Publication: Saturday Star
Date: 14 Jan 2017
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Focus to be on maths and science learners in the Eastern Cape

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IN MY CAPACITY as the president of the South African Institute of Physics (SAIP) and the Dean of Science at Nelson Mandela Metropolitan University (NMMU), I am extremely concerned about the state of maths and science education in South Africa, particularly in the Eastern Cape, KwaZulu-Natal and Limpopo.

Last year I resigned from my post as the founder and director of the University of Johannesburg (UJ) Soweto Science Centre, where I was based from 2010 to 2016, and moved from Joburg to Port Elizabeth to join NMMU. I accepted the post at NMMU partly because of the challenges the Eastern Cape faces with maths and science education.

I want to see learners from the Eastern Cape featuring among the top maths and science learners in South Africa. I want to see our Faculty of Science admitting increasing numbers of learners from throughout the province who pass matric with distinctions in maths and science. And I want to see increasing numbers of graduates achieving as scientists, engineers, technicians and mathematicians.

Hence, the first project I embarked on in 2016 was the Science Education, Outreach and Communication Programme (SEOCP), which will be the flagship project of the Faculty of Science at NMMU. The programme focuses on science education from Grade R learners to undergraduate university students, with outreach programmes for learners, teachers and communities across the province.

Physics is my discipline and my doctorate is in physics, which is the fundamental, basic science underpinning all science, engineering and technology (SET) disciplines. I am also a maths and science educator and my focus, which is also the focus of the SAIP and my colleagues, is on quality and work ethics. We look at the quality of learner and student performance. We are not interested in a 100 percent pass rate where all the students pass with 30 percent; we want quality passes.

In the Eastern Cape, we will be focusing on this and on the work ethics of the teachers, learners and students in this province where, based on the results, they are far from where they should be. Strong work ethics are the foundation of performance.

Significant successes are possible, as demonstrated by the UJ Soweto Science Centre, where each year about 800 Grades 8-12 maths and science learners from Soweto and surrounding areas are trained. Many matriculated with distinctions, contributing to the quality passes in Soweto and boosting Gauteng's performance by township schools. The first cohort graduated from universities in 2015.

Successes have also been achieved in parts of Limpopo where the SAIP and UJ Soweto Science Centre members have mentored and inspired learners, together with colleagues from the University of Venda. A strong example is rural Vuwani in Limpopo's Vhuronga 1 circuit, Vhembe district, where 30 schools were burnt down last year and for more than two months learners did not go to school.

> **Work ethics are the foundation of performance**

Yet, in last year's matric results, Vhuronga 1 circuit emerged as the top-performing circuit in Limpopo and Vhembe emerged as the top-performing district. Of the 22 top matric achievers for 2016 nationally, 12 came from Vhembe.

Within Vhembe are 2016's two top-performing schools in Limpopo – Mbilwi Secondary followed by Thengwe Secondary. Tshivhase Secondary, also in Vhembe, produced the top 2016 matric learner from Limpopo, Malamba Nemavhadwe. She emphasised how hard she had worked to achieved this, saying, "every day was a study day for me". She will be studying actuarial science at Wits University.

In 2015, matriculant Hermandishe Mathiva from Mbilwi Secondary achieved the second position Silver Award in the South African Physics Olympiad (SAPhO) and achieved 100 percent in maths and physical science, for which he was named South Africa's top maths and physical science matric pupil of 2015. To achieve this, he studied every day after school for four hours, and is studying computer science at the University of Cape Town.

South Africa's top matric performer for 2016 is Conrad Strydom from Hermanus High School in the Western Cape. He also won the first-place Gold Award at the SAPhO 2016. He will be studying physics at the University of Stellenbosch. He said he had worked hard throughout his school career, including studying throughout the holidays to achieve as he has.

SAPhO was launched by the SAIP to encourage an interest in physics among school learners. They receive considerable support and encouragement in physics from SAIP members who collaborate with their teachers, non-profit organisations and higher education institutions.

Our SAIP and UJ Soweto Science Centre outreach projects and science camps at schools in Limpopo have attracted girl and boy learners to physics and stimulated an interest in the subject by showing them that studying physics can be fun. The learners are also introduced to possible careers in physics, science, engineering and technology and ways to obtain funding to further their studies, such as exposing them to companies that offer sponsorships, bursaries and internships.

At NMMU, through the SEOCP, this approach will be duplicated at schools in the Eastern Cape, including the most disadvantaged, underperforming schools. We will partner with the range of educational outreach activities in the province already being run by various departments within NMMU and combine our expertise.

A partnership between the Faculty of Science at NMMU and the Institute of Physics UK will also be formalised and we will invite other institutions in the Eastern Cape to form a consortium. We will be co-ordinating maths and science teacher development projects in the province to advance their skills in teaching these subjects in a way that gets through to learners.