SAASTA Science Advancement Highlights Report

2012-2013

NRF National Research Foundation | SAASTA South African Agency for Science and Technology Advancement

Touching lives: reaching for new frontiers

A passport to knowledge: Putting the world of science in society's hands through

- school level interventions to increase the number of scientists of tomorrow;
- strengthening the science, engineering and technology culture; and
- bringing science and scientists closer to society.

Strategic approach

Science, through research, has a crucial role to play in the growth of South Africa's economy. When scientific research findings are made accessible, it is possible for innovation and entrepreneurial opportunities to arise. Research findings can also have an impact on policy and social conditions in the country. But this can only be achieved when science becomes part of our daily dialogue and discourse.

The bedrock of SAASTA's success to advancing a culture of engagement with science in South Africa lies in its synergistic approach. All SAASTA initiatives fall under three interdependent key strategic areas:

- Science Education (through which we build up the supply of tomorrow's scientists and innovators);
- Science Awareness (through which we engage the public with the phenomena of science, engineering and technology); and
- Science Communication (through which we share science and technology achievements with the public, building up their appreciation of the benefits of science).

Join us on our journey of discovery, touching hearts and minds, leading society to a brighter tomorrow.

Contents

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

The Department of Science and Technology is the main sponsor of SAASTA and its projects.

NRF National Research Foundation

SAASTA is a business unit of the National Research Foundation.

Towards a knowledge economy

"This year, SAASTA set out to further align its strategy and objectives with those of the NRF – in a combined organisational effort to act as a catalyst for capacity building and knowledge creation. This is a vital step towards transforming South Africa's economy into a knowledge-based economy, in which the production and dissemination of knowledge lead to economic benefits and enrich all fields of human endeavour."

- One of SAASTA's key objectives is to reach learners in remote rural areas with the message that they, too, can one day be a part of our country's skilled and valued workforce.
- SAASTA has strong international collaboration agreements in place, among others with the Beijing Association of Science and Technology and the American Museum of Natural History.

> I would like to acknowledge the support and encouragement that we have received from NRF management in fulfilling our mandate. We also gratefully acknowledge the contractual funding we received from the DST. Without our partners in the private sector, higher education and government departments, and at national facilities and science centres, we would not be able to deliver what is required of us. I would like to thank all of these role players for their support and contributions.

Foreword by Dr Jabu Nukeri, Managing Director of SAASTA

SAASTA set out to further strategically position itself with the National Research Foundation (NRF) in the year under review – in a combined organisational effort to act as a catalyst for capacity building and knowledge creation. This is a vital step towards transforming South Africa's economy into a knowledge-based economy, in which the production and dissemination of knowledge leads to economic benefits and enriches all fields of human endeavour.

From an operational perspective, I am proud to report that SAASTA exceeded several of its targets during the year, both in terms of the number of learners and educators as well as members of the public reached and the STEMI resources developed by the organisation. Career profiling activities and our resources on science, engineering and technology careers have the potential to make a valuable contribution to the NRF's objective of growing a representative science and technology workforce.

Via our science awareness programmes and competitions, which are aimed at identifying and nurturing national talent in science, engineering and technology (SET), we are contributing to a healthy pipeline of vital capacity in SET – from primary and high school learners to undergraduate and postgraduate students. One of our key objectives is to reach learners in remote rural areas with the message that they, too, can one day be a part of our country's skilled and valued workforce.

SAASTA exposes the winners of its various competitions to cutting-edge research and science communication practices outside of our country's borders. The winners of the National Science Olympiad participated in the International Youth Science Forum in London, the winners of the National Schools Debates won a trip to New York, two winners in the Eskom Expo for Young Scientists participated in the Beijing Youth Science Creation Competition and the winner of the Young Science Communicators' Competition will be attending an international science communication workshop to fine-tune his communication skills.

We developed, printed and distributed STEMI resource material across the country and provided learning platforms at the Johannesburg Observatory such as the forensic science laboratory where learners are challenged with real life problems and curriculum-based experiments can be performed for schools; learners can interact with exhibits; and members of the public come to view the night sky.

We have succeeded in strengthening our relationships with our strategic partners (higher education institutions and science councils) and with industry. We have strong international collaboration agreements in place, among others with the Beijing Association of Science and Technology and the American Museum of Natural History.

We pursued new partnerships with traditional media such as print and radio. This included a highly productive collaboration with one of the top 10 SABC radio stations – Munghana Lonene FM which operates from Polokwane. We worked with them for a period of eight weeks, focusing on eight SET topics in which we successfully involved a number of researchers to highlight key aspects of their work. We also explored new media platforms, including a successful viral advertising campaign for hydrogen powered vehicles, which scored over 8 000 hits on YouTube.

Another highlight was an invitation by the Parliamentary Portfolio Committee on Science and Technology to present our activities and achievements to its members. The two-hour presentation elicited a very positive response and several pertinent issues were raised. One of the outcomes of this engagement was that we were tasked to assist the Agricultural Research Council with a campaign aimed at promoting careers in the agricultural research sector.

From a financial perspective, it remains a cause for concern that 80% of our funding is contractual. This has implications for the stability of the organisation and the conceptualisation of programmes in line with SAASTA's mandate. Additional core funding from the Department of Science and Technology (DST) and NRF is vital to enable us to conceptualise programmes that speak to the needs of our target audience and attract the required human expertise into the organisation.

On behalf of SAASTA, I would like to acknowledge the support and encouragement that we have received from NRF management in fulfilling our mandate. We also gratefully acknowledge the contractual funding we received from the DST. Without our partners in the private sector, higher education and government departments, and at national facilities and science centres, we would not be able to deliver what is required of us. I would like to thank all of these role players for their support and contributions.

I would also like to express my appreciation towards the SAASTA staff members for having always been enthusiastic about their work and passionate about the difference they are making in the lives of our fellow South Africans.

> "SAASTA's business as an organisation has doubled in terms of the sheer volume of the work we've been doing over the past two years."

▲ *More than 22 000 learners participated in the 2012 National Science Olympiad competition. The top 100 performers attended a science focus week. Here the learners are introduced to the fascinating work being done in forensic science.*

Charting the future of South Africa's workforce

In order to evaluate the impact of its science and maths support and career guidance, SAASTA has commissioned two studies to track learners who participated in some of the National Science Olympiads, competitions and camps over the past few years.

1 The **first study** followed learners who were part of the science, engineering and technology awareness project that kicked off in 2007. Between 2007 and 2009, SAASTA's Science Education Unit collaborated with the University of Johannesburg, working with 73 rural schools across five provinces – the Eastern Cape, Free State, KwaZulu-Natal, Limpopo and Mpumalanga. The focus was on career guidance, and maths and science support. The main objectives were to identify and nurture talent and to broaden the learners' knowledge of the range of possible SET careers. The project started with 2 555 learners who were taking mathematics and science as subjects in grade 10 (2007) and followed them until they reached grade 12 (2009).

In 2010, SAASTA did a follow-up study of students from a sample of 54 of these 73 schools and tracked university entrance. The results showed that:

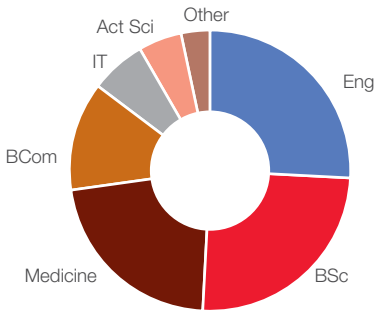
- 40% of the tracked learners were in higher education;
- 54% (or 572) of these learners were studying in SET fields; and
- 24% (252) of the SET field learners where studying engineering.

In 2012/13, only 1 386 students of the original group of 2 555 were tracked. Of these 1 386:

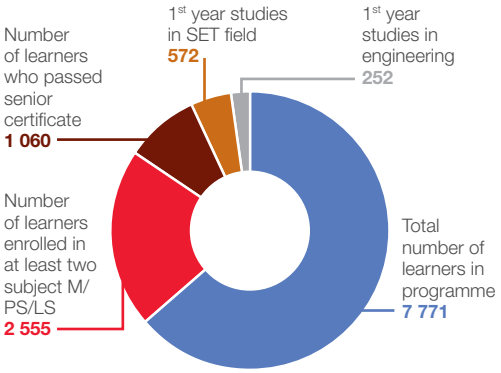
- 44% (612) are not studying;
- 56% (774) are furthering their studies;
- Of the 774, 62% (482) are studying at Higher Education Institutions (HEIs) furthering their studies in science, technology, engineering, mathematics and innovation (STEMI); and
- 30% (147) of these 482 students are studying engineering.

2 The **second study** involved learners who participated in the National Science Olympiad, a project that SAASTA has been running for the past 48 years. It has been sponsored by Harmony Gold Mining Company since 2009. The Olympiad aims to identify talent and potential, nurture it to enhance classroom performance and contribute to the development of the SET human capital pipeline by enhancing youth's access to SET.[1] The study, which focused on the top 200 grade 12 learners who participated in the National Science Olympiad, was completed in July 2012. Based on feedback from 82% of these learners, it appears that more than 90% of these students are furthering their studies in science, engineering and technology at higher education institutions. SAASTA believes it is not a stretch of the imagination to see these young people, in the near future, contributing to the NRF's envisaged vibrant national system of innovation.

Impact: 2010–2012
Identify and nurture talent in SET
Tracking of top learners who participated in NSO: 2009



Impact: 2008–2010
Identify and nurture talent in SET



1 Department of Science and Technology presentation to the Parliamentary Portfolio Committee on Science and Technology, March 2012

Raising the SAASTA flag

Exploration, covering new ground, discovering new territories

Collaboration to accelerate transformative science

The concept of a community is no longer restricted to a group of people living in a common geographic location. Today communities can extend across the globe. To remain relevant and at the forefront of developments in science advancement, awareness and education, SAASTA is increasingly spreading its wings and becoming an active member of the global community.

In the past year, the organisation visited rural communities as far afield as Springbok, Giyani, Thohoyandou, Maphumulo, Malamulele, Malelane and Lusikisiki, but it also took its exhibitions and workshops to places as far afield as bustling Beijing in China and beautiful Florence in Italy. It has sent worthy winners of science competitions to New York in the United States of America and Waterloo in Canada. And in between all that activity, SAASTA found time to participate in science fairs and festivals in South Africa, Mozambique, Kenya and Zimbabwe.

SAASTA coverage across the country

KwaZulu-Natal	Newcastle, Durban, Pietermaritzburg, Richards Bay, Stanger, Maphumulo, Bergville
Eastern Cape	Port Elizabeth, East London, Mthatha, Lusikisiki, Bisho, Mount Ayliff
Limpopo	Polokwane, Giyani, Thohoyandou, Modimolle, Phalaborwa, Tzaneen, Groblersdal
Western Cape	Cape Town, Saldanha, Hermanus, Worcester; Bredasdorp, George, Beaufort West
Gauteng	Johannesburg, Tshwane, Germiston, Bronkhorstspruit, Randfontein, Vanderbijlpark, Carletonville
Mpumalanga	Nelspruit, Secunda, Witbank, Piet Retief, Malalane, Middelburg, Komatipoort; Kameelrivier, Bushbuckridge
Northern Cape	Kuruman, Kimberley, Sutherland, Springbok
Free State	Sasolburg, Bloemfontein, Botshabelo, Thaba 'Nchu, Kroonstad, Welkom, Trompsburg
North West	Mafikeng, Potchefstroom, Rustenburg, Klerksdorp, Zeerust, Vryburg, Brits

SAASTA in the global arena

1. The winner of the South African Quantum Physics Project essay competition attended the International Summer School for Young Physicists in Ontario, Canada.
2. The top team in the SAASTA National Schools Debates Competition won a four-day trip to New York.
3. SAASTA participated in the Zimbabwe Science Fair.
4. SAASTA attended the first ever National Science, Technology and Innovation Week in Nairobi, Kenya.
5. SAASTA participated in the 10th Mozambican Science and Technology Exhibition in Maputo, Mozambique.
6. SAASTA attended a science communication workshop in Addis Ababa, Ethiopia.
7. SAASTA exhibited winning entries from its Science Lens competition in Florence, Italy.
8. The top national performers in the National Science Olympiad attended the London International Youth Science Festival in the UK.
9. SAASTA exhibited at the Beijing Science Festival in China.
10. The top national performers in the National Science Olympiad stand a chance to win a trip to the Australian National Youth Science Forum.

Making science accessible

Touching the hearts and minds of people

SAASTA plays a central role in drawing together science communication professionals, cartoonists and animators, journalists, scientific mediators, museums and information officers to discuss issues related to the diffusion of science. The diffusion of science has been identified as an instrument and even as a "social movement" capable of helping strengthen citizenship, improving the wellbeing of the people and boosting the economy of countries.[2]

By building the vision of a more mature relationship between science and society, SAASTA and its partners can help educate South Africans (young and not-so-young) about science, engineering and technology, thereby countering ignorance and ambivalence towards science.

SAASTA's flagship projects, education outreach activities, competitions and quizzes are all designed to advance public awareness, appreciation and engagement of science, engineering and technology in South Africa. The organisation has committed itself to a focus on poorer communities, to ensure that they too are afforded the opportunity to engage with and appreciate science.

SAASTA is growing in stature, having been invited to sit on the advisory board of a cutting-edge South African research centre and teaming up with corporates in sponsorships to promote science.

Over 53 600 learners in both primary and high schools and students at universities participated in SAASTA's STEMI Olympiads and Competitions, in particular the Natural Science Olympiad (grade 6 to 9); AstroQuiz (Grade 7); Schools Debates (Grade 10 to 12) and the National Science Olympiad (Grade 10 to 12).

2 http://www.ncbi.nlm.nih.gov/pubmed/11910449

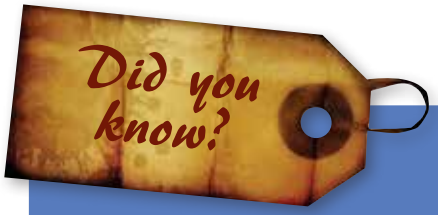
National Science Week

National Science Week (NSW) is a major event on the science community's calendar when, usually in the first week of August, South Africans all over the country celebrate the contributions that science makes to the wellbeing of our communities. NSW, which is led and funded by the DST, marked its 13th anniversary in 2012. SAASTA has been managing this flagship project on behalf of DST since 2002.

The former Minister of Science of Technology, Naledi Pandor, opened the celebrations early on 28 July 2012 at the University of Johannesburg's Soweto campus. During the following week, South African learners, educators, the public, politicians and the community at large were exposed to the value and impact of science, technology and engineering in their lives.

The theme of NSW, which changes from time to time, was “The role of Science in Economic Development” in 2012. SAASTA and the 99 organisations that implemented activities again exceeded their target for the number of participants. SAASTA is particularly excited about the marked increase in the number of members of the public (from 32 231 in 2011 to 108 900 in 2012) who joined in the celebrations, though the largest participation is still by learners (273 812).

A new three-year contract between SAASTA and the DST for the management of this project up to 2015 was recently signed.



- Just under 397 000 people took part in NSW 2012, over 8% more than the target set for participation.
- The large number of members of the public who participated can be ascribed to each organiser presenting at least two activities aimed at this group.
- Educators were attracted to interesting public lectures and by establishing collaborations with provincial Mathematics, Science and Technology coordinators in all the nine provinces.
- Seven new educational resources were produced for NSW and 16 popular existing resources were reprinted and distributed in large numbers.
- Seven organisations from the astronomy sector participated in NSW 2012.

▲ *The Science Learning Centre for Africa, based in the Western Cape presented hands-on science educator training sessions covering metal extraction and acid-base reactions and how to deal with these topics in large classes during National Science Week 2012.*

▲ *HIP2B² drew capacity crowds all over the country during National Science Week 2012 with their iThink Challenge competition. Participants had to think out-of-the-box to complete four different tasks based on science, engineering, mathematics and entrepreneurship in order to win a prize.*

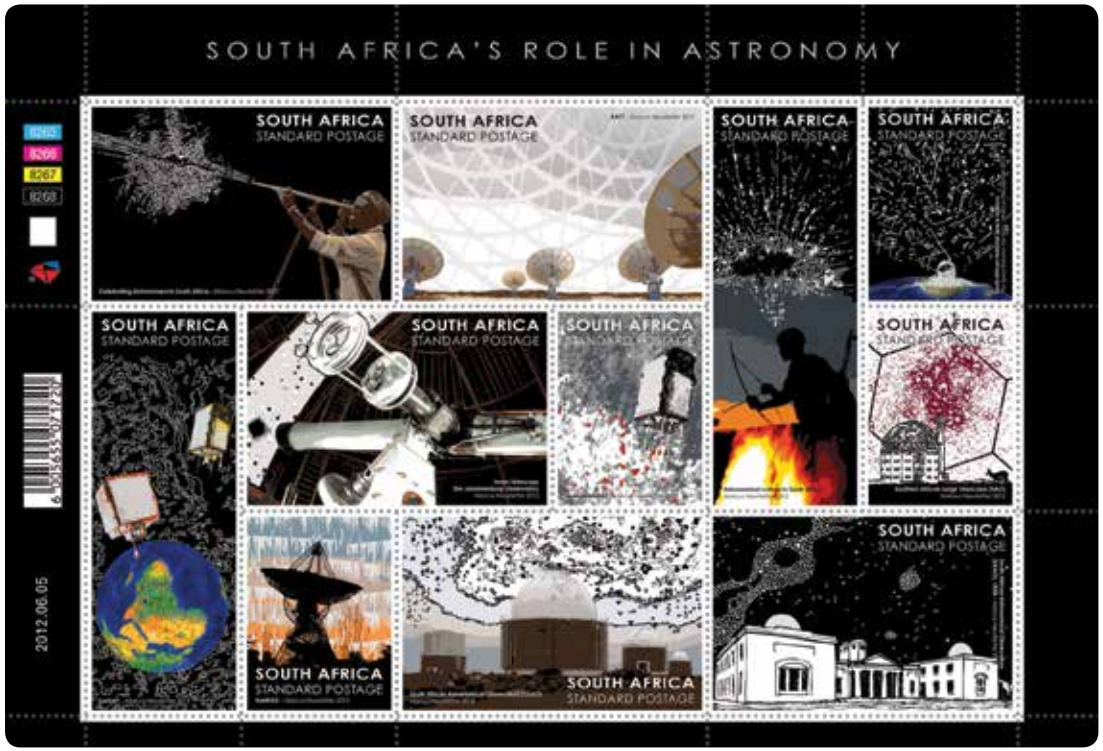
▲ *Councillor Victor Chiloane (centre) of Ekurhuleni receives a telescope on behalf of the community from Patrick Thompson (left), Group Executive: Human Resources of the NRF and Shadrack Mkansi, Manager of SAASTA's Science Awareness Platform.*

An eye to the sky for Daveyton and Hammanskraal

SAASTA donated state-of-the-art telescopes to the communities of eTwatwa, Daveyton in Ekurhuleni and Hammanskraal, north of Pretoria. The telescopes are used by learners and are also made available to the rest of the community for sky viewing. In eTwatwa some families face social ills such as drug addiction, alcoholism and violence.[3] Hammanskraal faces the challenge of poverty and its related ills. In addition to the many wonderful projects actively working to improve these two communities, access to telescopes of this capability is aimed at giving these families and communities the opportunity once again look up and reach for the stars.

Celebration of astronomy sealed with a stamp collection

> "The intention of the stamp artworks is to capture the intangible and magical elements of astronomy and to find a way to illustrate and translate this through visual interpretation."
> – Marcus Neustetter



▲ *The sheet with all the stamps in the series depicting South Africa's role in astronomy.*

3 eTwatwa residents embark on a crime awareness campaign, Keeping in Touch, Issue1 of 2012, newsletter of the Gauteng Provincial Government

A series of 11 stamps celebrating South Africa's role in astronomy was launched at SAASTA's Johannesburg Observatory in June 2012. The stamps were designed by Marcus Neustetter, an artist with a special interest in astronomy who worked closely with the astronomy fraternity on this task.

The eye-catching stamps, which glitter with silver foiling applied to tiny elements with the aid of a very specialised process depict, among other things, the Innes Telescope at the Johannesburg Observatory and the star Proxima Centauri, the closest star to our solar system, that was discovered by Innes while he worked at the Observatory. Other stamps depict the 26-metre radio telescope at HartRAO; the SAAO headquarters where the Royal Observatory was established in 1828; the Southern African Large Telescope (SALT) in the Karoo landscape; SumbandilaSAT floating in front of an image captured by the satellite; the Karoo Array Telescope (KAT-7), the precursor telescope to the MeerKAT radio telescope; and telescopes at the SAAO site near Sutherland.

Added to this is a stamp that acknowledges the perspective and scientific insight made possible by South Africa's first satellite, SunSAT1; one that celebrates the recent establishment of the South African National Space Agency (SANSA); one that acknowledges the achievements of astronomers; and one that celebrates indigenous knowledge of our night skies. Neustetter included drawings, photographic imagery, stories and references to represent the ideas he discovered through his research for each of the stamps.

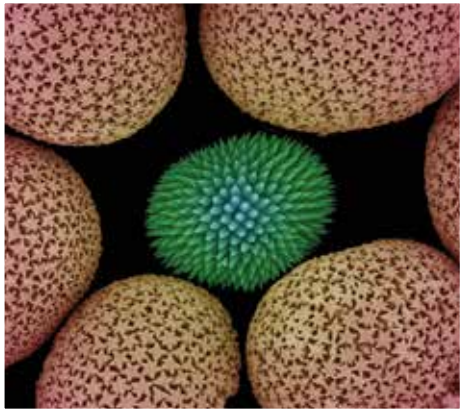
Guests at the launch were treated to a star gazing session made possible by SAASTA and members of the Astronomical Society of Southern Africa.

Science Lens goes to Italy

SAASTA was invited to exhibit the spectacular winning entries from its Southern African Science Lens competition at the biennial international Public Understanding of Science and Technology Conference that took place in the equally spectacular city of Florence in Italy. The intrepid "SAASTerians" travelled to the so-called birthplace of the Renaissance and UNESCO World Heritage Site in April last year. The invitation gave SAASTA the opportunity to showcase this project to an international audience of science communicators, journalists, science and society researchers and others involved in public engagement with science and technology.

SAASTA has been challenging photographers since 2002 to participate in this competition dedicated to science photography, which aims to illustrate the excitement and impact of science in a visual way and to communicate the science behind the images to a broad public. From the first round, photographers have responded enthusiastically to the challenge to illustrate the world where science and art collide.

▲ *Celebrating the weird and the wonderful - the Southern African Science Lens competition photo exhibition premieres in Florence, Italy.*



▲ *One of the winning entries in the 2011 Science Lens competition: The structural elements of a sea sponge photographed by Miranda Waldron.*

Science Festivals

Science festivals have the potential to become as popular as the arts festivals that are currently drawing huge crowds around the country. The DST, in collaboration with SAASTA, started supporting science festivals in 2007, when a collaborative contract was signed. Together SAASTA and DST are now the main sponsors of South African science festivals, with the Department of Basic Education also partnering at times. SAASTA participates actively in these events by exhibiting, presenting science shows and lectures.

Science festivals are public events where STEMI activities are presented in fun-filled and exciting ways. Activities such as lectures and workshops, demonstrations of experiments, guided tours, a mobile planetarium, laser shows and panel discussions are among the attractions presented together with the exhibits. Some science festivals incorporate cultural events such as theatre plays, all with the aim of involving the public in exploring the different facets of science. Science festivals range from large and well-established events such as the annual Scifest Africa and Grahamstown and Sasol Techno X in Sasolburg, to small festivals in rural areas.

The aims of the support for science festivals are, among others to promote public interest, awareness and appreciation of science and technology; create enthusiasm among learners and public for the wonder and application of science; invite people to share their views on how science impacts society, especially where moral and ethical issues are concerned; to persuade more youth to pursue careers in science related fields; and show learners technology that is not easily available in the classroom.

There are a growing number of innovative ideas around the science festivals intervention, with more organisers seeing the need to broaden their reach. After three successful years of this intervention, DST and SAASTA made a decision to continue to support these festivals over the next three years and signed a contract to this effect. Nine grants were awarded to science festival organisers in 2012/13. These festivals took place in the Northern Cape, Mpumalanga, North West, Limpopo, Gauteng and the Eastern Cape and were attended by 143 394 people.

A first for the Northern Cape

The Science Tube event that took place in Mothibistad, Kuruman in 2012 was the first science and technology focused event in the Northern Cape Province and it was hugely successful, thanks to the efforts of the organisers and the cooperation with the provincial Department of Basic Education. The Mothibistad Science Centre hosted the festival in their venue with excellent facilities.

Careers in agricultural research

"If you think agriculture is just about planting seeds and tending animals, think again. Agriculture is about providing safe, affordable and nutritious food – for today and for the future – while also protecting our natural environment."

This is according to the introduction to a booklet on career opportunities in agricultural research, developed by SAASTA in collaboration with the Agricultural Research Council (ARC). The booklet will be used to inspire learners to follow careers in this important sector which aims to develop improved crops, healthier animals and more productive farming methods while protecting our country's precious biodiversity.

Innovative communicator wins NSTF-BHP Billiton award

SAASTA is the proud sponsor of the category *Communication for Public Awareness* of the competition. This award is made annually to South African journalists, researchers, writers, educators, academics, specialist science communicators or science centre staff who excel in creating awareness of science, engineering, technology and innovation (SETI) issues among the public.

The winner of last year's NSTF-BHP Billiton Award was Professor Valerie Corfield, for her outstanding contribution to SETI through science communication for public awareness over the last five years. Professor Corfield received the award for a package of innovative SETI-based public engagement activities she produced and shared with other scientists and science communicators through training workshops and printed/electronic/DVD resources.

▲ *Professor Valerie Corfield (centre), winner of the 2012 NSTF-BHP Billiton award sponsored by SAASTA, with the former Science and Technology Minister Naledi Pandor (right) and SAASTA Managing Director Dr Jabu Nukeri.*

▲ *The Centre for High-resolution Transmission Electron Microscopy serves as a resource hub to promote knowledge and human capital development in areas of strategic importance to the country. (Image: NMMU)*

SAASTA is growing in stature…

having been invited to sit on the advisory board of the Centre for High-resolution Transmission Electron Microscopy at the Nelson Mandela Metropolitan University (NMMU). The facility serves as a resource hub to promote knowledge and human capital development in areas of strategic importance to the country, such as energy, nanotechnology, general and advanced material sciences, medicine, forensic sciences and hydrogen fuel cell technology. The technology also makes it possible to perform important research into national priorities, which include clean water, energy, mineral beneficiation and manufacturing.

The advisory panel aims ensure that the outreach, awareness, science advancement and communication objectives of the centre are fully supported. The initiative is a firm example of how the National System of Innovation is prioritising science communication in order to ensure that investment in R&D is paralleled with the investment in the translation of that research for its benefit across all relevant stakeholders. The science advancement activities ensure that information and data are provided that improve human knowledge and understanding of the research being conducted.

Initiatives that SAASTA has accomplished since the opening of the centre include the development of fact sheets that assist in popularising the complex research activities conducted at the centre, facilitating a tour of the facility, as well as discussions exploring potential collaborations between the centre and the Hydrogen South Africa initiative.

Science and society

SAASTA has identified the South African Sociological Association (SASA) as an important partner in its aims to develop interest and capacity in the field of science, technology and society studies. Sociologists are part of a vibrant social science community in southern Africa that can make a meaningful contribution to the analysis of society in the context of ongoing changes and challenges.

SAASTA sponsored one local and three international experts in the field of science, technology and society studies to serve as keynote speakers at the 2012 annual SASA congress, where the theme – *Knowledge, Technologies and Social Change* – spanned perfectly the worlds of science awareness and sociology. Professor Harry Collins is a distinguished research professor of sociology and Director of the Centre for the Study of Knowledge, Expertise and Science at Cardiff University in the United Kingdom (UK). Professor Collins delivered a presentation on the sociology of expertise during the opening session of the congress.

During a plenary lecture, Professor Dorothy Roberts, Professor of Law, Sociology, and Civil Rights at the University of Pennsylvania, United States discussed her research on the perpetuation and entrenchment of race through new technologies and science. Her lecture highlighted the role of sociologists and scientists as agents who should ensure accountability and counter the outbreak of racial classification supported by mainstream science. Professor Martin Bauer, Professor of Social Psychology and Research Methodology at the London School of Economics and Political Science in the UK, delivered a plenary lecture on Science Culture Indicators and work being done to create internationally comparable indicators in the social studies of science, technology and society within and across different cultures.

As part of the conference, SAASTA and SASA collaborated in hosting a working group session which focused on the underdevelopment of science and technology studies in South Africa. The session took the form of a vibrant discussion on the current state of science, technology and society studies in South Africa, current efforts to develop this field of research, the importance of this broad field of research, and suggestions for measures to support developments – particularly human capacity and interest – in this field of research.

International keynote speakers and academics from various institutions contributed to the discussions. The international experts could provide a comparative overview of the situation in their respective institutions, or other countries that they have worked in, in relation to the South African scenario. Furthermore, various presentations were made by individuals during the Higher Education and Science Studies working group sessions that proved to be both interesting and insightful. Feedback from congress goers was very positive, with delegates commenting on the insight that they got from the keynote presentations.

SAASTA hosted a Critical Thinkers' session at the congress aimed at optimising the availability of the local and international specialists, and to take their expertise to a broader community outside of the sociology sphere. The theme for this forum was *Researching the interaction between science and society*. Among the attendees were natural and physical scientists from various higher education institutions in the Western Cape, National Research Foundation (NRF) and SAASTA staff, science communication and journalism specialists, an educator and an artist.

▲ *Prof. Dorothy Roberts highlighted the role of sociologists and scientists as agents who should ensure accountability and counter the outbreak of racial classification supported by mainstream science.*

Our intrepid missions to the new frontiers

▲ *The SKA project is corroborating South Africa's position as a hub for technological investment, creating local job opportunities, investment in human capital and directly increasing the uptake of science among young people.*

Brave new worlds

The frontiers of science range from "listening" to outer space, which is what the world's largest and most sensitive radio telescope – the Square Kilometre Array (SKA) – will do, to the manipulation of matter on an atomic and molecular scale, or nanotechnology. The 21st century frontiers of science also include bioprospecting, the bioeconomy, ICTs and even social media.

SAASTA is involved in all of the above.

These exciting ideas at the forefront of humanity's scientific endeavour make SAASTA's work easier. What could possibly be more exciting than the idea of massive galaxies – comprising hundreds of billions of stars and spanning several thousand light years – careening though space and colliding?

If South Africa is to be a force in the nanotechnology era, it has to ignite the fire of innovation within the young minds of today. This is a critical step in developing the required skilled workforce of tomorrow. Young people, especially learners with scientific aspirations, are buoyed by the possibilities of these brave new worlds. When the SKA telescope reveals giant outbursts from a binary star system, young minds will buzz with excitement.[4] Mega-science projects like the SKA are happening right here in our back yard. As Science and Technology Minister Derek Hanekom put it, "SKA Africa is not only an innovation engine but also an inspiration engine".

Exploring the biggest laboratory of all: Space

What do we really know about the universe?

Mankind's understanding of the universe was the main topic of discussion at a transdisciplinary, international astronomy conference with the theme "The re-emergence of Astronomy in Africa" that took place at Maropeng Conference Centre in September 2012. The aim of the conference was to bring together scholars from diverse disciplines and academic backgrounds to discuss the historical use and impact of astronomy in the development of mankind's understanding of the universe. The conference provided a platform for meaningful science communication, built on conversations between the 80 delegates and on multimedia interactions. SAASTA participated by exhibiting and sponsoring a tour for delegates to HartRAO and media attendance of the conference.

4 South Africa's new radio telescope reveals giant outbursts from binary star system, 16 May 2013 , http://www.ska.ac.za/releases/20130516.php, accessed 31 July 2013

▲ *Dr Mike Gaylard, Managing Director, takes delegates on a tour around the HartRAO site. SAASTA sponsored the delegates' tour to HartRAO.*

The conference hosted speakers from the natural sciences, the social sciences and the humanities and was opened with a keynote address by the then Minister of Science and Technology, Naledi Pandor. Researchers from the SKA project reported on the substantial long-term benefits for South Africa and Africa resulting from the project, corroborating our country's position as a hub for technological investment, creating local job opportunities, investment in human capital and directly increasing the uptake of science among young people.

To assist in meeting government objectives, speakers at the conference were requested to give attention to the performance indicators that were identified in relation to the 'Space Science' thematic programme and Grand Challenge of the Department of Science and Technology:

- Generate independent earth observation, high-resolution satellite data available for all of Africa from a constellation of satellites designed and manufactured in Africa;
- Undertake at least one launch from South African territory in partnership with another space nation, and have in place a 20-year launch capability plan;
- Specify and co-build a domestic/regional communications satellite and secure a launch date and ITU (International Telecommunication Union) slot for its operations;
- Become the preferred destination for major astronomy projects and associated international investment in construction and operations; and
- Construct a powerful radio-astronomy telescope and use it for world-class projects.

The conference provided opportunities for human capital development that will span across disciplinary divides. Students were invited to attend and participate in the conference proceedings. The intention is that these students will gain a better understanding of various dimensions of space science and astronomy, which in turn will point them to a range of possible career fields related to science and science communication.

An exploration of space science

SAASTA, in partnership with SANSA, participated in the second South Africa Geospatial Forum, which focused on the role of geographic information system (GIS) technology in delivering long-term prosperity to the region in a stable, sustainable and inclusive way. The event was an ideal opportunity for SAASTA to showcase and promote its space science outreach and awareness products and activities.

The aim of the two-day event was to bring together people working in the South African geospatial domain to explore existing opportunities, deliberate on technologies, share knowledge and learn from varied experiences. Participants included academics, policy makers, industrialists, users of geospatial information, people in the defence sector, those who create maps, and surveyors.

Space Science road shows were held in the Eastern Cape, Limpopo and Gauteng from April 2012 to March 2013. During the road shows presentations on space science and astronomy were delivered and learners were also exposed to other science fields such as nanotechnology, hydrogen fuel cells and biotechnology. A total number of 4 334 participants were reached (excluding those who participated in Science Festivals).

Inspired by our solar system

Since the dawn of time, the night skies have inspired humanity to reach for the stars. Our solar system continues to reveal amazing facts once thought to be fantasy. In the same way, since the first-ever competition in 2005 at the Sci-Bono Discovery Centre in Johannesburg, the annual AstroQuiz has become a favourite on the school science calendar, inspiring more than 3 200 grade 7 learners from 817 schools in nine provinces to participate in the 2012 quiz.

Putting their knowledge of all things celestial to the test, the teams of grade seven learners competed in four eliminating rounds of the competition at 10 centres: Hartebeesthoek Radio Astronomy Observatory (HartRAO) and Sci-Bono Discovery Centre in Gauteng; Boyden Science Centre in the Free State; the South African Astronomical Observatory in the Western Cape and the Southern African Large Telescope in the Northern Cape, Unizul Science Centre in KwaZulu-Natal, Mondi Science Centre in Mpumalanga, North West University's Mafikeng Science Centre in North West, the University of Limpopo's Science Centre and the Grahamstown Foundation (SciFest Africa) in the Eastern Cape.

Ten teams of young learners from all around South Africa battled it out in the eighth round of the AstroQuiz finals. The overall winner was Laerskool Lynnwood, a team from Pretoria that competed in four gruelling eliminating rounds at the Sci-Bono Discovery Centre in Johannesburg.

It is particularly heartening to note that approximately 75% of the schools participating in round one of the AstroQuiz are from disadvantaged communities.

▲ *The winners of the 2012 AstroQuiz for grade seven learners. From left: Hans-Peter Fechter, Inge-Mari Alberts, Zahn Rijnen and Chris-Jasper Jooste from Laerskool Lynnwood in Pretoria. The team won an eight-inch mounted telescope with accessories for their school, as well as laptop computers and trophies for each member.*

> SAASTA contributed towards a national innovation system through the development of learner and educator resources in the critical areas of science, and through SAASTA's science advancement outreach activities in PUB, HySA, Nanotechnology and the Science Centre Development Programme.

SKA enters the classroom

South Africa has succeeded in bringing the lion's share of the SKA project to Africa and securing most of the funding required for the project, but now we need to build a sustainable pool of engineers, scientists and technicians to work on the different aspects of radio astronomy. South Africa's SKA project created a buzz in classrooms throughout the country by way of two high-profile competitions to raise awareness among learners - one aimed at learners in grades 4-7 and another at learners in grades 8-11. Learners had to answer five simple questions about the MeerKat and SKA radio telescopes. Prizes like laptops, printers, digital cameras and organised tours to their nearest astronomy observatory were up for grabs.

It is difficult to teach radio astronomy, which detects invisible radio waves, to students. It is not like optical astronomy where you can point a dish at the sky and stare at a star, says Anita Loots, associate director at SKA South Africa. "The concepts are abstract because you can't see the spectrum."

Despite this challenge, SAASTA is forging ahead with building slow and steady awareness. During 2012 the organisation distributed 200 000 entry forms to primary schools, high schools, science centres and the Department of Basic Education's provincial and selected district offices around the country. The aim of the competition, which was initiated by the DST and coordinated by SAASTA, was to increase awareness about Africa's bid to host the SKA and to ensure that South Africans were aware of the bid, especially at school level. It also aimed to attract young people and learners to careers in SET.

Considerable hype was created in the media for this campaign, including interviews on community radio stations such as Lesedi FM, Ikhwezi FM, Ukhozi FM and Phalaphala FM. The competition closed on 31 March 2012 and winners were announced at the end of April 2012. A total of 36 456 entries were received from all nine provinces of South Africa.

The SKA will be a mega radio telescope, consisting of about 3 000 dish-shaped antennae spread over an area of over 3 000 km. In Africa the core of the telescope will be constructed in Carnarvon in the Karoo region of the Northern Cape, with outlying telescope stations in other parts of South Africa as well as Botswana, Ghana, Kenya, Madagascar, Mozambique, Mauritius, Namibia and Zambia. MeerKat is South Africa's own world-class radio telescope that is being built near the proposed site for the SKA. It will consist of 64 dishes, of which seven have been completed and are operational.

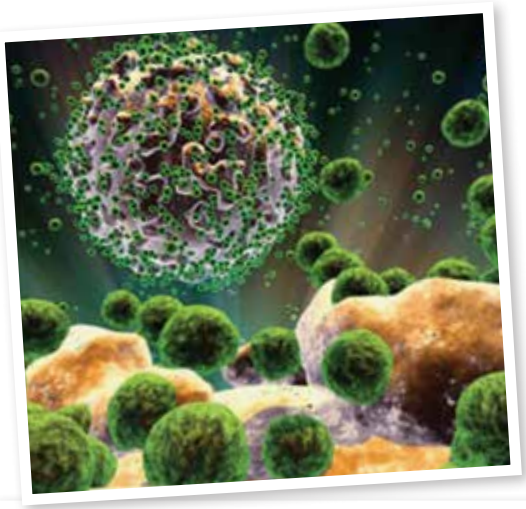
Small wonders: Nanotechnology, aerospace, medicine, energy

The first Pan-African Summer School in Nanomedicine was held in Pretoria in November 2012. The event was hosted by the CSIR's Pan-African Centre of Excellence in Nanomedicine, one of the 32 ANDI (African Network for Drugs and Diagnostics Innovation) Centres of Excellence in health innovation in Africa. The aim was to bridge the gap between the sciences, health and development in Africa - by educating young African scientists on the relevance and application of nanomedicine.

About 120 delegates from South Africa, Africa and Europe attended the Summer School. Faculty members included CEOs of companies, deans of university science faculties, heads of departments and senior researchers. Delegates included senior lecturers and postgraduate students from a range of disciplines such as biochemistry, chemistry, physics, microbiology and pharmacology, as well as science communicators working in nanotechnology and nanomedicine.

The Nanotechnology Public Engagement Programme (NPEP), managed by SAASTA on behalf of the DST, participated in the event by means of a presentation and a science communication workshop. NPEP also provided information resources as well as interactive exhibits such as National System of Innovation (NSI) and *A Biotech World* touch screens.

NPEP's presentation and discussions were well received, to such an extent that representatives from some African countries such Cameroon, Nigeria and Kenya have requested SAASTA's assistance in setting up science communication and public awareness structures in their countries. It was encouraging that European delegates such as Professor Ruth Duncan from Cardiff University in the UK publicly voiced their appreciation of resources developed by NPEP, such as posters, fact sheets and educator manuals aimed at raising public awareness. It was even more encouraging to hear local delegates such as Professor Jan Verschoor from the University of Pretoria applauding SAASTA for its sterling work in raising public awareness of nanotechnology in South Africa.



◀ *Nanomedicine is a rapidly advancing area of biomedical research that has revolutionised treatments for diseases like cancer.*

▲ *Mthuthuzeli Zamxaka (centre) receives a certificate of recognition for the role played by SAASTA in the Summer School. He is flanked by Dr Hulda Swai, host and the organiser of the Summer School (left) and Professor Ruth Duncan from Cardiff University in the UK.*

Unearthing new uses for nature's gifts: Bioprospecting, mapping biocapital

Journalists and scientists meet to discuss drought-tolerant maize

Africa is a drought-prone continent, making farming risky for millions of small-scale farmers who rely on rainfall to grow their crops. Maize, in particular, is susceptible to drought. As climate change is resulting in shorter and more variable seasons for crop production, there is an urgent need for crops that are more resilient and will sustain farming.

In February 2013, biotechnologists, government representatives, stakeholder groups and journalists met at a Media Roundtable in Lutzville in the Western Cape to discuss the development and cultivation of drought-tolerant maize. This highly successful meeting between role players in the Water Efficient Maize for Africa (WEMA) project, a public-private partnership that was formed specifically to develop drought-tolerant maize varieties for use by smallholder farmers, was organised by the Public Understanding of Biotechnology programme, managed by SAASTA on behalf of the DST, and the Agricultural Research Council.

The Media Roundtable provided a platform for fruitful discussions around GM regulations, processes and policy, as well as the safety of GM technology. A visit to the confined field trials site incorporated into the event provided insight into some of the challenges faced by scientists; and put into perspective the concerted effort required in developing a GM crop. SAASTA's workshop involving journalists and scientists, which was held on the same day, assisted scientists engaged in this project to hone their skills in communication and media relations. Journalists also benefited by gaining direct access to the scientific knowledge and findings resulting from this project.

▲ *Dr Kingston Mashingaidze, Manager at the Agricultural Research Council, explained the maize varieties in the field trials.*

▲ *A visit to the confined field trials site provided insight into some of the challenges faced by scientists.*

QUICK FACTS

A genetically modified organism (GMO) is a plant, animal, bacterium or virus whose genetic makeup has been modified for a particular purpose.

Genetically modified (GM) plants are cultivated as crops and consumed by humans and animals worldwide.

170.3 million hectares of GM crops were grown by 17.3 million farmers across the world in 2012. 90% of these are small, resource-poor farmers from developing countries.

Genetic engineering means new improved crop varieties can be produced in a shorter period than with conventional breeding.

Crops can be modified to display valuable characteristics such as:

- tolerance to drought and herbicides,
- resistance to disease and insects, or
- improved nutritional content.

In SA, GM maize is grown in about 72% of the cultivated land area of maize.

SA GM maize carries traits of herbicide tolerance, insect resistance, or both.

HySA competition - Winning design uses hydrogen fuel cells to power aeroplane

Hydrogen fuel cells are expected to play an important role in meeting the world's growing demand for clean energy. SAASTA manages the Hydrogen South Africa Public Awareness and Demonstration Platform on behalf of the DST.

In 2012, SAASTA invited the Potchefstroom Science Centre at North West University's Potchefstroom campus to run a competition aimed at creating awareness of the significance of hydrogen fuel cells. The contestants were challenged to plan and design a system that would bring awareness of the important role played by hydrogen fuel cells in meeting the growing demand for clean energy. The science centre decided to participate as a research team led by Dr Dmitri Bessarabov of the Department of Chemistry, who has been contracted by the NRF to research various aspects of hydrogen fuel cells.

Dolf Jansen van Rensburg was announced the winner of this student competition. He received R5 000 in prize money, sponsored by SAASTA. Van Rensburg did a comprehensive study of hydrogen and fuel cells, including production storage and uses, to produce a radio-controlled aeroplane. His model aeroplane was displayed at the university's science centre, where more than 10 000 visitors had the opportunity to interact with real small-scale fuel cell devices and with a 5 kW electricity generating hydrogen fuel cell donated by SAASTA, which illustrates how a fuel cell can electrolyse water and recombine it to produce electricity and water.

Second place went to a project titled *Hydrogen fuel cell technology*; while the third place was a tie between three projects - *Hydrogen fuel cells in a nutshell: A South African angle*; *Operation costs of a hydrogen fuel cell*; and *The Hyrunner Fuel Cell Cart*. These projects demonstrated, among other things, that the underlying technology showed promise not only for hydrogen fuel cells, but also for use as a source of heat and electricity for buildings.

▶ *The winning project, a radio-controlled aeroplane, uses hydrogen fuel cells as energy source.*

◀ *Lorenzo Raynard (SAASTA), winner Dolf van Rensburg, Mthuthuzeli Zamxaka (SAASTA) and Professor Kobus Pienaar (North West University).*

> "Hydrogen has the potential to end the world's reliance on oil. It will dramatically cut down on carbon dioxide emissions and mitigate the effects of global warming. And because hydrogen is so plentiful, people who have never before had access to electricity will be able to generate it."
>
> – Jeremy Rifkin, Foundation on Economic Trends president

A major worry in the context of the new 'bioeconomies' of the postgenomic 'race' to gain global market shares in new industries such as recombinant DNA technologies is whether yet another chapter in the 'voyages of discovery' genre is already under way.

– Sarah Franklin, Mapping biocapital: new frontiers of bioprospecting, Cultural Geographies

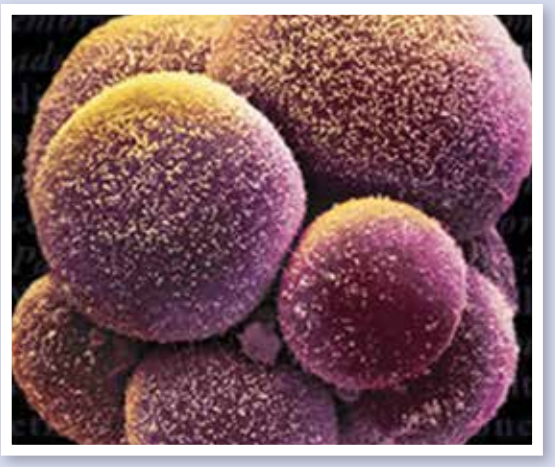
The Critical Thinkers' Forum on stem cell research and therapy that was organised by a team from the Public Understanding of Biotechnology programme, which is managed by SAASTA on behalf of the Department of Science and Technology brought together academics, policy makers, industry partners, the media and members of the general public on 7 November 2012 to discuss the state of stem cell research and therapy in South Africa. Due to the unique nature of stem cells they are potentially valuable for the treatment of disease and replacement of damaged tissue, in addition to providing greater insight into the process of development. Current uses (for many years already) are for bone marrow transplantation, to heal fractures, and for chronic wounds and burns.

A strong case was made for establishing a public cord blood bank in South Africa, which can assist greatly with the provision of stem cells locally. Cord blood refers to stem cells from the umbilical cord and placenta, an alternative source to bone marrow. The process of collecting cord blood is non-invasive and can increase the pool of local donors significantly. Only private cord blood banks currently operate in South Africa. A Department of Health-funded feasibility study for such a public bank is currently underway.

▲ *Speakers at the Critical Thinkers' Forum included (back row, from left): Prof. Susan Kidson, Deputy Dean: Health Sciences, UCT; Dr Earl Prinsloo of Rhodes University; Prof. Michael Pepper, Director: Institute for Cellular and Molecular Medicine, University of Pretoria; Dr Antonel Olckers, CEO: DNAbiotec. In the front are Dr Marnie Potgieter, Postdoc, University of Pretoria; Prof. Kathy Myburgh of the University of Stellenbosch and Dr Marco Alessandrini, Postdoc, University of Pretoria and ME Enterprises.*

QUICK FACT

Stem cells have the remarkable potential to develop into many different cell types in the body during early life and growth. In addition, in many tissues they serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialised function, such as a muscle cell, a red blood cell, or a brain cell.



▲ *Due to the unique nature of stem cells they are potentially valuable for the treatment of disease and replacement of damaged tissue.*

New ways of communicating: Pioneering social media in science

Viral advertising is a whole new ball game. And if science wants to be noticed, it will have to join the frenzy. A viral campaign is out of the box marketing that is so cool and hip that people want to pass it on to friends via social networks and other electronic media, hence the comparison with the spread of viruses.

The Hydrogen South Africa (HySA) Public Awareness and Demonstration Platform, managed by SAASTA on behalf of the Department of Science and Technology, is now using this innovative way to inform people about research into hydrogen powered vehicles. The viral ad is fun, but provides correct, responsible information on hydrogen and fuel cells research. This clip is available on YouTube.[5] The video features scientists engaged in a race with two radio-controlled cars in a laboratory – one a conventional radio-controlled car and the other using hybrid fuel technology.

It is SAASTA's responsibility to ensure that all messages remain accurate, responsible and reliable. For this reason, the content of the information was circulated among content specialists to ensure that all scientific references, however brief or miniscule, remain accurate. The team presented the final production at a Southern African Association of Science and Technology Centres (SAASTEC) conference workshop in November 2012. Feedback from the workshop participants prompted the team to make a few adjustments to the campaign.

New media, new ideas

In a workshop at the SAASTEC conference, the team demonstrated how the science outreach and awareness community can use viral media as a tool to communicate science. In the group activity with the delegates, viral media concepts including flash media and viral media marketing platforms were explored with the objective to break the ice, demystify viral media and look at how it may possibly be used in the science centre environment.

> "Viral media has the potential to reach a massive audience through social media platforms at a low cost. The challenge is to develop a viral ad that will gain enough appeal to warrant such exposure."
>
> – Lorenzo Raynard, Manager of SAASTA's Science Communication Unit

▲ *The video features scientists engaged in a race with two radio-controlled cars in a laboratory - one a conventional radio-controlled car and the other using hybrid fuel technology.*

5 Scientists race radio control cars , https://www.youtube.com/watch?v=u6WRy6d_WSQ, accessed 20 August 2013

Exploring the future, inspiring the youth

A science-literate, knowledge-based society fosters innovation and creativity

Science and technology play an increasing role in every aspect of our daily lives, pushing back the boundaries of our knowledge and understanding of the world. Embracing a science-literate and appreciative culture is an important catalyst to stimulate a knowledge-based society, to promote development, and to foster innovation, creativity, and better citizenship among the youth in particular and society at large. SAASTA plays an important role in making science accessible, understandable and inspiring to all South Africans, with a particular emphasis on the youth.

By attracting more young people to pursue scientific careers and become science performers, South Africa's future ability to generate growth and jobs is improved. The flagship National Science Olympiad, TechnoYouth, Natural Science Olympiad and National Schools Debates projects of SAASTA are all designed to captivate the youth.

The organisation's scope of activities includes building the quantity and quality of mathematics and science outputs at school level (developing SET human capital).

"At SAASTA we strongly believe that South Africa has the potential to become a rich source of scientific expertise; but this can only be achieved if the system is fed with a healthy supply of learners and students who have a passion for science and mathematics and the will to excel."

– Dr Jabu Nukeri, Managing Director, SAASTA

Flagship projects

> Through projects like the National Science Olympiad, one of our flagship projects, we identify and nurture talent to inspire these learners to further their studies in SET and so increase the SET human capital in the country, which will ultimately contribute towards the generation of knowledge
>
> – Dr Jabu Nukeri

Now in its 49th year, the **National Science Olympiad** continues to be one of SAASTA's flagship projects. Since 2005, the project has been offering learners in grades 10-12 an opportunity to compete in the science arena with fellow learners from across all the nine provinces and SADC countries such as Namibia, Zimbabwe, Malawi and Lesotho. The Olympiad test paper consists of a number of curriculum based and general science and technology questions in Physical and Life Sciences. Prizes are awarded to the learners who perform best in various categories of the Olympiad as well as to the top performing schools. The top national performers also stand a chance to win an all-expenses-paid trip to the London International Youth Science Forum and the Australian National Youth Science Forum.

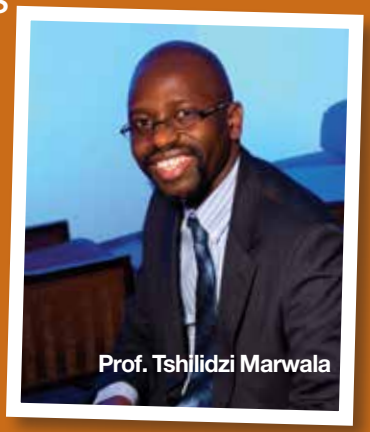
The main aim of the competition is to encourage excellence in science education, yet also to stimulate interest in the sciences. It seeks to inspire young people to consider careers in science and technology. Over the years, participation and performance in the National Science Olympiad has increased significantly – from approximately 700 learners in 1967 to over 22 000 in 2013.

Harmony Gold Mining Company Ltd (Harmony), one of the largest gold producers in the world has been the main sponsor of the competition for the last four years. Harmony also sponsors participation in the Olympiad of schools in the areas close to their mines, coaching of these learners and their teachers, as well as educational material to assist them to participate and excel in the competition. The Department of Science and Technology sponsors the participation of learners in some of their "adopted" Dinaledi Schools.

▲ *The winners of the 2012 National Science Olympiad, with the organisers and sponsors of the competition. From left: Dr Jabu Nukeri, Managing Director of SAASTA, Mr Graham Briggs, CEO of Harmony Gold Mining Company Ltd, Dzulani Thanyani, Dr Nonhlanhla Nduna-Watson, Director (FET), Department of Basic Education, Bevuya Mahamba, Rishen Singh, Thiolan Naidoo and Jessica Breet.*

▲ *The 104 best achievers in the National Science Olympiad attended a science focus week in Gauteng. The learners were treated to lectures, excursions and industry visits to a Harmony Gold mine, the National Zoological Gardens of South Africa, Necsa, Denel, the Agricultural Research Council, Sci-enza Science Centre, the Johannesburg Observatory, Nissan and Forensic Laboratories. Whereas the main objective of the National Science Olympiad is to nurture potential scientists, the youth focus week exposes the youngsters to careers in science, engineering and technology.*

Former National Science Olympiad winners on the road to success


Prof. Tshilidzi Marwala

Years ago, as a young learner from a small school in Limpopo, Tshilidzi Marwala won the National Science Olympiad. As part of his prize he had the opportunity to join other winners on a visit to the London International Youth Science Forum where he was exposed to many exciting scientific ideas. Today Professor Tshilidzi Marwala is Executive Dean of the Faculty of Engineering and the Built Environment and Deputy Vice Chancellor at the University of Johannesburg.

Dr Fulufhelo Nelwamondo, from a small village in Venda, holds a BSc and a PhD in electrical engineering in the area of Computational Intelligence from Wits University. He was only 26 when he was appointed acting manager of the Council for Scientific and Industrial Research's Modelling and Digital Sciences' information security competency area. Fulufhelo says that participating in the National Science Olympiad definitely had an influence on his career. It presented him with challenges that made science more interesting, and motivated him to try to better understand science concepts.

Dr Busisiwe Vilakazi from Evaton in Gauteng, who completed her doctorate in electrical engineering at the University of Oxford on a Nelson Mandela Scholarship, was an Olympiad finalist in 1999. She says that the Olympiad and her trip to the London International Youth Science Festival gave her a huge appreciation of the importance of science in the betterment of humankind.

There are many more such examples.

Bright sparks win big prizes in Natural Science Olympiad

The aim of SAASTA's **Natural Science Olympiad** is to identify and nurture talent in Natural Science, Life Science and Accounting and to increase the number of learners who opt for these subjects, as well as Mathematics at high schools. The competition also acts as a feeder for SAASTA's National Science Olympiad for grades 10-12, which is now in its 49th year.

The second year of the Natural Science Olympiad attracted entries from 28 000 learners from 473 schools around the country. The 23 top performers and 16 educators were invited to Pretoria for a fun-filled programme, which included a visit to the National Zoological Gardens of South Africa and the Natural History Museum. At the awards event, which was hosted by SAASTA, the winners received an array of exciting prizes such as laptops, iPods and digital cameras. The top performing schools won science equipment and book vouchers.

▲ *Lorenzo Raynard, Manager of SAASTA's Science Communication unit (centre) is flanked by the best achievers in the Olympiad per grade (grades 4-6 and 7-9). These bright sparks are - back row, from left: Jeremy Wilkinson (left) and Jaco Schoeman (right). Front row: Thandeka Mokoena, Miscar Mbhalati, Jonas Olyn and Tatum Van Rooyen. The best achievers each received a R1 000 book voucher.*

SAASTA's National Schools Debates

With its emphasis on critical thinking, effective communication, independent research and teamwork, debate teaches skills that serve individuals well in school, in the workplace, in political life and in fulfilling their responsibilities as citizens. Once students have learned how to debate, they are better able to make informed judgments about crucial issues.

In August 2012, the final round of the SAASTA National Schools Debates Competition ended in grand style, with the team from Crawford College in Pretoria out-debating the other finalists in the nanotechnology and space science topics. Their performance won them the grand prize of a four-day trip to New York to visit the American Museum of Natural History. The runners up were Northern Cape High School (in third position) and St Mary's DSG High School from KwaZulu-Natal, which was placed second.

Nine schools (one from each province) participated. The theme for the 2012 School Debates was the same as that of the United Nations: *International Year for Sustainable Energy for All*. The provincial topic was "Can genetic engineering make biofuels a sustainable alternative energy?"

Did you know?

- This SAASTA competition started in 2007.
- It focuses on secondary school learners.
- Learners compete in teams by debating on a science topic.
- Six thousand copies of each of the following resources were distributed to schools and learners to assist them in their preparations for the competition: Biofuels basic factsheet; Biofuels – benefits and risks factsheet; Current status of biofuels factsheet; Energy and biotechnology MiniMag article; Student article: Biotechnology's role in sustainable energy for all.

> "Honest disagreement is often a good sign of progress."
>
> – Mahatma Ghandi

The winning team from Crawford College in Pretoria with their educator, Mrs Reddy and Dr Beverley Damonse, Group Executive: Science Advancement of the NRF. Back row, from left: Zola Shokani, Dr Damonse, Thato Nyenbe and Kirra Evans. Front row: Boitumelo Senoamadi, Mrs Reddy (educator) and Kiara Soobrayan.

Get famous ... "sell" your science at FameLab

> "FameLab certainly challenges young scientists to make their work exciting at a new level!"
>
> – Michelle Knights, winner of FameLab South Africa 2013

FameLab, the international competition that gets people around the world talking science, has created considerable excitement among South African participants and audiences. The nail-biting finals took place at Scifest Africa in Grahamstown on 15 March 2013. In just three minutes, the finalists had to explain a science concept using only what they could carry onto the stage with them – and no PowerPoint.

SAASTA partnered with the British Council and Jive Media – along with fellow sponsors the South African Space Agency and the CSIR – to increase the visibility of the competition and to encourage participation. FameLab was open to entrants between 21 and 35 years of age working or studying in science, technology, engineering or maths and who are passionate about their science. The participants also attended a two-day masterclass training session with international FameLab trainer Malcolm Love.

The winner of FameLab South Africa 2013, Michelle Knights, will represent the country at the international finals at the Cheltenham Science Festival in the UK, where young scientists from 25 countries will be competing. Michelle is a PhD student from Cape Town and a bursar of the SKA SA project. Her talk in the final rounds was about the search for life on planets elsewhere in the universe.

To get to the top in South Africa, Michelle had to beat eight other regional winners from Johannesburg, Durban and Cape Town in front of a capacity audience at Scifest Africa. Not only did she win the trip to the Cheltenham Festival, all expenses paid, but also pocketed a R10 000 cash prize. First and second runners up were Febe Wilken, a biotechnology student from the University of Pretoria and John Woodland, a chemistry student from the University of Cape Town. They each received R3 000 in cash.

The aim behind the competition is to encourage young scientists to talk about their work; improving their communication skills to enable them to engage with the public or any non-science audience, which is of critical importance as science and technology impacts society as a whole. The competition also seeks out new spokespeople for science ... to inspire a new generation of scientists and challenge public perceptions about what it means to be a scientist.

Toys from trash

Hideo Nakano, Science Specialist and JICA Senior Volunteer at Osizweni Education and Development Centre (right), explains to the workshop participants how to build a rubber band propelled straw kite.

As part of the Science Centre Capacity Building programme that SAASTA manages on behalf of the DST, 35 science centre staff members attended an educational toy building workshop at the Johannesburg Observatory.

The presenter, Hideo Nakano is a Japan International Cooperation Agency (JICA) volunteer at the Osizweni Science Centre in Secunda, Mpumalanga. Nakano has been seconded to Osizweni by the Japanese Government for a period of two years to assist and transfer knowledge for scientific inventions and is a very popular presenter of this type of workshop. Nakano uses readily available items to make low-cost educational toys and taught science centre staff members how to handle and use these tools safely and effectively when interacting with their audiences. The training on the design and manufacturing of educational toys received excellent feedback from participants.

Young science communicators show their mettle

The Young Science Communicators Competition run by SAASTA encourages young scientists and science students under the age of 35 to communicate their work, either through a newspaper article, a radio script or a viral video.

The competition received a total of 60 entries from all over South Africa across the three categories. The judges applauded the enthusiasm of the entries and commented on some of the wonderful examples of imagery used for communicating complex scientific concepts.

The overall winning article was a unanimous choice across the judging panel. Leon Van Eck scooped top honours for his "fascinating, accessible and entertaining" article entitled ***Jungle fever: Brazil nuts, bees and orchids***[6]. Morgan Trimble was the runner-up for her article *Why Conserve Biodiversity? Your life could depend on it*.[7] Dane McDonald, Nikki Le Roex, Nico Chung and Michelle Robinson were commended for their efforts.

In the broadcast category, entrants were required to write a script about their science for a five-minute radio broadcast. The winning entrant was Michelle Knights for her script entitled *The Great Debate*. Runner-up was Bongani Thabethe for his script entitled *Who could have thought there could be room at the bottom (thinking in the nanometre dimension)*. Melissa Boonzaaier and Morgan Trimble were commended for their efforts. The "People's Choice" award went to Bongani Thabethe for his radio script, *Who could have thought there could be room at the bottom (thinking in the nanometre dimension)*.

In the Viral video category, the judges felt only one video had the capacity to go viral and therefore awarded just one place – to Morgan Trimble for the video *What is biodiversity?* The overall winner of this round of the competition was Dr Leon Van Eck from the Department of Genetics at the University of Stellenbosch. He will be attending an international science communication workshop to fine-tune his already impressive communication skills.

▲ *The overall winning article was a unanimous choice across the judging panel. Leon Van Eck scooped top honours for his "fascinating, accessible and entertaining" article entitled Jungle Fever: Brazil Nuts, Bees and Orchids (Photo by Daniel Jimenez; reproduced with kind permission)*

◀ *In the broadcast category, the winning entrant was Michelle Knights for her script entitled The Great Debate. Michelle also won the 2013 national FameLab competition.*

6 Jungle fever: Brazil nuts, bees and orchids, getSETgo, April 2013, http://www.saasta.ac.za/getsetgo/issues/201304/06.php, accessed 23 August 2013
7 Why Conserve Biodiversity? Your life could depend on it, http://www.saasta.ac.za/images/stories/YSCC/vote/newspaper%20Why%20conserve%20biodiversity.pdf, accessed 23 August 2013

Tomorrow's leaders brainstorm solutions for a better future

Science ruled the day at the SNSET Institute's International Innovation Indaba which was held at Klerksdorp. With the theme of "Unlocking Your Curiosity", the Indaba aimed to demonstrate how scientific applications can be used to better people's lives. Young innovators were encouraged to use a fun approach to inform other youngsters about SET in an engaging manner so that delegates felt free to interact with people they perceive as their peers. Some of the presentations, workshops and discussion tackled topics such as nanotechnology, hydrogen and fuel cell technologies, the millennium development goals, the zest for SET, how to become an innovator, biotechnology, twelve innovations of the year and education innovations. The highlight of the conference was the Key Indaba Challenge where delegates worked right through the night to create an innovative new product.

The Indaba, which was sponsored by the Technology Innovation Agency, was supported by SAASTA, the National Youth Development Agency, the Departments of Basic Education, Water Affairs, Science and Technology, the City of Matlosana's Public Safety Department and ITWeb. The SNSET Institute is an organisation that promotes science, engineering and technology innovation among young people through integrated programmes, projects and products.

"I'm interested in how technology contributes to jobs, innovation and the economy. We live in a fast-paced world where we are all affected by technology – *Walala Wasala* (you snooze, you lose)."

– Stuart Ntlathi, co-founder of SNSET Institute

Touching lives

A very anxious grade 10 girl stepped off a bus from Polokwane at the Pretoria station back in May, 2006. Being one of the winners of a national competition did not seem much fun at the time - her first time away from home in Seshego. Jerida Mathipa came to Pretoria to receive speech training, organised by SAASTA, since she was about to represent South Africa in a speech competition to be held in Japan. At that stage she did not realise that her stepping off the bus would change the whole direction of her life.

Jerida was the winner of the category for senior high school learners in a competition initiated by the DST in partnership with the Science and Technology Office in the South African Embassy in Japan. The Africa-Japan Essay and Speech (AJSE) Competition was held between learners and tertiary students from Japan, South Africa and Zambia. The theme of the competition was *Making science and technology a foundation for partnership between Africa and Japan*.

That year, SAASTA had been requested by the DST to implement and administer the South African leg of the competition. Participants were required to write an essay based on the competition theme and the winners would participate on this topic in a speech competition in Japan. The competition was simultaneously implemented in South Africa, Zambia and Japan, involving high school learners in grades 8 to 12, as well as university students (including at under- and postgraduate levels), who had an interest in international relations and science and technology.

A few weeks later, her speech training completed, Jerida stepped on the airplane with Zia Maharaj, a junior high-school learner from Gauteng (now in her third year of medical studies at the University of Pretoria), and Jasmeer Ramlal, an honours student in engineering at the University of Pretoria (now working for Sasol), the other two winners of the SA leg of the competition. All the finalists from the three competing countries presented their 15-minute speeches in Japan on 21 July 2006. The overall winners were selected on the basis of the speeches given for this international leg of the competition. From South Africa, Zia won a first prize and Jerida and Jasmeer both won second prizes in their respective categories.

The story continues …

Back home, SAASTA staff kept in contact with the competition winners and it was with great shock that they read about the tragic death of Jerida's mother in the paper a year later. Jerida was in Grade 11 at the time and was sharing an informal home with her mother and sister. The two sisters were left destitute after their mother had passed away. Through contributions in kind and financially, SAASTA staff, their friends and family supported the two girls, but in the April of her matric year Jerida indicated that she had no choice but to go out and look for work. Ina Roos, Corporate Editor at SAASTA received the call from Jerida while she was away on a long weekend and shared the sad news with her friends. Fortunately one of the friends had a possible solution. He contacted Eskom's social services in Polokwane, who stepped in and provided assistance to get Jerida through her matric year. She passed well, with two distinctions, and was offered an Eskom bursary.

The happy ending

Six years after the AJSE Competition, in December 2011, an ecstatic 20-year old Jerida graduated from the University of Cape Town as an environmental scientist. She is now working for Eskom in Polokwane and has enrolled for an honours degree in environmental science at Unisa.

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