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UNIVERSITY OF JOHANNESBURG

Faculty of Science NEWSLETTER

Innovatively creating **new knowledge** and **leading scientists**

THE UJ SCIENCE CENTRE @ SOWETO

Global trends in the fast growing advancement in Information and Technology demands a growing need for qualified physicists, mathematicians, chemists, biologists, engineers, technicians, technologists, and other science related professionals in order to cope and address human resources needs in the sciences. The South African school system and the higher education sector should therefore be in a position to prepare our young scientists for the national human resource challenges in the scientific and technological fields.

Given South Africa's challenges in the Science, Engineering and Technology (SET) sector, namely,

- a shortage of human resources in SET
- too few female professionals in the SET fields
- an imbalanced distribution of skills in the SET careers along racial lines
- a high drop-out rate at school level and in Higher Education Institutions
- poor academic preparedness of learners entering tertiary education

There is a growing demand from institutions of higher learning to become proactive and creative in their response to these challenges.

Inspired by these challenges, the Faculty of Science at UJ established the UJ Soweto Science Centre in 2010. As an engaged, inclusive community-focused Centre, the UJ Soweto Science Centre will become a gateway to our nearest communities while the youth in these communities will use it as a gateway to unlocking their potentials.

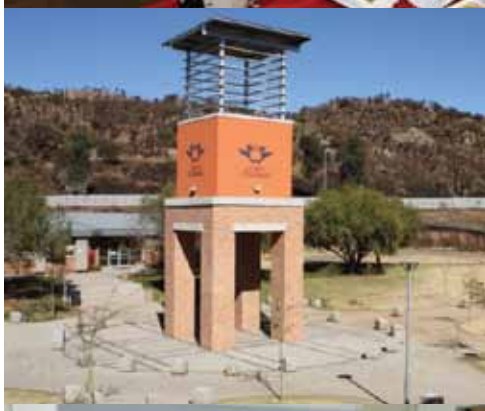
THIS ISSUE **FOCUSES ON THE UJ SCIENCE CENTRE @ SOWETO.**

UJ **Science Centre** Soweto

The value of science in achieving national development goals is more evident now than has been postulated in the past, since the application of science in advancing new technologies is one of the most effective weapons in the struggle toward the reduction and eventually the elimination of poverty in our society.

However, to realize our potential to harness science and technology for our country's development, we need to firstly address our current crisis in mathematics and sciences education. There is no doubt that the country needs serious intervention strategies that would strengthen mentorship, support and guidance in curriculum implementation at secondary school level, especially at grade 10, 11 and 12 level.

The UJ Soweto Science Centre was established as a facility to address some of the challenges faced by our country in the areas of Science, Engineering and Technology. In particular our aim is to provide access to the world of SET to local communities and to provide a facility that focuses on bridging the gap between high school and university science and thereby training the future scientists and engineers that South Africa desperately needs.



The Centre provides hands-on experience to learners in our physics, chemistry, biology, geography and IT laboratories as well as exposure to a variety of exhibitions spanning various disciplines.

Through innovative science theory and laboratory lessons, computer training, exhibitions stressing on aspects of everyday life and other developments relevant to South Africa, the UJ Soweto Science Centre is ideally poised to play an important role in nation-building efforts.

The principal activities of the Soweto Science Centre include

- teaching theory lessons in mathematics, physical sciences, life sciences and environmental sciences;
- conducting supervised laboratory and tutorial sessions;
- teaching English for scientific communications and conducting computer training;
- participating in and organizing public talks, expo day, science day, career guidance day, National Science Week, and other science related activities.

The Centre currently has 200 grade 10 learners, 200 grade 11 learners and 240 grade 12 learners registered in subjects of mathematics, physical science, life science, environmental science and English from schools around Soweto and surrounding regions. In addition the learners receive computer training.

The learners attend supervised laboratory and tutorial sessions on Friday afternoons and theory lessons on Saturdays. The year planner is designed on a university model to introduce the students to a university culture, thereby bridging the cultural gap between high school and university. The learners are also provided with the necessary learning material for each grade level.

Important days in the year programme include:

- A Science day hosted in a school in Soweto during the week: The different departments from UJ's Faculty of Science display their science exhibitions to Soweto high school learners.
- Expo day: students showcase their inventory projects to the public at the Soweto Science Centre.
- Career day: various companies and other stakeholders are invited to showcase careers to the learners in the Science Centre.
- Public lectures by invited scientists.

At the launch of the Science Mobile Centre were Prof Kinta Burger (Dean, Facuty of Science), Mr Derek Hanekom (Deputy Minister of Science and Technology), Prof Angina Parekh (Deputy Vice-Chancellor, Academic), Rejoice Ratlhallane (Thomas Mofolo School), Prof Azwinndini Muronga (Manager Soweto Science Centre, Dr Annah Moteetee (Vice Dean, Faculty of Science) and Dr Melanie Jacobs (Head UPEQ).

In collaboration with SciBono the Centre also assists in empowering and enhancing the skills of mathematics and science teachers. The Centre provides teachers with the educational support and assistance with mathematics and science learning content, mathematical and science related skills, professional development, and knowledge and skills related to curriculum development and implementation. The Centre serves as an alternative and additional resource centre for mathematics and science teachers. Mathematics and science study rooms, as well as a computer laboratory with internet access, are used to train teachers in the use of relevant technology at different levels for various purposes.

Even before the establishment of the Centre in 2010, the Faculty of Science offered outreach programmes in mathematics in the period 2008 -2009 to schools in the vicinity of Auckland Park and Soweto via the very successful Mathematics Advancement Programme (MAP). A grade 12 learner from Almont Technical High School who benefited from the Mathematics Advancement Programme made front page headlines with 6 A's. Almont Technical High School also became the school with the most improved matric pass rate: from 42% in 2009 to an 87% pass rate in 2010 – an increase of 45%.

The Centre was officially opened in 2011 by the Deputy Minister of Science and Technology, Mr Derek Hanekom. Present at the official opening in the Imbizo Auditorium at the Soweto Campus were the parents, learners, teachers, government officials and staff from UJ.

One of the key indicators of the programme is the regular assessment of the learners through term tests and competitions. Last year there were two award giving ceremonies. Five top grade 12 learners were identified

Mr Derek Hanekom
(Deputy Minister of Science and Technology),

Dr Brian Doyle (Department of Physics) demonstating physics in action with Prof Muronga looking on.

to represent the Science Centre at an annual Science Camp at Boyden Observatory outside Bloemfontein. At this camp learners participated in theoretical and hands-on scientific activities.

The Science Centre was recently awarded a grant by the Department of Science and Technology (DST) to purchase a Mobile Science Lab. DST's Deputy Minister, Mr Derek Hanekom, officially handed over the unit to the Faculty of Science on 5th August 2011 during the National Science Week. Along this spirit the Imbizo arena was filled with exciting science exhibitions that exposed learners to the wonders of science. At the occasion one of the grade 12 learners, currently registered with the UJ Soweto Science Centre, Rejoice Ratlhallane, speaking on behalf of the learners gave a moving speech in which she said:

"The Centre will provide a service to develop disadvantaged schools and also help bring about desired change to local societies. Learners in Soweto will no longer have any reason to feel inferior or discriminated against. Being educated means having access to optimal states of mind, regardless of the situation or environment you are in"

Abstract science theories become alive when experienced in action in a laboratory. However, many schools lack the necessary laboratory facilities. With the Science Centre Mobile Laboratory UJ is able to conduct science experiments in the most remote areas and to provide first hand laboratory experience to learners of schools who do not have the necessary facilities. The Mobile Laboratory will also be used to illustrate relevant science related topics to the public at (for example) shopping malls.

The Science Centre continues to make headlines for its positive contributions. They have received a grant from the US State Department through the US Embassy, Pretoria, to support a joint satellite project between a US Institute and the Science Centre at UJ. The support will focus on two educational projects at the Science Centre. These are the Hands-On Universe (HOU) and Universe Quest. Both projects will support skills development for secondary school learners in Science, Technology, Engineering and Mathematics topics.

HAND-ON UNIVERSE is an educational program that will enable learners to investigate the universe while applying tools and concepts from science, math, and technology. Using the internet, learners

will request observations from an automated telescope, download images from a large image archive, and analyze these with the aid of user-friendly image processing software. By analyzing real astronomical images with HOU image processing software, similar to the software professional astronomers use, students become more engaged and more excited about math and science.

The ***Universe Quest*** project will provide girls ages 14-17 with a unique opportunity to learn IT skills in the context of studying the Universe with modern technology. Young women will have access to astronomy activities; game design and authoring; internships at technology companies; and leadership development. ***Universe Quest*** will inspire girls to build a personal connection with science and technology using astronomy and game development, while empowering them with the skills they need to succeed in their education and life. Learning materials will be developed by the University of Johannesburg in collaboration with national astronomy institutions. Role model presentations, in person and remotely, with those working in astronomy and those with similar backgrounds. Field trips include visits to astronomy and other national scientific facilities.

It is the Science Centre's ambition to demonstrate that, through individual and collective efforts, South Africa can produce young future scientists through an inclusive and non-elitist Science Centre that can compete and collaborate with other Science Centres – locally and internationally. This ambition will require a strong partnership between the UJ Soweto Science Centre and various stakeholders: parents, schools, government, private sector and UJ's various divisions.

In this regard the Science Centre would like to acknowledge its partnership with SASRIA Limited for providing financial support since 2010, the partnership with DST through SAASTA for their continued support through grants for various projects and programmes. The partnership with De Beers is bearing fruits especially in the educator's programmes and De Beers Saturday School. The Centre also has a very healthy relationship with the GDE, schools, parents and community leaders.

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