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**Table of Contents**

**Science, Technology, Economic, Maths crisis in South Africa**

**STEM Education as a Solution to Youth Unemployment**

http://www.iafrikan.com/2014/03/12/stem-education-as-a-solution-to-youth-unemployment-in-africa/

### Introduction

The story of Africa’s booming economic growth has dominated the press for a while. Africa is the fastest growing continent economically, real income per person has increased by 10% over the last 10 years, and [GDP is expected to grow by 6% per year](http://www.economist.com/news/special-report/21572377-african-lives-have-already-greatly-improved-over-past-decade-says-oliver-august).

Amidst all this encouraging growth lurks a number of significant challenges that threaten to derail it.

### Ticking Time Bomb

Africa faces an unprecedented youth unemployment crisis.

Having the [youngest youth population in the world of 200 million aged between 15 and 24](http://www.africaneconomicoutlook.org/en/in-depth/youth_employment/), increasing youth unemployment poses a significant threat to sustained economic growth and the growing political and socio-economic stability of the continent.

South Africa’s Statistics SA released the official unemployment rates for the southern African country, which currently sit at 25.6% as per the third quarter of 2013. Unemployment is calculated based on active job seekers, thus when including those who have given up on searching, termed discouraged job seekers, the true [unemployment figure for South Africa sits closer to 40%](http://www.salabournews.co.za/index.php/home/archives/12205-data-including-discouraged-workers-would-push-jobless-rate-to-367.html) .

According to Statistics SA, nearly 50% of the 40% who are unemployed, are between the ages of 14 – 25.

Unfortunately, South Africa is not unique. [Youth unemployment in North Africa sits at 30%](http://www.un.org/africarenewal/magazine/may-2013/africa%E2%80%99s-youth-%E2%80%9Cticking-time-bomb%E2%80%9D-or-opportunity), and this is even higher in some Sub Saharan African countries. Zambia’s finance minister, Alexander Chikwanda, states ‘Youth unemployment is a ticking time bomb’.

### Another Crisis

While youth unemployment is an often touted challenge for the continent, another, equally severe crisis is brewing.

The growing skills shortage, particularly in management and specialised skills such as in STEM (Science, Technology, Engineering and Mathematics), has reached crisis level.

Though an estimate suggests that there will be a [75% increase in the demand for expatriate skills in the next 3 years](http://www.howwemadeitinafrica.com/talent-grab-how-top-companies-are-managing-africas-skills-shortage/15372/), one of the challenges of this skills shortage is that there is little quantification of the nature, depth and extent of the skills shortage across the continent and in individual countries.

Clearly the dichotomy of high youth unemployment and a growing skills shortage indicate a mismatch between the type of skills in demand and what can be supplied by the labour market.

### [Image result for maths crisis in south africa](https://www.google.co.za/imgres?imgurl=https%3A%2F%2Fimage.iol.co.za%2Fimage%2F1%2Fprocess%2F620x349%3Fsource%3Dhttps%3A%2F%2Finm-baobab-prod-eu-west-1.s3.amazonaws.com%2Fpublic%2Finm%2Fmedia%2Fimage%2F102883181.JPG%26operation%3DCROP%26offset%3D0x-32%26resize%3D3543x1989&imgrefurl=https%3A%2F%2Fwww.iol.co.za%2Fpretoria-news%2Ftackling-crisis-in-sa-education-15138489&docid=q0EZyGGGZBC2HM&tbnid=xOcGfRro06IK0M%3A&vet=10ahUKEwib-5uf4cziAhXUThUIHQPMA3YQMwiMASgsMCw..i&w=620&h=342&bih=824&biw=1684&q=maths%20crisis%20in%20south%20africa&ved=0ahUKEwib-5uf4cziAhXUThUIHQPMA3YQMwiMASgsMCw&iact=mrc&uact=8)Demand vs Supply

Figure SA Maths crisis

Based on current indicators, the growing economic resurgence in Africa is driving a demand for specialised skills.

These include skills in fields such as mining, manufacturing, engineering, retail, agriculture and medicine.

Foreign direct investment and growing entrepreneurship opportunities in natural resources, retail and telecommunications across the continent require skilled geologists, technologists, engineers, technicians, and financiers.

Compare this demand to the skills that Africa is churning out; the largest contingent of social sciences and humanities graduates of any region in the world with [70% of graduates in Sub Saharan Africa holding a social science or humanities degree, according to a study by OECD (Organisation for Economic Co-operation and Development)](http://www.oecd.org/site/devyewa/Pocket%20Edition%20AEO2012-EN.pdf)**.** This study surmised that African universities are failing to prepare African youth for the labour market.

It would be unjust however, to merely view this as a university or tertiary education challenge alone. Universities produce what the education pipeline fosters, and the education pipeline across Africa is leaky and has failed to keep up with the changing nature of the economy and work.

### Foundation

[](https://www.google.co.za/imgres?imgurl=https%3A%2F%2Fafricacheck.org%2Fwp-content%2Fuploads%2F2015%2F03%2F10134003085_b3c49321c9_o-Cropped-1.jpg&imgrefurl=https%3A%2F%2Fafricacheck.org%2Freports%2Fare-80-of-south-african-schools-dysfunctional%2F&docid=X3x9sXKb67a64M&tbnid=s-YCk0MOadyapM%3A&vet=10ahUKEwib-5uf4cziAhXUThUIHQPMA3YQMwhVKAIwAg..i&w=760&h=428&bih=824&biw=1684&q=maths%20crisis%20in%20south%20africa&ved=0ahUKEwib-5uf4cziAhXUThUIHQPMA3YQMwhVKAIwAg&iact=mrc&uact=8)The challenges start at a foundational level with the quality of foundational skills.

Foundational skills, are literacy and numeracy skills developed through primary and high school education. These basic skills allow for future training and skills development without which the attainment of adequate employment and or the participation in entrepreneurial activities is reduced.

A lot has been written concerning the challenges of basic education across Africa, not least a curriculum that is still heavily colonially biased and does not reflect Africa’s current reality; infrastructure concerns; a shortage of of qualified teachers; and minimum on-going development of educators. However, It is important to note that a significant portion of the "blame" for the lack of strong foundational skills is simply laid at the feet of governments and schools, and not enough focus is given on the other, equally prominent reasons such as societal attitudes to education, particularly STEM education and the role that communities need to play in supporting governments and schools in delivering education.

To transform Africa's capacity to produce more qualified individuals particularly in STEM, African society needs to radically change its attitudes to STEM.

In Africa, STEM is considered elitist, for the intelligent and above the capacity of the ordinary African scholar.

This attitude is reinforced by teachers and schools that advocate for advanced maths and science for the top performers only, and a curriculum that provides a more watered down syllabus for the majority of students and learners. Compare this with South Korea, where advanced science and maths education are considered a staple for all students, and great performance in these subjects is attributed to hard work and not intelligence. South Korea, by the way, is amongst the best performing countries in education and particularly in maths and science education.

Communities, parents and business must also play a bigger role in education. The diverse nature of education and the curriculum today, and the challenges faced by many of our schools due to the legacies of colonisation and or apartheid clearly demonstrate that it does our children a great disservice, to limit education, particularly formal education, purely to the domain of schools. Parents and communities need to be actively involved, providing optional avenues of learning that substantiate the roles of schools.

Research shows when communities, parents and schools work together to support learning,students perform better academically and stay in school longer.

The single most important predictor of student success is the family’s attitude that learning is a positive, joyful and valuable experience. Hence, parents, family and community are critical components of any effective education pipeline.

For most of Africa, this presents a problem, as our historical background means that most students in formal education today are often the 1st generation in their families and communities to receive formal education. Thus parental and community involvement in education is limited. Organisations such as the South African Agency for Science and Technology Advancement (SAASTA) and the P-STEM foundation could be part of a resolving this challenge.

Research in the US shows that most science is learned outside of school in a variety of informal education programs, such as those offered by science centres, public libraries, community centres, aquariums or zoos. Expanding our communities capacity’ to provide out of school programs in maths and science, and promoting community involvement in these programs can go a long way in changing the perception that education, and particularly STEM education is purely the domain of governments and schools.

Lastly, it will be important to include entrepreneurship into the standard school curriculum. This should include the technical skills of running a business, the softer aspects of managing change, dealing with failure and self-motivation with an intention to equip our youth with the skills to opt into starting and running businesses of their own.

This will in the long run increase the number of job opportunities available overall and provide a rich pipeline of African based products and businesses solving local problems and challenges.

The solution therefore to the leaky education pipeline, requires a more integrated approach to education, involving government and schools, supported and substantiated by parents, communities and community based organisations. This will go a long way in alleviating the challenges of having a labour market that meets the demands of the economy. Ultimately, the skills shortage itself could work as a means of alleviating the youth unemployment crisis and provide a sustainable boost to economic growth.

**Maths and science need desperate boost**

http://www.iweek.co.za/special-report/maths-and-science-need-desperate-boost

*Wednesday, 21 May 2014 00:00 Written by Illva Pieterse*

South Africa’s dwindling interest in maths and science subjects needs to be urgently addressed.

While matric results might have improved from 73.9% in 2012 to 78.2% last year, it seems less pupils are registering for maths and science. Maths uptake dropped 21% from 2009 to 2013 and science fell (20%).

These trends do not bode well for the future of South Africa’s ICT industry, which continues to be fraught with issues of skill scarcity.

According to Prof [Barry Dwolatzky](http://www.itweb.co.za/?tag=Barry%20Dwolatzky), director of the JCSE at Wits University, there has been a steady decline in the number of young people registering for ICT-related disciplines since 2000.

He believes students are not drawn to study computer science, information systems, software engineering, electrical engineering or IT for a number of different reasons. “In most cases, these programmes require good matric results in maths, science and English. The poor state of these subjects in schools precludes many students from making the choice to study ICT-related subjects,” he explains. He also blames poor career counselling. “Parents and teachers at schools in townships and rural areas know little or nothing about careers in ICT. Students who may have the interest and aptitude are never presented with ICT as a choice. There are also very few role-models in previously disadvantaged communities,” he states.

Dwolatzky also believes poor career guidance can lead to incorrect choices. “ICT is a very broad discipline. A student may choose to study for a computer science degree, for instance, while he may be better suited to work as a business analyst, which would be better learnt through an information systems qualification.

“We have noticed that university graduates entries are very low for IT-related courses which clearly show a local skills shortage, which will inevitably affect the growth of the economy,” Malcolm Rabson, MD at Dariel Solutions explains.

### Secondary School

According to Betty Enyonam Kumahor, regional director for ThoughtWorks Pan-Africa, students at secondary school-level often do not know what types of careers will be open to them if they take maths and science. “There is also the common perception that these subjects are more difficult than the others,” she explains.

Further challenges, she says, include a lack of support from families and not enough viable role-models for students.

Rabson agrees that a lack of interest in maths and science can largely be attributed to a lack of support and encouragement from teachers or parents, who often fail to make ICT-related subjects appealing for students.

“Furthermore, there is a lack of qualified technical educators in our school system, which makes exceeding in the subjects difficult,” he explains.

“A career in the STEM (science, technology, engineering and mathematics) industry is not seen as a ‘family-friendly’ choice, as many believe it is characterised by long hours,” Kumahor explains.

“There is also, of course, the perception that STEM is male-dominated, which discourages female learners from pursuing them at a tertiary level,” she continues. This originates from the early days of STEM when there were so few women yet in the industry and encouragement was rarely given to female scholars. ”Also consider the social factors in our communities that incorrectly teach women early on that they would be better suited to creative disciplines as their skills can not be fully utilised in the STEM world,” says Kumahor.

### Low Marks

In 2013, the World Economic Forum’s (WEF) 5th Financial Development Report ranked South Africa last on the quality of maths and science education out of 62 countries surveyed. Why are maths and science marks not up to scratch?

According to Kumahor, science especially requires significant financial investment (ie labs and equipment) in order to be taught adequately and schools that cannot afford these investments struggle to sufficiently illustrate certain practical concepts to its students. WEF’s annual Global Competitiveness Report 2013, ranked South Africa 146 out of 148 for the (poor) quality of its educational system.

“Quite simply, it is due to poor teaching,” says Dwolatzky. “In my experience, I have found that maths and science teachers do not have good subject knowledge. They tend, therefore, to teach by repetition, rather than building a love and deep understanding of their subjects.”

Rabson agrees it is due to the lack of technical educators in our school systems that science and maths grades are dropping. “This is filtering down to the students as they are not being exposed to the full knowledge which is stifling their learning process. This is a serious issue especially in high school as at this stage students should be moulded to ensure their grades are good enough to carry them through their tertiary careers – and allow them to enter into the IT and sciences space,” he says.

### Encouragement

Despite the current low state of maths and science uptake in schools, there is much that can be done to encourage interest.

Rabson believes the best way to do this is through education. “We need to educate the parents, teachers and principals on the inherent value in these subjects. These individuals play an important role in a young student’s life and can either have a positive or negative influence. They are in the ideal position to encourage and impose their knowledge to influence behaviour,” he says.

He suggests the industry start implementing programmes. “There are some successful programmes that have been implemented globally and are making a huge difference in the industry. South Africa needs to start implementing such programmes to ensure we see a positive and necessary change,” he says.

“Additionally, government needs to assist by partnering with the industry to develop pragmatic solutions as there is generally a lack of understanding of what is needed in the curriculum and what’s needed in industry in terms of skills.”

Kumahor believes providing students with assistance, in their maths homework, such as peer study groups, instead of relying on parents who may not have adequate background in the subject, could greatly help learners increase their marks.

According to Dwolatzky, schools need to focus on improving teacher knowledge and provide more exposure to exciting careers (such as ICT, game design and app development) that require maths and science in order to study at university.

“Furthermore, the government needs to get the schools right. Better management, upgrading teachers, improve career guidance and getting experience are some changes that could greatly benefit schools. Schools could, for instance, consider using retired maths and science experts to support teaching. Finally, exposing students – and teachers – to inspirational role models would definitely be a step in the right direction.”

Rabson says if this issue is not treated as urgent we will find ourselves outsourcing services overseas to fulfil the local demands and still be stuck with the same problem 10 years from now.

**South Africa ICT Skills shortage starts in Matric**

*http://deloitteblog.co.za/2014/01/17/south-africa-ict-skills-shortage-starts-in-matric/*

The South African Matric results for 2013 have been recently published and they are not painting as rosy a picture as the overall pass rate would lead us to believe.

When you look deeper at the subjects that are seen as feeder subjects for careers in IT; namely Maths and Science; there are far less people registering for these subjects. In other words; while the results may be better – a higher pass rate – the amount of students who are eligible to register for a BSc degree is drastically diminished.

The following table looks at the number of students registered for maths and science in 2009 and compares them to those registered in 2013.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Maths Lit** | **Maths** | **Science** |
| % Change | 14% | -21% | -20% |
| 2009 | 284 174 | 296 164 | 224 902 |
| 2013 | 330 789 | 245 663 | 187 170 |
|  |  |  | <<function>> |

This shows a drastic reduction in the number of maths and science pupils – to the tune of approximately 20% each. That translates to 20% less students who will be choosing a career in the ICT industry. The ramifications of this are dire as South Africa cannot compete with other emerging markets who are breaking new ground in the ICT industry on a regular basis.

There are also many other industries that rely on students being literate in maths and science. These range from actuarial science and engineering through to data analytics and accounting. In essence, it can be said that a county’s entire foundation is built on the quality of maths and science Matric graduates.

In 2013; The World Economic Forum ranked South Africa last on the quality of maths and science, in a survey of 62 countries. This is a country-wide problem and not just one confined to the ICT industry. Steps need to be taken now in order to ensure that within the next 10 years South Africa can move back to a leading position within ICT.

While great strides have been made in order to provide better education to more South Africans; there is still a lot that needs to be done to ensure students are excited and encouraged to pursue careers in ICT. Projects such as the SKA Square Kilometre Array are vital in generating some of this excitement; which needs to be instilled at a young age. It is largely fruitless to encourage a grade 10 pupil that they should be interested in maths and science as by then it is almost too late. The encouragement and foundations need to be laid in the earlier grades to ensure that the development of an appetite for maths and science is a voracious one!

Let us know in the comments field your thoughts around this important topic of discussion.

**The 10 Skills Employers Most Want In 2015 Graduates**

http://www.forbes.com/sites/susanadams/2014/11/12/the-10-skills-employers-most-want-in-2015-graduates

Can you work well on a team, make decisions and solve problems? Those are the skills employers most want when they are deciding which new college graduates to hire. The next-most-important skill: ability to communicate verbally with people inside and outside an organization. Employers also want new hires to have technical knowledge related to the job, but that’s not nearly as important as good teamwork, decision-making and communication skills, and the ability to plan and prioritize work.

The National Association of Colleges and Employers (NACE) a Bethlehem, PA non-profit group that links college career placement offices with employers, ran a survey from mid-August through early October where it asked hiring managers what skills they plan to prioritize when they recruit from the class of 2015 at colleges and graduate schools. Though the survey sample is small—NACE collected responses from just 260 employers—the wisdom is sound. New and recent grads should pay attention. (Most of the respondents were large companies like Chevron, IBM and Seagate Technology.)

College majors and graduate degrees also matter. The three degrees most in demand for the class of 2015 are business, engineering, and computer & information sciences. But cutting across all majors and degrees, employers want new hires who can work well on teams, and who are decisive problem-solvers.

### Win At Work: An eBook From Forbes

[Land a great job, handle your boss and get ahead today.](http://www.amazon.com/Win-At-Work-Great-Handle-ebook/dp/B00TLEMHNY/?utm_source=article&utm_medium=direct&utm_campaign=winworkebook)

Here are the 10 skills employers say they seek, in order of importance. NACE gave each a rating on a 5-point scale, where 5 was extremely important, 4 was very important, 3 was somewhat important, etc.:

Ability to work in a team structure  
Ability to make decisions and solve problems (tie)  
Ability to communicate verbally with people inside and outside an organization  
Ability to plan, organize and prioritize work  
Ability to obtain and process information  
Ability to analyze quantitative data  
Technical knowledge related to the job  
Proficiency with computer software programs  
Ability to create and/or edit written reports  
Ability to sell and influence others

### Include all skills in résumé

The good news for grads: No matter what you have studied in school, whether anthropology or French or computer science, you will have had to learn the top five skills on the list. The trick is to demonstrate that you have those skills through your cover letter, résumé and interview. Think about class projects where you have been a team member or leader and jobs where you have had to plan and prioritize. Describe those skills specifically in your résumé and cover letter and in your job interview.

For instance if you staffed a campus snack bar, say you worked on a team of five people and handled food orders. Or if you worked in the library, include the size of the staff and that you handled requests from 50 students a day at the circulation desk. Even a job as a counselor in a summer camp can involve team work, decision-making and planning. Make sure you spell out those responsibilities briefly but specifically. For example, you could say you worked on a staff of 20 counselors, supervised the daily activities of 35 campers and coordinated group activities for 140 young people.

The survey makes clear that employers want universal skills you can learn across academic disciplines and in any job where you are working with others. The trick is to communicate clearly that you have those skills.

**Bibliography**