way we learn it and how we are taught is changing. This has implications for schools and higher level education, as well as for life-long learning.

Is the call, then, to become more business-like in our approach to how schools should function?

> If you were running a supermarket instead of a school and saw that 30 out of 100 customers each day left your shop without buying anything, you would think about changing your inventory. But that does not happen easily in schools because of deeply rooted, even if scientifically unsupported, beliefs that learning can only occur in a particular way.
>
> We live in a fast-changing world, and producing more of the same knowledge and skills will not suffice to address the challenges of the future. A generation ago, teachers could expect that what they taught would last their students a lifetime. Today, because of rapid economic and social change, schools have to prepare students for jobs that have not yet been created, technologies that have not yet been invented and problems that we don't yet know will arise.

Schleicher asks the question: How do we foster motivated, dedicated learners and prepare them to overcome the unforeseen challenges of tomorrow?

It goes about what education should be in today's world.

> … educational success is no longer about reproducing content knowledge, but about extrapolating from what we know and applying that knowledge to novel situations.

> Education today is much more about ways of thinking which involve creative and critical approaches to problem-solving and decision-making. It is also about ways of working, including communication and collaboration, as well as the tools they require, such as the capacity to recognise and exploit the potential of new technologies, or indeed, to avert their risks. And last but not least, education is about the capacity to live in a multi-faceted world as an active and engaged citizen. These citizens influence what they want to learn and how they want to learn it, and it is this that shapes the role of educators.

The development of imaginative skills is important for the 21st century and requires that we move away from teaching students the techniques of solving manageable bits and pieces of problems. Schleicher makes the point that today knowledge demands open-mindedness, making connections between ideas and becoming familiar with knowledge in other fields. It is through learning and teaching across disciplines that future inventions, and probable sources of economic value, will come from.

Numeracy and mathematics are not the only challenges that South Africa's education is facing. According to Nick Taylor, the head of the unit which reports directly to Basic Education Minister Angie Motshekga, the literacy level of South African Grade 5 pupils is a "national catastrophe".

According to Schleicher: Rather than just learning to read, 21st century literacy is about reading to learn and developing the capacity and motivation to identify, understand, interpret, create and communicate knowledge.

It is very important that students are encouraged to learn on their own and to enrich their knowledge through communication and collaboration.

> Innovation in particular is the outcome of how we mobilise, share and link knowledge.

Schleicher concludes:

> Success will go to those individuals and countries that are swift to adapt, slow to resist and open to change. The task for educators and policymakers is to help countries rise to this challenge.

THE MATHS & SCIENCE LEADERSHIP ACADEMY NPC

The Maths & Science Leadership Academy (MSLA) was initiated by Anne Maclean, whilst in the employ of the Northern Cape Department of Education, in 2006, in direct response to the challenges facing maths and science education in the Kimberley area. The non-profit organisation started from very humble beginnings but through the establishment of partnerships with various stakeholders in education, (private sector, government and civil society), it is fast becoming a model of success.

Kimberley is the capital of the Northern Cape Province, the largest province in South Africa, with the smallest population and which faces the greatest challenges: far distances, severe climate (very hot in summer and very cold in winter), arid conditions and very few resources.

A special goal of the Maths & Science Leadership Academy *is to bring hope to the youth of the Northern Cape and to motivate them to have a dream and to DREAM BIG!*

The majority of youth in this province are faced with serious challenges:

- *Uninspiring and unsafe school environments in the poorer areas*
- *High rate of unemployment*
- *Poor socio-economic circumstances*
- *No recreation facilities*
- *High rate of teenage pregnancy*
- *High rate of alcohol and substance abuse*
- *Very few students at tertiary institutions*
- *No role models*

In response to the challenges mentioned above, and to those mentioned earlier, the MSLA maths & science programmes currently aim to:

- motivate, support and empower teachers and student teachers
- develop a passion for maths and science in learners from an early age
- increase the number of learners who opt for maths and science in the FET Phase
- increase the number of learners who achieve more than 50% for mathematics and science at matric level
- produce students who will be a success at tertiary level in fields that are critical to growing the economy
- provide opportunities for learners to develop the skills and knowledge needed for success in the 21st century
- grow and develop future leaders of calibre for a brighter and greener South Africa

It is not enough to merely raise the level of academic achievement if we are to grow tomorrow's leaders for a brighter and greener South Africa. We therefore focus on the holistic development of our youth and provide them with novel opportunities to develop skills needed in the 21st century, namely: communication, collaboration, problem-solving, innovation, research and IT.

When it comes to leadership, it is all about growing the MADIBA legacy – learners seeing themselves as young leaders who are knowledgeable about national and global challenges and who have the values, desire and passion to work towards the future this world wants.

MSLA MATHS & SCIENCE PROGRAMMES

GRADE 9 – 12 MATHS & SCIENCE PROGRAMME

While maths & science interventions across the country tend to focus more on Grade 12 learners for the sake of improving matric results, the MSLA approach is to target learners in the lower grades and to provide them with as many opportunities as possible to develop holistically until they have completed their schooling..

MSLA currently provides 270 Grade 9 – 12 learners from 20 schools in Kimberley (mainly from the poorer areas) with extra academic support in maths and science through afternoon classes, holiday academies and the Saturday Maths Pi-oneers Programme. The focus of the holiday academies also includes English / Afrikaans, as well as novel challenges aimed at developing leadership skills and exposing the learners to global issues.

Each year the organisation secures a sponsor to "adopt" a new group of Grade 9 learners with the expectation that the same learners will be supported until they have completed matric. The learners receive much; therefore much is expected in return. Hard work, commitment, good results and involvement in community service are the basic requirements if learners are to remain in the programmes.

The afternoon maths and science classes are run at the MSLA Campus, a De Beers owned heritage building established in1901, which consists of a few office areas, a classroom, a science lab, a small computer lab, ablutions and a tiny kitchen area.

The majority of learners are provided with transport from their schools to the campus and home again after their classes which run from 15:00 – 18:00, Monday to Thursday during school terms. Each learner attends one afternoon session per week. They are taught by the best maths and science teachers available and are provided with stationery and study materials, as well as refreshments. At the end of term 1 and term 3 they all write a test on the work covered in maths and science which is aligned to CAPS. These results, together with their school June and November results are used to gauge their progress and to report to sponsors.

MSLA MATHS PI-ONEERS PROGRAMME

The MSLA Maths Pi-oneers Programme focuses on developing maths problem-solving skills in learners and on developing teachers' *competence and confidence in teaching this important subject, through the use of Maths Olympiad questions.*

The programme currently focuses on the GET and FET phases. There are 225 learners and 18 teachers in the Grade 4 – 6 programme and 400 learners, 3 student teachers and 20 teachers in the Grade 7 – 12 programme. Each programme runs over 5 Fridays and Saturdays throughout the year.

The teacher training sessions take place at the MSLA Campus from 14:30 – 17:00 on the Friday afternoon preceding the Saturday sessions. Teachers work in teams, according to the grade they facilitate, to solve the questions that the learners are given on Saturday. The training sessions are conducted by the two Programme Directors: Mandisa Lebitso and Nina Scheepers.

The programme objectives for teachers and student teachers:

- Improve teachers' knowledge of maths content.
- Improve teachers' self-concepts with respect to the abilities to solve problems.
- Make teachers aware of problem-solving strategies.
- Make teachers aware of the value of developing problem-solving skills in learners.
- Make teachers aware that many problems can be solved in more than one way.
- Encourage teachers to use new and exciting methods in teaching maths.

The Saturday sessions are run at two local schools (Diamantveld H/S and Kevin Nkoane P/S) from 08:00 – 16:00. It is most inspiring to witness so many learners who are passionate about mathematics and who are willing to spend a whole Saturday engaged in maths problem-solving. No formal teaching takes place. Teachers serve as facilitators. The learners spend the most part of the day working in groups to find solutions to the maths problems and reporting their methods back to the class. Through this process the learners:

- develop a willingness to try problems and improve their perseverance when solving problems.
- improve their self-concepts with respect to their abilities to solve problems.
- acquire problem-solving strategies.
- become aware that many problems can be solved in more than one way.
- improve their abilities to get more correct answers to problems.

After lunch the learners write a test which is marked immediately by the teachers. The results are recorded as a means of evaluation and for reporting to sponsors.

The MSLA Grade 9 learners' November school maths results have been compared with their maths problem-solving results revealing much higher results at school.

The need to address learners' maths and science problem-solving skills was raised in the article: MATHS AND SCIENCE PUPILS 'SET UP FOR DISAPPOINTMENT', by K. Seekoei and D. Macfarlane (07 Jan 2011), in response to the 2010 matric results:

> Diane Grayson, a professor of physics at the University of Pretoria, said that focusing merely on pass rates in these subjects was not enough. To enable more learners to become engineers, scientists and medical practitioners it was necessary to improve their problem-solving skills and conceptual understanding in the two subjects, she said.

Problem solving Grayson headed a study published last year showing "anecdotal evidence" from universities that students' problem-solving skills and conceptual understanding were worse than they were in the past. (Mail & Guardian, 07 Jan 2011).

PEDI: ENGLISH OLYMPIAD

The Pilot English Development Initiative (PEDI) is a joint project of the De Beers English Olympiad, SACEE and the Maths & Science Leadership Academy NPC and is sponsored by the De Beers Fund. It aims to include English FAL speakers, within the De Beers operational areas, in the English Olympiad, by adding an educational direct contact element to deepen the learning experience, and enhance learners' chances of success. All MSLA Grade 9- 11 learners participate in this programme as the specific outcomes of the PEDI English Olympiad Programme are directly linked to the language needs in education:

- building learners' confidence in the use of English
- facilitating entry to the mainstream English Olympiad exam
- facilitating entry to and success in tertiary study in any field/chosen career

MSLA CLUBS

Friday afternoons at the MSLA Campus are abuzz with other activities. Learners are invited to join various clubs: chess, journalism, robotics and STEM Leadership.

The MSLA Journalism Club is a source of motivation for the learners to write their own articles and reports on the events at MSLA and on whatever is important to them. The learners recognize the value of being in this club as they are developing so many skills: IT; reporting; language; team work and growing a sense of creativity and self-esteem. Some of their articles are included in the MSLA annual report to sponsors each year.

In today's global society, excellence in Science, Technology, Engineering, and Mathematics (STEM) is essential in contributing to building a workforce that will grow a healthy economy. The STEM Leadership Club is all about making the learners aware of this importance and creating a passion in them to serve as STEM ambassadors in the wider community. Last year they represented the organisation at the Bloodhound SSC exhibition at the Diamond Pavilion shopping mall during National Science Week and enjoyed interacting with the general public and encouraging people from all walks of life to become more aware of the importance of STEM in our modern world.

ESKOM EXPO FOR YOUNG SCIENTISTS COMPETITION

When learners design, plan, carry out, and publicly exhibit a project of genuine value (to themselves, to the community, or to a teacher), it has a transformative effect on their perception of themselves, their relationship to learning, and their sense of their place in the world around them. It is also the best way to develop the diverse portfolio of skills that are increasingly in demand from universities and employers.

Each year the 190 MSLA Grade 9 – 11 learners are expected to enter a maths or science research project for the Eskom Expo for Young Scientists Competition.

The learners have access to the internet at the MSLA campus and they are provided with basic support and guidance in the early stages of compiling their projects.

During National Science Week, the MSLA learners have to present their projects to a panel of judges and the best projects are recommended for entry to the Provincial Eskom Expo Competition.

The response from the learners has been incredible and their efforts have been rewarded with a large number of learners receiving medals at provincial level and each year a number proceeding to the International Science Fair in Gauteng where they have done exceptionally well.

CAREER GUIDANCE

The MSLA computer lab is a great asset to the organisation. It is the engine room that links us to the world wirelessly 24 /7 and enables the organisation to function professionally. It also plays a vital role in the development of our youth and in their preparation for life after school. The majority of our learners do not have access to computers or to the internet at their schools or at home. The matrics are able to apply to universities online and to further their own research.

The ultimate aim of these intervention programmes is to grow the pool of students who are well equipped to study further at tertiary institutions in maths and science related careers needed to grow South Africa’s economy.

MSLA offers the learners support in career guidance, an area that is often neglected at schools. The Grade 9 learners receive guidance on their Grade 10 subject choices during the Spring Academy. The Grade 11 learners spend a week in the winter holidays experiencing the real world of work. Local companies and government departments have been most generous in opening their doors. There are few opportunities in Kimberley but each year the learners get to job-shadow alongside professionals associated with 2 to 3 of their possible choices of study. The Grade 12 learners receive one-on-one support from the MSLA Guidance Counsellor, who also assists them with the completion of application forms to universities and in accessing bursary information.

Each year the MSLA Grade 11 and 12 learners get to attend Open Days at tertiary institutions in Bloemfontein: CUT and UFS. Tertiary institutions further afield visit the MSLA Campus to make presentations to the matrics.

DIAMOND NETWORK – "GROWING THE MADIBA LEGACY"

MSLA former students, going back to our launch in 2006, who are currently studying at universities around South Africa, have initiated the **"DIAMOND NETWORK"** – a group that wishes to reach out to MSLA Grade 12 learners and provide as much support as possible in making the journey from school to university a smooth ride. The group runs a 3-hour workshop for our matrics each year on the last day of the Winter Academy where they assign themselves as mentors to the matrics.

"KIDS TEACHING KIDS" PROGRAMME

An excellent way of demystifying mathematics is to get kids to teach other kids.

The MSLA learners are expected to make a difference in their school communities through the "Kids teaching Kids" Programme which began in 2008. In that year the Grade 10 learners were trained to be teachers in the fields of maths, science, English and career guidance. They formed teams and each day during National Science Week a different team ran workshops for different groups of Grade 9 learners from various schools in Kimberley. All sessions were presented using 21st century equipment: laptops, data projectors and PowerPoint! By the end of the week they had taught over 500 learners.

During the winter holidays of the same year they ran workshops for other Grade 10s and impacted on over 200 learners.

The major event of that year was the "080808 Maths Extravaganza". A hall was hired in Galeshewe, along with furniture for 420 people. On 08 August 2008 the 60 MSLA Grade 10 learners ran a day's workshop for 360 other Grade 10s from 8 schools in Kimberley, together with their maths teachers. All participants received stationery, a CASIO calculator and good things to eat. Another great way of demystifying maths is to include stage smoke and a DJ. What an awesome maths experience! The day started at 08:00 but nobody wanted to stop doing maths at 15:00 and it was on a Friday!

In 2009 the Grade 10 group went to teach learners at 5 different schools in the Postmasburg area, 200 kms away from Kimberley, during the winter holidays. This meant that the day started at 05:00 in the cold and dark but nobody wanted to stay behind. The love for maths and science was the driving factor!

Since then the Kids teaching Kids Programme has become less formalised and all Grade 9 – 12 MSLA learners have to start their own programmes at their schools as a way of community service. School principals verify that this is actually happening.

It is hoped that through the Kids teaching Kids Programme:

- learners will become more responsible for their own learning
- the process of demystifying mathematics will occur
- more learners will believe they can do maths and science
- better results will be achieved
- the seeds for growing future maths and science teachers will be planted.

NATIONAL SCIENCE WEEK

During National Science Week the organisation runs special maths & science programmes targeting learners, parents and the public at large. The programmes include hands-on workshops for 600 Grade 6 learners and 40 teachers, a "Kids teaching Parents" evening, MSLA Radio Talk Show on Radio Teemaneng, SET Career presentations for the 270 Grade 9 – 12 MSLA learners and a maths & science exhibition at the Diamond Pavilion shopping mall.

The MSLA Radio Talk Show is an amazing opportunity for getting learners to inspire other learners about:

- national and global challenges
- the need for young South Africans to take up maths and science-related careers
- skills needed in the 21st century
- various other relevant issues

The "Kids teaching Parents" evening is also a novel way of creating excitement about maths in the home. The session on kids teaching parents how to use the CASIO scientific calculator provides opportunity to make maths fun.

MSLA MATRIC RESULTS

The first group of learners that started in the MSLA Maths and Science Programme in 2007 completed matric in 2010. It was very exciting to have the top mathematics learner of the province from our MSLA ranks. Goodwill Tshekela, a very poor learner from Dr E P Lekhela H/S in Galeshewe, was the only learner in the Northern Cape to achieve 100% for mathematics and 96% for science.

In 2011 the top learners for maths and science in the province both participated in the MSLA programmes. Since then MSLA has had learners in the top 20 positions in the province and the quality of the mathematics and science results has been very good.

In evaluating the results one must take into account the socio economic background of the learners as indicated below:

BOTH PARENTS	UNEMPLOYED	LIVE ELSEWHERE	DECEASED	UNKNOWN
	18	18	9	0
FATHER	UNEMPLOYED	LIVES ELSEWHERE	DECEASED	UNKNOWN
	18	52	37	32
MOTHER	UNEMPLOYED	LIVES ELSEWHERE	DECEASED	UNKNOWN
	71	32	10	2

TABLE 1: PARENTS' SITUATION OF ALL GRADE 9 – 12 LEARNERS

LIVES WITH: AUNT/ SISTER /GRANNY / GRANDFATHER	40
LIVES IN SHANTIES/SHACKS	13
NO PLACE TO STUDY AT HOME	64
NO ELECTECTRICITY AT HOME	13

TABLE 2: HOME CONDITIONS OF ALL GRADE 9 – 12 LEARNERS

SUBJECT	RANGE %	NUMBER	GROUP%
MATHEMATICS	90 - 100	4	7.14
	80 - 89	10	17.86
	70 - 79	9	16.07
	60 - 69	14	25.00
	50 - 59	14	25.00
	40 - 49	3	5.36
	30 - 39	2	3.57
TOTAL		56	100

QUALITY OF RESULTS:
25% achieved above 80%
41.07% achieved above 70%
66.07% achieved above 60%
91.07% achieved above 50%

TABLE 3: QUALITY OF MSLA MATHEMATICS RESULTS: 2013 GRADE 12

SUBJECT	RANGE %	NUMBER	GROUP %
PHYSICAL SCIENCE	90 - 100	1	1.79
	80 - 89	4	7.14
	70 - 79	13	23.21
	60 - 69	10	17.86
	50 - 59	13	23.21
	40 - 49	9	16.07
	30 - 39	6	10.71
TOTAL		56	100

QUALITY OF RESULTS:
8.93% achieved above 80%
32.14% achieved above 70%
50% achieved above 60%
73.21% achieved above 50%

TABLE 4: QUALITY OF MSLA PHYSICAL SCIENCES RESULTS:

2013 GRADE 12

It is pleasing to note that of the 56 matrics in 2013, 48 are studying further in 2014 at universities or universities of technology. Of these, 42 are first generation at tertiary institutions.

MSLA – THE OPPORTUNITY ISLAND VISION

De Beers has donated 1.9ha of land in Kimberley for MSLA to build its dream venue: OPPORTUNITY ISLAND. This concept is unique and innovative and will certainly address many of the challenges facing education, especially maths and science, in the Northern Cape Province.

The vision is to create a 21st century educational environment for 21st century teaching & learning, that will:

- break the cycle of poor education,
- inspire a passion for maths & science,
- provide opportunities for developing innovation and creativity
- set new standards & instill values,
- lead to future scientists, engineers & visionary leaders of calibre, so as to grow the economy of the Northern Cape and reduce the level of poverty

There will be OPPORTUNITIES...

- for all stakeholders, with a vested interest in education, to make a collective difference in breaking the cycle of poor education
- for all partners, to have a share in creating a WORLD-CLASS 21ST CENTURY teaching and learning environment aimed at empowering top quality maths and science teachers and learners

- for professionals, to engage with learners at school level in view of motivating and inspiring the youth to follow in their footsteps
- for the wider community, to experience a wide range of exciting maths & science related activities and become a society that values STEM
- for the unemployed, especially the youth, to receive training and develop skills

OPPORTUNITY ISLAND will become an ISLAND OF OPPORTUNITIES FOR ALL that will inspire a new generation of visionary leaders, who have the knowledge, values and determination TO BUILD THE MAINLAND WE WANT!

Kumba Iron Ore views the Maths & Science Leadership Academy NPC on Opportunity Island as being the solution to their planned mega project for the Northern Cape Province and has already sponsored the cost of the feasibility study that has been carried out by PricewaterhouseCoopers.

The plan is to establish a full-time Maths and Science Leadership Academy on the island for Grade 8 —12 learners with potential from across the province, especially from the rural areas, who will receive quality education in a 21st century learning environment.

Schools from all the corners of the Northern Cape Province that lack resources and good maths and science teachers will receive assistance from Opportunity Island through the use of 21st century technology. In this way, teachers will be empowered, more learners will have the opportunity to study maths and science and our youth will enjoy the bright futures they deserve.

OPPORTUNITY ISLAND will continue to offer:

- Afternoon classes & holiday programmes for learners in Kimberley
- Workshops & empowerment sessions for teachers
- Maths & science problem-solving programmes
- Skills development programmes

GXY Architects have already completed the plans for the building which is to be totally GREEN!

The lower level will include:

- auditorium (300 seats)
- 2 computer labs
- science lab
- technology lab
- 5 multi-purpose areas (with cooking facilities)
- multi-purpose hall (1200 seats)
- cooking school, veggie garden and greenhouse
- music room
- games area
- rock-climbing wall

- radio station
- STEM exhibitions area
- tuck-shop

The upper level will include:

- 10 classrooms
- boardroom
- staffroom
- admin offices
- media centre
- careers centre

There will be A WORLD OF OPPORTUNITIES ... (to name but a few)

- Teacher training (internships)
- Focus weeks
- Career guidance
- Clubs: press, chess, debating, music, etc.
- ICT training
- Competitions & Science Expos
- Kids radio station
- Annual Maths & Science Conference (For kids — by kids)
- Job creation
- Sports & cultural events
- A "water plant" - promoting water-related careers

The establishment of **OPPORTUNITY ISLAND** in Kimberley will ensure more students gain entrance to the new Northern Cape University, thus assisting in breaking the cycle of poverty and ensuring economic growth.

The Northern Cape Provincial Growth & Development Strategy acknowledges the vital importance of developing human and social capital: "Creating opportunities for life-long learning; improving the skills of the labour force to increase productivity and increasing access to knowledge and information".

MSLA, in its quest to enhance mathematics, science and technology competencies of a wide range of target groups, has the potential to play a key role in assisting the Northern Cape Province in its strategy to build a stronger economy and reduce poverty.

OPPORTUNITY ISLAND will be a source of hope and inspiration – a benchmark for setting standards – a learning organization providing opportunities for the development of human capital and life-long learning – an island of quality education.

CONCLUDING COMMENTS

Things cannot go on as they are! Demystifying mathematics is everyone's business. *So let's:*

- *rekindle the fire of passion for what we do*
- *strive to become world class maths teachers*
- *take ownership where we have failed*
- *change what can be changed*
- *ensure a bright future for our youth*
- *acknowledge the importance of our role as mathematics teachers in growing the economy and reducing poverty levels*

Together, let's start building the world we want - let's keep our world alive!

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