

TOUCH

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TRANSFORM

SAASTA SCIENCE ADVANCEMENT HIGHLIGHTS REPORT 2010

and sharing the excitement

the wonder of science

We are opening people's eyes

helping people to become aware of and absorb

generation of young scientists



SAASTA
South African Agency for Science
and Technology Advancement

WE ARE ...

... touching people's lives
by growing their awareness
of science

TOUCH

SCIENCE AWARENESS

... sharing the excitement
and achievements of
science in daily life

SHARE

SCIENCE COMMUNICATION

... transforming lives by
educating a new generation of
young scientists

TRANSFORM

SCIENCE EDUCATION

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THEME CREDITS

The theme information and fact boxes scattered throughout this report are extracted from the series of “Did You Know/Shift Happens” animated information clips, produced by Karl Fisch and Scott McLeod, and available at www.shifthappens.wikispaces.com

“ When I reflect on the past year and the activities in which SAASTA has been involved, I am truly amazed at what we have achieved. From far-away Shanghai in China, to the deepest rural parts of our country, our teams have worked diligently to touch, share and transform lives through science awareness, communication and education. ”

FROM LOCAL ROOTS TO DISTANT LANDS

DID YOU KNOW?

Between April 2010 and March 2011, 420 467 learners and 15 151 educators were reached through SAASTA's activities.

Additionally, 22 learner resources, 10 educator resources and 12 technical manuals and fact sheets were developed.

In the past year, SAASTA has excelled in exploring innovative ways of connecting all our various audiences with science – from 3D films and touch-screen computer applications, to traditional media such as print and radio.

FOREWORD

by Beverley Damonse, Executive Director of SAASTA

In 2010 we shared insights about fossils of hominids that lived almost two million years ago, as well as about the most advanced research on nanoparticles. We successfully promoted our country's National System of Innovation (NSI) in the most technologically advanced parts of the world, but also connected with learners in remote villages, showing them that science is a part of their lives and that they too can one day be a part of our country's skilled workforce.

We worked with an award-winning local filmmaker to produce a 3D film on aspects of biotechnology research. We also developed a touch-screen computer application on South Africa's NSI, and another on successful women scientists.

We explored new partnerships with traditional media such as print and radio and successfully involved a number of researchers in proactively using media to communicate messages about their work. This includes two radio programmes that are currently being produced using material submitted by two postdoctoral students, who were the winners of our Young Science Communicators' Competition (YSCC).



Beverley Damonse, Executive Director of SAASTA.

SAASTA exposes its various competition winners to cutting-edge research and science communication practices outside of our country's borders. In 2010, the winners of the National Science Olympiad participated in the International Youth Science Forum in London, while the two winners of the YSCC attended the 177th Annual Meeting of the American Association for the Advancement of Science in Washington DC.

Our staff also did us proud by flying the SAASTA flag in other African countries: one staff member participated in the Ugandan National Science Week, showcasing her popular science shows; and another presented science translation workshops in Botswana.

Locally our activities reached into the furthest corners of our country. Among our many science advancement activities was a roadshow for learners in the remote Sekhukhune area in Limpopo. This included presentations relating to inflatable planetaria, science shows and profiling science, engineering and technology. This was also the year in which we updated and upgraded our Intranet and Internet pages and created a social media profile for the organisation. We are proud of our new

“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 them for their support and contributions.”

windows to both the inside and outside world.

I would like to acknowledge the support and encouragement that SAASTA has received from the NRF management team in fulfilling our mandate, and that is to create awareness of and engage South Africans with science, engineering and technology in order to build the human capital our country requires. 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 them for their support and contributions.

I would also like to express my appreciation towards the 50 SAASTA staff members who at times carry a heavy workload, but who are always enthusiastic and passionate about the job at hand.



More than 20 000 learners participated in the 2010 National Science Olympiad competition. The top 100 performers attended a science focus week, which included an excursion to a Harmony Gold Mining Company mine.

SAASTA has

been in existence since 2003, when the former Foundation for Education, Science and Technology became part of the National Research Foundation and adopted the new name: South African Agency for Science and Technology Advancement. The organisation has grown and changed much in the past seven years in order to fulfil its mandate as the leading science advancement agency in the country. For the first time since 2003, a comprehensive **external institutional review** was done of all SAASTA's functions. The SAASTA management team and stakeholders were engaged in the review process from 15 to 19 November 2010. The review panel consisted of Professors Mamokgethi Setati (from UNISA), Susan Stocklmayer (from the Australian National University) and Dr Sheila Ochugboju (from the African Centre for Economic Transformation).

SCIENCE ADVANCEMENT CLUSTER REVIEWED

In 2010 SAASTA reflected on the science of science awareness, communication and education, with a first-ever review of its own functions to examine its effectiveness and role in the broader South African science sector.

SAASTA provided its management response to the review to the NRF Monitoring and Evaluation Unit and gave inputs into the overall NRF management response.

SAASTA stakeholders who were interviewed by the review board were drawn from:

- The Departments of Science and Technology and Basic Education.
- Eight local science centres.
- Science associations such as Women in Physics in South Africa, the South African Mathematics Foundation, and the Association for Mathematics Education of South Africa.
- Five scientists representing astronomy, education, geosciences and palaeontology.
- Industry.
- Service providers and consultants such as science communicators and curriculum advisers.
- Science advancement staff at National Facilities.

The panel members responsible for the institutional review are, from the left: Dr Sheila Ochugboju, Professors Susan Stocklmayer and Mamokgethi Setati, with SAASTA's Executive Director, Beverley Damonse.





We are opening people's eyes to the wonder of science by listening and communicating, by helping people to become aware of and absorb new knowledge, by working together, talking and sharing the excitement of science by making a difference and seeing the results, and by building South Africa's new generation of young scientists.

SAASTA is touching people's lives by growing their awareness of science

TOUCH

SCIENCE AWARENESS

SAASTA generates new ideas and brings them to life through science and technology awareness and interactive experiences. By raising the awareness of

science through exploration, exhibitions and actual experience, we inspire people about the wonder and application of science in everyday life.

INTRODUCTION

The vision of SAASTA's science awareness platform is to present and excite South Africans with the best possible science and technology awareness facilities and activities.

Underpinned by national government strategies, which focus on improving the lives of ordinary South Africans, our approach specifically aims to increase the participation of schools and the public in science and technology awareness activities.

We strive to provide learning and enjoyment of science and technology through exhibitions, science shows and other available science facilities, and we motivate young people to pursue innovative and entrepreneurial careers by identifying and nurturing talent among the youth.

AWARENESS

DID YOU KNOW?

It is estimated that a weeks' worth of the *New York Times* newspaper contains more information than a person was likely to come across in a lifetime in the 18th century.

How aware are we today – and how do we become more so?

The surge of new technologies and social media innovations is altering the media landscape, making it easier than ever to reach a large audience, but perhaps, harder than ever to really connect with it.

Science on the go

The natural curiosity of children means that they love to explore and discover new ideas hands-on. With the right opportunities and guidance, these discoveries can guide their future careers. But not all children have equal opportunity to discover the world of maths, science and technology. Neither do all grade 12 learners have the opportunity to do the right kind of practical work that is required for their natural science exams. **Mobile science laboratories** are popular and proven tools that offer children the opportunity to learn about science through laboratory experiments, while enhancing classroom learning, bringing science and maths to life, and providing schools with the educational resources that they lack. As part of the Department of Science and Technology's **science centre capacity building** programme, and also from its own funds, SAASTA awarded grants to three science centres between May and August 2010, to buy and equip vehicles as mobile laboratories. With these laboratories-on-the-go at the Mondi, ArcelorMittal and FOSST science centres, thousands more learners are now being reached and inspired with fun, science-related activities and curriculum-related experiments.

Mobile science laboratories are popular and proven tools that bring science and maths to life, giving children the opportunity to learn more and providing schools with the educational resources they lack.

LEARNING IN MOTION

The mobile laboratory at the Mondi Science Career Guidance and FET Skills Centre in Piet Retief, Mpumalanga, has been operating since May 2010. "We focus on reaching rural schools that would not normally have the opportunity to visit our centre," says Mondli Mnguni, manager of the centre.

The mobile lab visits schools twice a week during school terms to help prepare grade 12 learners for the practical work in the school curriculum. "We tailor our programme according to a particular school's needs,"

explains Mnguni. "We ask the educators what practical work we should demonstrate, and then prepare work sheets and pack the equipment that will be needed for the relevant experiments. We have received very positive feedback from the schools in the Gert Sibande region, to which we currently travel with our mobile lab."

Mnguni adds that during the school holidays and for National Science Week, the Mondi Science Centre team uses the mobile laboratory for outreach

activities at shopping malls and also at points where people gather to collect their pensions. On these occasions the lab is packed with 10 portable exhibits to entertain audiences.

At the ArcelorMittal Science Centre in Vanderbijlpark, the centre has used their own funds to equip the new mobile laboratory with a built-in sink and chemicals cabinet. The laboratory is currently being used at science exhibitions and by learners to conduct experiments. "From August 2010 until May 2011, about ➔

QUICK FACTS

BETWEEN MAY AND AUGUST 2010, SAASTA AWARDED DST GRANTS TO THREE SCIENCE CENTRES TO BUY AND EQUIP VEHICLES AS MOBILE LABORATORIES.

THOUSANDS MORE LEARNERS ARE BEING REACHED AND INSPIRED WITH FUN SCIENCE AND CURRICULUM-RELATED EXPERIMENTS.

1

Mondi Science Centre

The mobile lab at this centre in Piet Retief, Mpumalanga, visits schools twice a week during term time, and has been operating since May 2010.

2

FOSST Discovery Centre

This newly-launched mobile lab at the University of Fort Hare, Eastern Cape, provides equipment, syllabus content and vocational guidance information.

3

ArcelorMittal Science Centre

Based in Vanderbijlpark, Gauteng, this centre has seen some 35 000 learners participate in science activities made possible by the mobile lab.



Learners at Vanderbijlpark, where a mobile laboratory is operated by the ArcelorMittal Science Centre.

Did you know that RADIO took 38 years to reach a market audience of 50 million?

TOUCH

TELEVISION took 13 years. The INTERNET took four.

35 000 learners participated in science awareness activities made possible by our centre's mobile lab," says Thami Mphokela, manager of the centre.

The third science centre to benefit from SAASTA's mobile labs programme is the Forté School of Science and Technology (FOSST) Discovery Centre at the University of Fort Hare, Eastern Cape. The new mobile laboratory was launched here in August 2010 and is equipped with, among others, a Technology Research Activity Centre (TRAC). This provides equipment, syllabus content, vocational guidance information and a variety of other material to help develop communities where resources are limited.

"We are focusing our mobile lab activities on schools that find it too costly to visit our centre," says Pumezo Kwinana, manager of FOSST. "The mobile TRAC lab not only gives the learners the opportunity to do curriculum-based experiments, but it also teaches them computer literacy, as all the experiments are done using the computer."

When the FOSST mobile lab is used for outreach activities outside of the school environment, it is fitted with a variety of exhibits and equipment for science shows. "We travelled to SciFest Africa in May 2011, and had a strong presence, thanks to our mobile lab," says Kwinana.

Have you heard

that the space probe Voyager I, launched in 1977, is now nearing the edges of the Solar System? Or that astronomer Robert Innes was in Johannesburg when he discovered the closest star to Earth (after our Sun)? These are some of the fascinating facts contained in the **new edition of the book** *Your Guide to the Universe*. Originally produced as the primary source of information for SAASTA's annual Astronomy Quiz, the book has now been updated with developments such as the new solar system structure, which was adopted by the International Astronomical Union in 2006.

Since the first-ever competition in 2005 at the Sci-Bono Discovery Centre in Johannesburg, the annual Astronomy Quiz has become a favourite on the school science calendar, with more than 3 000 learners participating in 2010.

READ IT IN THE STARS

After six years of hotly contested competition, SAASTA's Astronomy Quiz remains a much-anticipated school science event.

In 2010, more than 3 000 grade 7 learners participated in the first round of the competition – almost double that of 2009. Schools from across the country each put forward one team (usually the winners of mini competitions held within the schools themselves),

who then competed against each other in a series of knockout rounds hosted at various science centres.

The top teams represent their area at the national finals, which are organised by SAASTA and in 2010 were held in Cape Town at the South African Astronomical Observatory. This time, a grade 7 team from Sutherland Hoërskool in the Northern Cape won the national quiz for the first time.

"Participation in the Astronomy Quiz provides a wonderful opportunity for our learners," says Mr Dolf Nel of Springbok Primary in the Northern Cape, who accompanied teams to the 2008 and 2009 finals.

"Not only do they learn about the fascinating field of astronomy, but many of them get to visit a city for the first time and meet learners from all over the country."

DID YOU KNOW?

- SAASTA funds, coordinates and manages the AstroQuiz project, liaises with the participating centres, and supplies the project resources with assistance from the astronomy community (this includes the *Your Guide to the Universe* booklet, question bank, scoring sheets, Q&A sheets, PowerPoint presentations, check lists and rules).
- SAASTA also organises the final quiz event between finalists from the centres, prints certificates and arranges the prizes for the event.
- SAASTA invites selected centres to participate in the project. Each participating centre is responsible for implementing the project up to the finals, and to liaise with their local Department of Education and schools.



An elated winning team and their teacher celebrate their victory in the SAASTA Astronomy Quiz 2010 finals. The team of grade 7 students from Sutherland High School are, from the left, Gerardo Verhoog, Animm Heyns, Petrus Muller and Philip Steenkamp, with their teacher and coach, Ms Ann Gilfillan.

How much potential does the Internet hold?

CREATING AWARENESS

The Internet started being widely used by the general public in early 1995.

- Number of Internet devices in 1984: 1 000
- Number of Internet devices in 1992: 1 000 000
- Number of Internet devices in 2006: 6 000 000 000

Approximately 75% of the schools participating in round one of the Astronomy Quiz are from disadvantaged communities.



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SCIENCE COMMUNICATION

The essence of good science communication lies in providing credible and accurate information that is accessible to all South African communities.

SAASTA develops and implements new science communication initiatives in response to national need and in line with international trends.

INTRODUCTION

Sound science communication depends on far more than the media: it involves everyone who is passionate about science, as well as those who produce it. To this end SAASTA's science communication unit works with media practitioners and scientists to help them share and popularise the field.

SAASTA also develops various communication tools and resources to promote science to the general public, while hosting communication skills workshops.

All of this work is underpinned by three critical processes: the scientific editorial process (which ensures that information is responsible, reliable and credible); scientific editing (which considers ethnicity and ethnology to ensure that messages are clearly communicated and understood); and audience analysis (to better understand South Africa's diverse audience categories).

COMMUNICATION

DID YOU KNOW?

- Newspaper circulation is down seven million over the last 25 years. But in the last five years, unique readers of online newspapers are up 30 million.
 - More video was uploaded to YouTube in the last two months than if the three major US TV networks had been airing new content 24 hours a day since 1948.
- MySpace, YouTube and Facebook get 250 million unique visitors every month collectively. None of these sites existed six years ago.

“It is being

called the most significant palaeontological find in nearly a century and it was discovered by a nine-year-old boy. The find is a new species of hominid that some scientists are saying is a direct ancestor of modern man.” These were the opening lines of the front-page article written by Shaun Smillie, senior reporter of *The Star* newspaper, on 9 April 2010. The same newspaper carried lead articles on three other pages on the same day and a supplementary insert. **The cause of the excitement?** Professor Lee Berger from the University of Witwatersrand (Wits) had just disclosed the discovery of two *Australopithecus sediba* fossils at the Cradle of Humankind World Heritage Site, outside Johannesburg. This followed two papers related to the discovery, authored by Professor Berger and Professor Paul Dirks (former head of the Wits School of Geosciences, and now from James Cook University), which were published in the journal *Science* on Friday, 9 April 2010. Berger’s research is supported with funding from the **National Research Foundation.**

They lived almost two million years ago, strode upright, but climbed through trees on apelike arms. Meet the recently discovered new species of hominid ... *Australopithecus sediba*.

UNEARTHING RENEWED INTEREST IN SCIENCE

As a result of a concerted integrated campaign that included targeted marketing, communications, media and public relations components by the communications department of Wits University, the discovery of *Australopithecus sediba* was used to substantially augment the local and international profile of the institution as well as its Institute for Human Evolution. Local media coverage of the announcement in all major newspapers, television and

radio stations, was valued at in excess of R40 million. A 60-minute documentary broadcast on CBS exposed more than 60 million viewers to the science behind the find and the *New York Times*, which has a readership of almost three million, ran a lead story on the find. Some 24 million viewers in Europe were reached through the Wits-ESRF World Television Partnership and about 100 million Internet users managed to access related information.

The exposure for Wits was significant, with the university being lauded in Parliament. International recognition came in the form of a number of high-profile visitors, including the likes of Richard Branson, Al Gore, President Jacob Zuma, Deputy President Kgalema Motlanthe, Paul Allen, Minister of Science and Technology Naledi Pandor, Deputy Minister of Science and Technology Derek Hanekom, and Ambassador Donald Gips.



Professor Lee Berger and his son Matthew pose with the almost complete skeleton of the *Australopithecus sediba*. Photo Daniel Born/*The Times*

QUICK FACTS

1

36 journalists and 16 journalism students attended a round table session, profiling the work of seven research specialists, and covering topics such as genetics, plant and animal fossils, extinction theory, and the *sediba* find.

2

More than 5 500 guests visit the Iziko South African Museum on the last day of Palaeo-Sciences Week, and more than 400 people visited the West Coast Fossil Park.

3

New palaeo resource materials were developed, including an anthology of rhymes; the *Kids' Guide to Hominids*; a palaeo-tourism exhibit; a tourist information guide of palaeo sites; and a learner and educator resource guide.

The Department of Science and Technology recognised the significance of the find by declaring a Palaeo-Sciences Week. With input from Wits, SAASTA and the Iziko South African Museums, the *sediba* fossils travelled from Maropeng in the Cradle of Humankind, to the Iziko South African Museum where the exhibit was hosted from 21-24 April 2010. The intention was not only to introduce the fossils to a wider audience in another province, but also to coincide with the Minister of Science and Technology's budget speech

in parliament, thus giving members of parliament the opportunity to view the fossils and lobby for more support of the palaeo-sciences.

Palaeo-Sciences Week kicked off with a breakfast hosted by the Minister and Deputy Minister of Science and Technology. Other sessions included a special lecture on dinosaurs by Professor Anusuya Chinsamy-Turan of the University of Cape Town and Dr Adam Yates of Wits University (attended by 211 people), followed by

a media round table session titled *The Story of All Life on Earth*.

References:

1. LR Berger et al. "*Australopithecus sediba*: A New Species of Homo-Like Australopith from South Africa" *Science* 9 April 2010: Vol. 328 no. 5975 pp. 195-204.
2. HG M Dirks et al. "Geological Setting and Age of *Australopithecus sediba* from Southern Africa" *Science* 9 April 2010: Vol. 328 no. 5975 pp. 205-208.

For some scientists,

the next best thing to a trip to Mars is an expedition to the Earth's driest deserts. In 2010, a diverse group of 26 people gathered at the Gobabeb Field Station in the Namib Desert for such a mission: to study those rare life forms that survive under extreme conditions. The expedition, called **Spaceward Bound: Namibia**, focused on hypoliths, which are bacteria that live under light-coloured, translucent stones. It forms part of the Spaceward Bound NASA programme, which brings together scientists and educators in the study of extreme environments (usually very hot or very cold deserts) where they search for and investigate microscopic organisms. Their knowledge and experience is then used to design research methods and equipment that will look for life on Mars. **The mission of Spaceward Bound** is to train the next generation of space explorers through authentic fieldwork so that they can take that experience back to their classrooms. During the Namib expedition, students and science teachers from the United States, Australia, South Africa and Namibia were inspired to embark on their own voyages of scientific discovery.

The mission of Spaceward Bound is to train the next generation of space explorers through authentic fieldwork so that they can take that experience back to their classrooms.

SHARING THE SCIENCE OF EXTREME ENVIRONMENTS

SAASTA sponsored two journalists and a videographer to accompany the Spaceward Bound mission and produce communication products and educational material relating to it.

Four members of the University of the Western Cape's Spaceward Bound Team were subsequently interviewed on the SAfm radio show, Science Matters (Thursdays at 21:00). A number of articles also appeared in the local media.

The videographer produced a 15-minute documentary that profiles the cutting-edge scientific research while promoting the scientists as career role models. Fact sheets on careers in science, extremophiles, cyanobacteria and more have also been produced and are available through the SAASTA website.

The Spaceward Bound expedition has resulted in an agreement between the principal investigator, Professor Don Cowan of the University of the Western

Cape and Dr Chris McKay of NASA Ames (the research and development organisation that develops the technologies that make NASA missions possible). The parties have agreed in principle to conduct further field research in the Namib Desert in April 2012. Cowan has also been invited to join an international consortium headed by NASA, which will submit a funding application to build a "Martian rover". This rover will identify and characterise biological soil crusts in desert environments.

SCIENCE IN SHANGHAI JUST ONE TOUCH AWAY

How does one communicate all the science and research activities in South Africa to over 73 million Chinese people – in Mandarin? This was the challenge facing SAASTA when it prepared for the Shanghai World Expo, which started in May 2010 and attracted that many local visitors by the time it closed at the end of October.

SAASTA's solution came in the form of four touch-screen computers containing an interactive presentation on South Africa's National System of Innovation (NSI).

The presentation begins with an introductory video filled with truly African sounds and music, zooming in towards a topographical view of South Africa, listing all the NSI institutions.

A voice-over artist then introduces this frame in Mandarin, advising viewers to "touch" the relevant category of NSI institution they wish to view. Once selected, viewers can choose from the various options available and a screen opens up with information on that specific institution, with the voice-over explaining the institution's functions in more detail. The touch-screen presentation also enables users to request further information via email by submitting their details there and then. If the screens are left idle for 90 seconds, the software restarts with the introductory video.

The touch-screen machines were returned to South Africa when the expo was over, and SAASTA will be moving these to various locations in the country to share the presentation – this time in English.



The way we say things is changing ... In November 2006, 16-year-old Ang Chuang Yang of Singapore typed a Guinness Book of World Records-approved 160-character text on his cell phone in 41.52 seconds ...

SHARE

That's about **FOUR** characters **PER SECOND**.

Top: A scene of the interior of the South African pavilion at the Shanghai World Expo. Photo courtesy of the Department of Science and Technology.

Top right: Screen shots from the interactive NSI presentation.

Above: A videographer documents the teachers' and scientists' research in the Namib Desert, as part of the Spaceward Bound Mission. Photo: NASA Ames Research Center/Matthew F Reyes.

The social science

studies that are commissioned by SAASTA's science communication unit help to conceptualise the way forward with science awareness projects, and contribute valuable insight into understanding the audiences that are targeted through science awareness projects.

In 2010, these studies included:

- Biotechnology in the South African media.
- Human capital needs in the South African Biotechnology sector.
- The use of comics as a science communication tool for tertiary students.

Getting to know student audiences better

In order to more adequately direct activities and programmes aimed at promoting science, engineering and technology (SET) among tertiary students, one of the key studies commissioned in 2010 focused on the perceptions and attitudes of these students towards SET and the associated drivers and barriers related to their study choices.

This investigation specifically aimed to assess the motivations of tertiary students to enrol (or not enrol) for SET-related studies; their levels of awareness and interest in related developments; and their intent to complete their studies and remain in the sector. Both quantitative and qualitative focus group discussions and face-to-face interviews were conducted. Respondents' answers were recorded into electronic hand-held devices for processing via GPRS to a central server in real time.

A quota-controlled sample of 815 students was drawn from 16 higher education campuses throughout South Africa. Of the 815 respondents who took part in the first phase of the study, 61% were enrolled in SET courses, and 39% indicated that they were enrolled in the fields of commerce, social science, humanities, arts and "other".

In the second phase, eight focus group discussions were held with the aim of gaining additional insights to supplement the findings of phase one.

Some of the results included the following:

- Among SET-related fields, almost 50% of students identified the Internet as being the most interesting of all the 11 developments from which they could choose.
- Medicine and the environment shared second place, with 36% of respondents indicating their interest in these fields.
- Only 5% of respondents indicated that they are not interested in any of the listed SET fields, and 2% indicated that they had no interest in SET at all.
- In the group discussions, the use of new inventions

EXPLORING THE SCIENCE OF SOCIETY

QUICK FACTS

A QUOTA-CONTROLLED SAMPLE OF 815 STUDENTS WAS DRAWN FROM 16 HIGHER EDUCATION CAMPUSES THROUGHOUT SOUTH AFRICA

1

50% of students identified the Internet as being the most interesting SET-related field.

2

36% of students listed medicine and the environment as the most interesting SET-related field.

3

84% of SET students stated that they believe their field of study is their calling.

and technologies was the category that received the most interest from respondents.

- The establishment of better, more extensive courses was identified as the strongest potential motivator for studying in SET-related fields. A guarantee of an internship or employment on completion of studies ranked second highest.
- A common theme emerging from the study was the belief that SET courses at university level are very difficult and that respondents would not be able to cope with them.
- Among students already studying in a SET-related

field, passion and enjoyment of science were the overriding factors that influenced their study and career choices.

- 84% of respondents enrolled in SET-related studies indicated a high level of enjoyment, stating that they believe it is their calling.
- Students in SET fields indicated that their study choices were strongly influenced by their parents' encouragement. However, focus group discussions revealed that students in SET-related fields as a result of strong parental influence are finding their studies much less enjoyable. Some expressed regret over

their study or career choices and generally seemed more negative towards their studies. They also reported that they find their courses more difficult and less rewarding than those students who made study and career choices without parental pressure.

- Exposure to a SET field at an early age was identified as a driving force behind the subsequent take-up of SET-related studies.
- 92% of respondents enrolled for SET degrees said that they would consider taking their degree to a postgraduate level.



SAASTA's

Women in Science **touch-screen kiosk** is an excellent example of how new media tools can be used to make education both interactive and entertaining. The computer-based kiosk incorporates video clips of interviews with successful women in science, as well as information on the type of qualifications needed. The kiosk is also programmed to send students additional information via email, upon request. Each time a participant navigates to different sections of information, the machine saves this data. This will be used by SAASTA to determine which careers are the most and least popular. The information can then be used to plan educational activities geared at increasing interest in the less popular fields of science.

Science and technology is full of innovation – and the manner in which we communicate it should be as well. Fortunately, advances in Information and Communication Technology (ICT) make this both possible and relatively easy.

NEW MEDIA FOR NEW IDEAS

The touch-screen kiosk, which targets both learners and university students, was developed specifically with young women in mind, and aims to encourage them to take up careers in science and persevere with their studies.

It showcases career opportunities for women in science and technology, and allows students to view the study courses in their fields of interest at different South African universities. It profiles successful women working in

different fields of science, and stresses that working conditions for women in these fields are changing for the better. It also contains information on how to obtain funding for studies.

The touch-screen exhibit was tested at various sites at the University of Pretoria in late 2010 and early 2011. SAASTA aims to eventually give students at all South African universities' science faculties the opportunity to use the innovative Women in Science touch-screen kiosk.

Today's average 21-year-old in the United States has:

- Watched 20 000 hours of TV
- Talked 10 000 hours on the phone
- Sent/received 250 000 emails or instant messages

SHARE

More than 50% of US 21-year-olds have **CREATED CONTENT** on the web, and more than 70% of four-year-olds have **USED A COMPUTER**.

In 2010

the Public Understanding of Biotechnology programme (PUB) at SAASTA enlisted the help of Learning to the Max, an education team who has reviewed all of PUB's existing information resources, in order to align them to the national curriculum and match each resource to the most appropriate grade. They also produced a set of classroom activities to assist educators who teach biotechnology-related topics.

Biotechnology is prevalent in the life sciences curricula of grades 9, 11 and 12. The grade 9 section of the classroom activity resources is restricted to information on careers in biotechnology, while resources for grades 11 and 12 include short stories on biotechnology and complementary data response activities.

Each story delves into the various aspects of biotechnology, like genetically modified organisms, forensics and others. Not only do these stories provide relevant background information that feeds directly into the curriculum, but the pre-planned activities also help to minimise the teacher's workload.

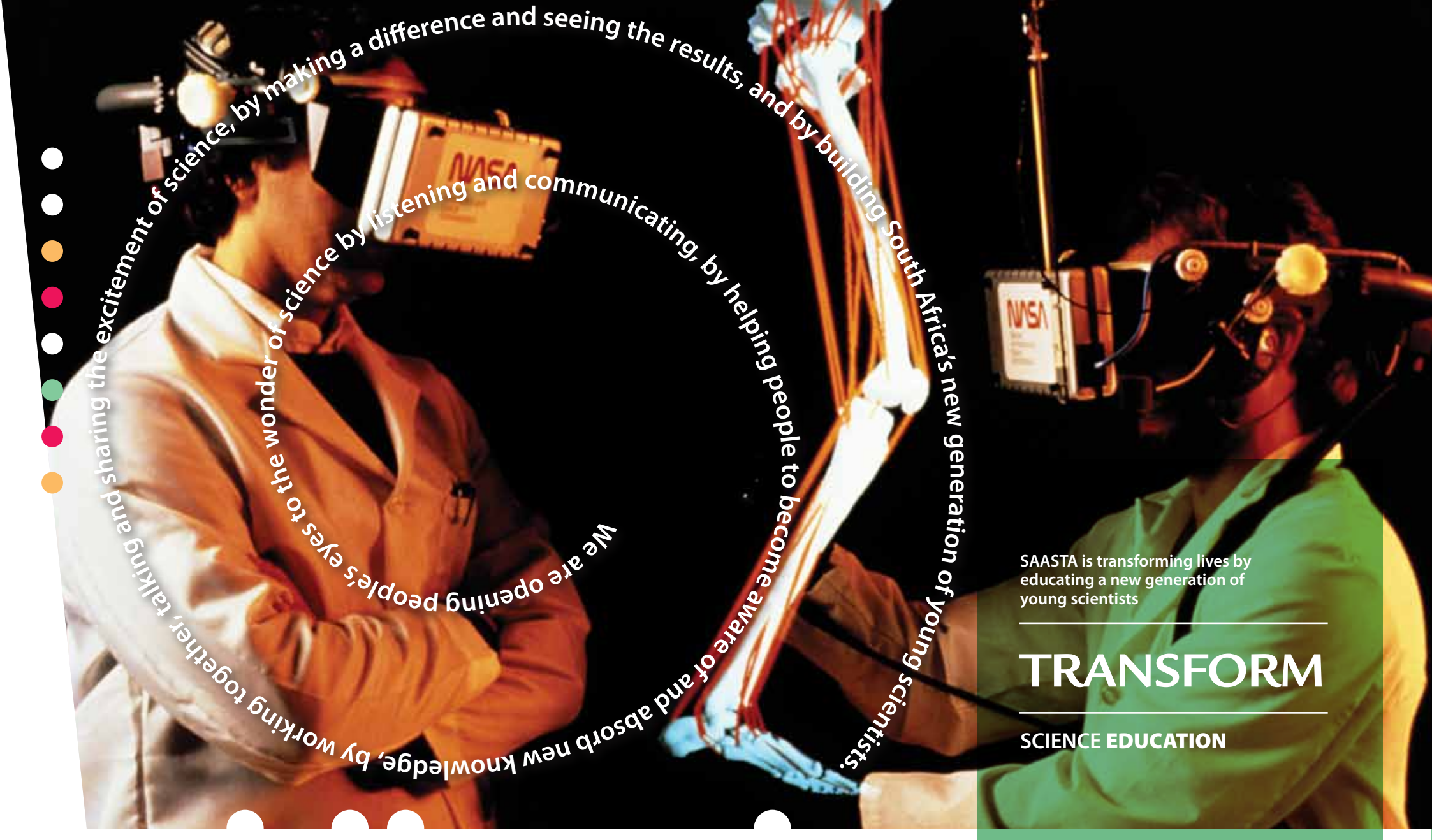
PUB has also created educator resource packs to help teachers make better use of their existing resources. Each pack, which takes the form of an expandable file, has compartments to help teachers easily sort and access resources according to grade. The neat, compact packaging makes it practical to carry from class to class.

Members of the PUB team with a selection of the new resources developed specifically for learners and educators who work with biotechnology-related topics.

TOOLS YOU CAN USE

Information resources on specialised subjects are often all it takes to transform ignorance into insight. But no matter how well prepared these documents are, educators and learners often fail to make full use of them in the classroom, or discard the material once it is read. Fortunately, this is changing ...





We are opening people's eyes to the wonder of science by listening and communicating, by helping people to become aware of and absorb new knowledge, by working together, talking and sharing the excitement of science, by making a difference and seeing the results, and by building South Africa's new generation of young scientists.

SAASTA is transforming lives by educating a new generation of young scientists

TRANSFORM

SCIENCE EDUCATION

South Africa is rapidly reaching the forefront of science and technology advancement in Africa and has the potential to become a rich source of up-coming

scientists, engineers and innovators. SAASTA's education unit specifically aims to build the supply of tomorrow's scientists and innovators.

INTRODUCTION

The work done by SAASTA's education unit is pivotal in preparing today's youth to become tomorrow's scientists and engineers.

This work can be divided into the following three broad areas:

- School science support, which includes educator and learner programmes, science enrichment projects and competitions.
 - SET career information, which exposes learners to career opportunities in science, engineering and technology.
- Science resources, which support the school science curriculum and include enrichment materials, web-based materials and online learning.

EDUCATION

DID YOU KNOW?

It is estimated that 1,5 exabytes ($1,5 \times 10^{18}$) of unique **new information** was generated worldwide in 2006. That's more than in the previous 5 000 years.

The amount of new technical information is **more than doubling** every two years. For students starting a four-year technical or college degree, this means that half of what they learn in their first year of study will be **outdated** by their third year of study.

Right on target

Since 2000, SAASTA has managed the National Science Week (NSW) initiative – a flagship project of the Department of Science and Technology that exposes learners, educators, the public, politicians and community members to the value and impact of science, technology and engineering in their lives. The vast experience that SAASTA has gained over the past 11 years was evident in the planning and successful implementation of NSW 2010, which was based on the theme “The role of Science in Economic Development”. Due to the local hosting of the FIFA Soccer World Cup in South Africa and the resulting long winter school holiday, the time slot for NSW 2010 was moved to the first week of August. Despite having only five months in which to prepare, SAASTA not only reached but also exceeded its target for the number of participants – some 250 000, a 25% increase on the previous year.

National Science Week – an annual countrywide celebration of science, led and funded by the Department of Science and Technology and managed by SAASTA – celebrated its 11th anniversary in 2010.

EXPERIENCE TAKES NSW TO A NEW LEVEL

NSW currently runs simultaneously at multiple sites across the country in the same week. During this week, science-based activities involving various stakeholders are conducted at different sites in all nine provinces. This includes input from science councils, higher education institutions, science centres, Department of Education resource centres, professional associations, the business sector and other science, engineering and technology organisations. The intention is that

eventually all municipalities and metropolitan cities across the country will participate in this celebration.

During 2010, for the first time in the history of NSW, libraries and museums in two provinces, Gauteng and the Free State, became actively involved. A total of 120 libraries (105 in Gauteng and 15 in Free State) participated. The Geosciences Museum and Transvaal Museum in Pretoria also presented programmes.

Participation

For the past six years, more than 81,6% of NSW participants have been learners, with a grand total of 984 427 learners taking part in NSW activities since the inception of the programme. While this high level of learner participation is satisfactory, educator and public participation is still lacking.

An analysis of school participation in NSW 2010, based

QUICK FACTS

ALMOST ONE MILLION LEARNERS HAVE PARTICIPATED IN NSW ACTIVITIES SINCE THE INCEPTION OF THE PROGRAMME (984 427 IN TOTAL). HOWEVER, EDUCATOR AND PUBLIC PARTICIPATION IS RELATIVELY LIMITED.

IT IS INTENDED THAT EVENTUALLY ALL MUNICIPALITIES AND METROPOLITAN CITIES WILL PARTICIPATE.

1

86,2% of schools participating in NSW 2010 were from disadvantaged communities and rural areas.

2

On average, more than 81,6% of the participants in NSW are learners.

3

120 libraries, as well as the Geosciences Museum and Transvaal Museum participated in NSW 2010.

4

More than 250 000 people took part in NSW 2010 – a 25% increase on the previous year.

5

2010 marked the 11th anniversary of the NSW initiative.

on where the schools are located, revealed that 86,2% were from disadvantaged communities and rural areas in which the communities have limited exposure to science and resources.

Over the past decade of managing the NSW, SAASTA has learnt valuable lessons that will be used to further refine the model for the next five to 10 years. This will ensure sufficient returns on the huge investment that

is being made through this initiative. This was also the beginning of a two-year interim period, pending a 10-year review of the NSW (2000 – 2009). The review results, which are due in mid 2011, will greatly inform the Department of Science and Technology on the way forward.



Did you know that 100% of college graduates in India speak English?

TRANSFORM

In 10 YEARS it is predicted that the number one English-speaking country in the world will be CHINA.



Snapshots from National Science Week 2010.

SAASTA recently

commissioned two studies to track learners who have participated in its activities. **The first study** followed learners who were part of the science, engineering and technology awareness project, which kicked off in 2007. This involved 7 777 grade 10 learners studying any two of maths, life science and physical science subjects. They were part of the project until they passed grade 12 in 2009. When surveyed the following year, 1 060 of these learners indicated that they were studying at higher education institutions; over 500 were studying in science-related fields; and 252 were studying engineering. SAASTA will again follow up on these students to see how many have passed their first year and, if they had dropped out, what the reasons were. **The second study** involved learners who participated in the National Science Olympiad, a project that SAASTA has been running for the past 46 years. The study focused on the top 100 grade 12 learners in each of the physics and life science exams in 2009. Based on feedback from 82% of these learners, it appears that most of them went on to study further in science, engineering or technology.

How does an organisation measure and maximise its impact on youngsters who have participated in science awareness projects? This has become a crucial question for SAASTA, and one that is often very difficult to answer.

FOLLOWING – AND SUPPORTING – OUR SCIENTISTS OF THE FUTURE

Educators go back to school

A five-day mineral resources course at SAASTA in August 2010 saw 20 educators and curriculum advisors put their learning skills to the test. The team was given a unique opportunity to study with five highly regarded geoscientists and educators from the American Museum of Natural History (AMNH) in New York and Columbia University, on the topic of “The Mineral Resources of South Africa in Geographic Context”.

The aim of the course was to deepen the educators’ understanding of the geology and earth science of South Africa. The knowledge that attendees gained is now being used to develop inquiry-based activities for the classroom.

SAASTA and the AMNH organised this event to help meet the goals of the Geography National Curriculum for grades 10 to 12. The project, funded and hosted by SAASTA from 16 to 20 August, was partially supported by the US National Science Foundation.

The project forms part of the broader partnership between the AMNH and the Southern African Large Telescope, which includes sponsorship by AMNH for education and outreach efforts in South Africa.

Specific topics covered in the mineral resources workshop included:

- Geographical skills and techniques – political and geological maps.
- Development and sustainability – using indicators

to contrast global and local sources of mineral resources.

- People and their needs – mineral resources, the economy, education, and careers.

At the end of the course, teams presented the outline of a teaching unit they created based on one of the topics.

Primary school resources for learners and educators

The past year also saw the launch of a brand-new set of chemistry resources for SAASTA's Primary School Science Intervention project. The set includes learner and educator manuals as well as a box containing all the equipment and chemicals needed to conduct the experiments described in the manuals (for example, testing for acids and bases using various indicators and exploring the properties of carbon dioxide, among others).

SAASTA's primary science programme started a number of years ago with a biotechnology kit that contained a booklet on forensic biotechnology, an educators' manual and a kit for preparing DNA from wheat germ. Though this was a popular project with schools across the country, SAASTA realised that it could be improved by making the project more curriculum-focused and therefore more useful for educators.

A new kit, with electricity as theme was developed and has been in use since 2006. Each includes background information on electricity, basic equipment and instructions on how to build simple circuits, information on electrical safety and how to save electricity. Educators in Gauteng, Limpopo, the Eastern Cape,

14%

1 060 of the grade 10 learners who participated in the SET awareness project went on to study at higher education institutions.

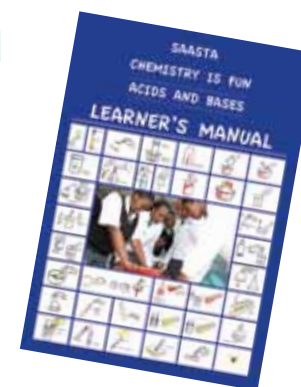
SAASTA will follow up with participants to see how many pass their first year, how many drop out, and why.

10%

More than 750 of the surveyed learners who embarked on further studies, did so in the field of science and engineering.

A second study in 2010 indicated that most National Science Olympiad participants went on to study further in SET.

The new chemistry kit was evaluated in the Free State by provincial curriculum advisors. It is now being used countrywide, during what is aptly named the United Nations International Year of Chemistry.



KwaZulu-Natal and the Free State have been trained on how to use this kit to best effect in the classroom.

"We knew that learners would be creative and find uses for the kits far beyond the experiments we provide in the manuals," says Dr Jabu Nukeri, manager of the education unit at SAASTA. "We therefore created a competition in which learners have to use the kits to make products that

serve their communities." One competition entry involved creating an alarm system for the flooding of a river that dissects a rural community in the Eastern Cape. Another component of the project is a quiz competition between schools, based on the content of the learner manuals.

The electricity hand-out kits are still in great demand, and science centres have indicated an interest in expanding the project in their areas.

In 2006, 1,3 million college students graduated in the United States. Around 3,3 million graduated in China.

TRANSFORM

In 2010, South Africa had approximately 840 000 students enrolled at universities COUNTRYWIDE. But according to the Human Sciences Research Council, **ONLY 15% of these students are likely to finish their degrees in the allotted time.**

Role models

are an extremely effective way to showcase the excitement and potential that a career in maths, science and technology offers. SAASTA's role-modelling campaign is specifically designed to expose learners to career opportunities and gives them the chance to interact with role models and mentors who already have careers in these fields.

In one year alone, the campaign has taken SAASTA staff to Atteridgeville in Tshwane, Khayelitsha near Cape Town, schools in the rural areas around Port Elizabeth and Fort Hare University in the Eastern Cape, and Kuruman in the Northern Cape.

In 2010, however, the campaign gained momentum of its own, with role models volunteering to take the project to their own communities.

"The role models we use are impressed with the success of the project," says Dr Jabu Nukeri, manager of the education unit.

"We find that more and more of them are mobilising colleagues and friends to take the campaign back to their own communities. In this way, the campaign is being expanded into places that SAASTA would not be able to reach of its own accord."

Before giving role models support to do their own campaigns, SAASTA requires that at least five scientists or engineers participate at one time. They are also required to arrange the venue and send invitations to all learners within a cluster in the area. Furthermore, they must do this in their own time and without

SAASTA's role-modelling campaign has ventured into all areas of the country in its quest to show learners that they too can follow a career in maths, science and technology.

LEADING BY EXAMPLE



A role model tells learners about his career path, during a SAASTA role-modelling project in Port Elizabeth.

remuneration. SAASTA provides resources in the form of career brochures, educator and learner material, and travel and accommodation expenses.

The typical programme for a role-modelling day at a school involves a meeting in which the concept is

explained, after which learners are divided into groups that rotate until everyone has interacted with all the role models present. "We find that learners ask many probing questions and role-models go into more detail on their career paths if they are in smaller groups," says Nukeri.

SAASTA 2010

SCIENCE COMMUNICATION



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2. Tryphina Mabena, administration officer.
3. Lithakazi Lando, DST/NRF intern.
4. Sharon Mashau, project coordinator: HySA.
5. Michelle Joubert, audience analyst.
6. Mthuthuzeli Zamxaka, project coordinator: NPEP.
7. Melissa Gopaul, project officer.
8. Maphefo Chauke, project officer.
9. Martha Mokgoko, PUB administrator.
10. Dr Manjusha Joseph Sunil, project coordinator: PUB.
11. Lorenzo Raynard, manager.



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3. Mari-Louise Snyman, financial controller.
4. Lucy Coetsee, manager.
5. Michael Monametsi, driver/messenger.
6. Hendrick Modjadji, building and maintenance.
7. Mariet Tolmay, financial officer.
8. Marlize Delport, financial controller.
9. Jacob Manchidi, registry.



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5. Erna Taljaard, project coordinator.
6. Suzie Maruma, project coordinator.
7. Dr Jabu Nukeri, manager.
8. Imaan Allie, project officer.
9. Lindie Brazer, administrative assistant.



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2. Bafedile Kgwadi, project coordinator.
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4. Mavis Mohumotjje, general assistant/receptionist.
5. Shadrack Mkansi, manager.
6. Dira Marule, NSTF volunteer.
7. Wilson Kompleni, messenger.
8. Edwin Ramonnye, maintenance.
9. Vanessa Murugan, senior administration officer.
10. Nare Selolo, NSTF volunteer.
11. Wisani Siweya, DST/NRF intern.
12. Hubert Mathebula, project coordinator.
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