

16 @ SAASTEC Conference

17 - 20 November 2014
Nelson Mandela Bay Science & Technology Centre



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



NELSON MANDELA BAY
SCIENCE & TECHNOLOGY CENTRE



Urbane Development Development Initiative
Nelson Mandela Bay

Programme & Book of Abstracts



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Word of welcome from the SAASTEC Chair

Dear Delegate,

A warm welcome to the 16th Annual SAASTEC Conference hosted by the Nelson Mandela Bay Science and Technology Centre. At the outset we must express our appreciation to the Department of Science and Technology for their generous support and to the UDDI for believing in and supporting this event.

This conference has witnessed an incremental growth over the years. Starting with a handful of very youthful looking science centre managers all those years ago this event has grown to command a significant space in the science and technology education landscape. The conference now boasts over 157 delegates from over 57 science centres in Southern Africa and globally, from universities, government, industry, corporates, NGO's and the education sector in general. The conference does not exist in isolation but is located in the context of the global science centre community, driving the goals espoused in the Mechelen Declaration. For those of us who do not look that youthful anymore we are proud to have aged with the science centre movement in this country – which has also grown older, wiser and more effective.

We look forward to hearing from you over the next three days. However, we are more interested in what you take away from this conference, how you apply the learnings to your work and how you will use that to change the lives of those whom we serve.

Thank you for investing in this conference. I wish you well in your deliberations.

Sincerely,



*Michael Peter
SAASTEC Chair*

The Uitenhage Despatch Development Initiative (UDDI) welcomes you

Your presence at this conference is valued as it shows us your commitment to SAASTEC's vision of facilitating a technologically-based Southern Africa. We too as the UDDI buy into this vision hence hosting the 16th SAASTEC Conference is fitting. Not only does the conference provide a platform for robust dialogue on trending industry advancements, it also facilitates an ongoing learning experience as we move towards building a competitive Southern Africa in the global economy.

As the UDDI, we believe in the intrinsic value of technology as a conduit for socio-economic growth. Hence the launch of the Nelson Mandela Bay Science & Technology Centre in March 2013 entrenched our programmatic approach to education, training and skills programme. We took on this task with the view of making a positive contribution in the transformation of education and skills development agenda of our country.

Through outreach and in-house programmes which mainly target educators and learners in STEM (science, technology engineering and mathematics), the centre reached 180 schools within the Nelson Mandela Bay area in 2013 alone. A majority of the learners who benefitted are from townships and informal settlements and we believe that these programmes will build their affinity to STEM (science, technology, engineering and mathematics).

In our journey to address the socio-economic challenges in the Uitenhage-Despatch communities, we have also identified town regeneration and enterprise development as strategic focus areas which should aid the organisation in its efforts to change the socio-economic character of the Nelson Mandela Bay region.

Town regeneration involves the enhancement of urban and township areas, and the creation of a vibrant environment that is competitive and enhances social cohesion. Enterprise development on the other hand is used as a tool to advance small business growth through the provision of support packages, capacity building, new business solutions, investment opportunities and markets.

We hope that this conference will highlight potential areas of collaboration; and importantly help identify ways for eliminating gaps in the current education system and skills development interventions of our country.

This is our call for lasting partnerships to drive real change!

Patricia Dollane Chambers Dlamini
UDDI chief executive officer

Programme

“Science Centres - lighting up the way”

Sunday 16th & Monday 17th November 2014

Time	Activity
.	SAASTA's PRE-CONFERENCE WORKSHOP on Dramatization @ NMSTC, Uitenhage Delegates will be transported to NMSTC.
09:00-16:00	Sunday
09:00-14h00	Monday

Monday 17th November 2014

Time	Activity
14:00-17:30	Registration @ Bayworld, Port Elizabeth
14:00-17:00	Workshops @ Bayworld
	Tea/Coffee/Juice
18:00-20:00	Icebreaker – Jester Cruiser – a cruise around the bay (or the harbour if the weather is nasty). (Delegates will be transported from Bayworld Parking lot to and from the harbour for this event.)

Tuesday 18th November 2014

Time	Activity	Delegate	Mins
08:00-08:30	Registration at Conference Venue NMBST Morning Tea / Coffee		30
08:30-10:20	Opening Session Chair : Michael Peter		
08:30-08:35	Welcome by Michael Peter (SAASTEC President)		5
08:35-08:45	Welcome by Chair of Board / CEO (UDDI)		10
08:45-08:55	Welcome by Local Municipality		10
08:55-09:00	Introduction of Keynote Speaker by Derek Fish		5
09:00-09:30	Building Communities through Science : Dr Charlie Trautmann	Executive Director, Sciencenter, Ithaca, New York USA	30
09:30-10:00	Opening Address : Deputy Minister, Ms Zanele kaMagwaza-Msibi	Department of Science and Technology	30
10:00-10:20	Questions		20
10:20-10:45	Tea & Poster Session		

10:45-12:00	Topic : Lessons from far and wide (Plenary) Session 1 (Chair : Shadrack Mkansi)		
10:45-11:00	Lessons from a science centre in the Middle East.	Mike Bruton, MTE Studios	15
11:00-11:10	Towards the development of Namibia Science Centre	Generosa Simon	10
11:10-11:25	A preliminary study of public visitors at the science centre exhibition during 3rd National Science, Technology and Innovation week in Kenya.	E. Odoyo, K. Monjero, C. Kariuki and C. Mutie, KARI	15
11:25-11:40	Online Resources from the Cornell Lab of Ornithology	Dr Nancy Trautmann, Director of Education, Cornell Lab of Ornithology, Cornell University	15
11:40-11:55	Science Centres: Educating, Enriching, Empowering or just Existing?	Derek Fish, UniZulu Science Centre	15
11:55-12:15	Panel discussion, with questions from the audience		20
12:15-12:20	Housekeeping	Chris McCartney	5
12:20-13:30	Topic : Strategic Thinking (Plenary) Session 2 (Chair : Michael Peter)		
12:20-12:35	Adapt or Die – staying on track in challenging times	Penny Haworth, SAIAB	15
12:35-12:50	How to build a sustainable relationship between the youth and the industrialo-port activity?	Candice Potgieter The KZN Science Centre	15
12:50-13:05	Aligning Science Centre Plans with National Priorities	David Kramer, Sci-Bono Discovery Centre	15
13:05-13:25	Panel discussion, with questions from the audience		15
13:25-14:30	Lunch		60
Parallel Sessions			
14:30-15:55	Topic : Playing and Competing Session 3 (Chair : Rudi Horak)		
14:30-14:45	Nurturing talent for building our scientific heritage	Shadrack Mkansi, SAASTA	15
14:45-15:00	The law of Win-Win!	Sinah Magolo & Kogie Moodley, JHB City Parks	15
15:00-15:10	Performance analysis of rural-based versus urban-based schools in the science and mathematics- a case study on Min-Quiz national competition results	Zimasa Dubeni, FOSST	10
15:10-15:20	The use of Cooperative Competition to enhance Life Science Education	Armstrong Mashakeni, NZG	10
15:20-15:30	The Science in Chess : the benefits of hosting chess in a science centre	Rosslyn Kekana, Sci-Enza	10
15:30-15:40	Directing Play for Purpose	Silindile Mthembu, UniZulu	10
15:40-15:55	Panel Discussion:		15
14:30-15:55	Topic : Sustainable Development Session 4 (Chair : Tebogo Gule)		
14:30-14:45	Greening the 16th SAASTEC Conference	Chris McCartney, NMBSTC	15
14:45-14:55	Science Centres creating awareness of possible solutions for global problems -	Ntandoyenkosi Masango, Sci-Enza	10
14:55-15:10	How best can science museums and centres integrate themselves into the long-term sustainable development plan of a city?	Allison Ruiters, DNSM	15

15:10-15:20	I can see clearly now that the centre is here	Kagisho Seitshiro, ArceloMittal Science Centre, Sebokeng	10
15:20-15:30	From booze to books. Can such an initiative bring science to life in a lost and forgotten, yet rich and pristine environment?	Siphesihle Bukhosini, Isibusiso Esihle Science Discovery Centre	10
15:30-15:40	Impact of gardening for learners with disabilities: a case study of Mzamomhle Disabled School in Alice, Eastern Cape.	Vuyokazi Nongogo, FOSST	10
15:40-15:55	Questions to the Panel		15
15:55-16:15	Tea & Poster Session		20
16:15-17:30	Workshop - This is the Inspired towards Science, Engineering and Technology (I-SET) project. It is a community engagement flagship project of the College of Science, Engineering and Technology of UNISA. We use the FUN activities of ROBOTICS to create awareness of Science, Engineering and Technology. – Patricia Gouws, UNISA		75
	Developing a science show about light – Alfred Tsipa / Derek Fish, Unizulu		
	Book making / Poster Making – Derek Potgieter		
17:35-18:40	Buses leave to go to VW Pavilion (and then on to a spit braai at the Cuyler Manor)		
18:40-22:00	Spit Braai at Cuyler Manor (buses will return delegates to PE)		

Wednesday 19th November 2014

Time	Activity	Delegate	Mins
08:30-09:00	Registration at Conference Venue (NMBST) Morning Tea		30
Parallel Sessions			
09:00-09:15	Topic : Capacity Building Session 5 (Chair : Busi Maqubela)		
09:15-09:30	Seven years later: Reflection on the investment in the NYS programme for Science Centres -	Rudi Horak, Sci-Enza	15
09:30-09:45	You don't know what you are losing until you build the relevant capacity.	Shadrack Mkansi, SAASTA	15
09:45-10:00	Building a Solid Foundation: Models for Effective Science Communicator Training.	Michael Ellis, Sci-Bono Discovery Centre	15
10:00-10:15	Astro-teacher project.	Tony Dhlamini, HartRao	10
10:15-10:25	The nuclear new build: what it means for us in particular the role that science centres can play.	Gilbert Lekwe, NECSA	10
10:25-10:40	Questions to the Panel		15
09:00-09:15	Topic : Outreach Session 6 (Chair : Allison Ruiters)		
09:15-09:30	Durban Natural Science Museum's Rotating Exhibitions Programme -	Busi Gumede, DNSM	15
09:30-09:45	Taking the Museum to the people.	Sindi Nzama, DNSM	10
09:45-10:00	Outreach as a means of bringing Science to the people	Bulelani Tokwana and Justin Downey Nelson Mandela Bay Science & Technology Centre	10
10:00-10:15	What do you do if you don't have a Science Centre?	Vanessa Rouhani, SAIAB	15
10:15-10:30	Questions to the Panel		15
10:30-11:00	Tea & Poster Session		30

Growing a Sustainable Science Centre (Plenary Session)			
Session 7 (Chair : Derek Fish)			
11:00-11:05	Housekeeping (Chris McCartney)		
11:05-11:50	Growing a Sustainable Science Centre	Dr. Charlie Trautmann Executive Director, Sciencenter, Ithaca, New York USA	45
11:50-12:05	Questions		15
12:05-12:10	Leg stretch		5
12:10- Topic : Research on Science Centre Impact (Plenary) Session 8 (Chair : David Kramer)			
12:10-12:25	Quality assurance, key to success within the NSI system.	Shadrack Mkansi and Luyanda Mahlanza, SAASTA	15
12:25-12:40	International Science Centre Study: Do science centres prepare students for life?	Michael Peter and Tony Lelliott	15
12:40-12:50	Sasol TechnoX (Planting seeds for a better tomorrow).	Mbali Mahlayeye, Sci- Enza	10
12:50-13:05	Investigation into university of the Witwatersrand students, opinions and knowledge of science and technology issues: in particular their beliefs about earth sciences and evolution and palaeontology icons like Mrs Ples.	I.J. McKay, Evolutionary Studies Institute, Wits	15
13:05-13:15	Questions		10
13:15-14:10	Lunch (and Poster Session)		60
Parallel Sessions			
14:10-15:45 Topic : Career Education and Nurturing Talent Session 9 (Chair : Koki Selepe)			
14:10-14:20	How are you "wired"? A survey on how your personality traits can influence your career choice.	Thandiswa Magqeleba, FOSST	10
14:20-14:30	STEM Ambassadors Illuminating the future of Science Centre.	Buzani Khumalo, SAAO	10
14:30-14:40	Siyophumelela – iThemba LAB'S Corporate Social Engagement.	Ambrose Yaga, iThemba LABS	10
14:40-14:50	Mentoring as the key to Education success in South Africa.	Lekgabe Dihlabi and Siphosethu Dudumashe, ArcelorMittal Science Centre, Saldanha	10
14:50-15:00	Exposed to Science at a very young age.	Phinah Manamela, ArcelorMittal Science Centre, Saldanha	10
15:00-15:10	Growing our own timber in Marine Science.	Garth van Heerden, SAIAB	10
15:10-15:20	Career Matters!	Singathwa Poswa & Noluvuyo Yumata, Nelson Mandela Bay Science & Technology Centre	10
15:20-15:35	Questions to the Panel		15
14:10-15:50 Topic : New Ways of Learning with Technology Session 10 (Chair : Michael Ellis)			
14:10-14:20	A Slice of humble Pi...from simply interacting to creating technology.	Akash Dusrath, Sci-Bono Discovery Centre	10
14:20-14:30	Alternative innovative ways to revitalize performance of chemistry experiments using virtual laboratory techniques.	Iviwe Dofi, FOSST	10

14:30-14:40	Effect of HP graphing calculators in promoting active learning environment, learners' achievements and attitudes. A case study of rural-based science schools in Alice.	Viwe Kwinana, FOSST	10
14:40-14:50	Breaking the walls of traditional classrooms: Impact analysis of blackboard and MOODLE as forms of eLearning systems.	Lizo Masikisiki, FOSST	10
14:50-15:00	Disruptive technology innovation, an effective way to advance learning of science, mathematics and technology.	Mncedi Rani, FOSST	10
15:00-15:10	Virtual reality technology instruction: An effective supplement model for enhancing teaching and learning of science in the rural-based Alice schools.	Abongile Pekana, FOSST	10
15:10-15:20	Accelerated Mentoring and Coaching Learner Programme.	Thami Mphokela, ArcelorMittal Science Centre (Sebokeng)	10
15:20-15:35	The TouchTutor™ Maths and Science Schools Competition on Mxit– an innovative application of mobile technology for promoting learning.	Philip Collett and Peter Weisswange, Govan Mbeki Maths Development Unit	15
15:35-15:50	Questions to the Panel		15
15:45-16:15	Tea & Poster Session		30
Parallel Sessions			
16:15-17:30	Topic : Communicating Science Session 11 (Chair : Candice Potgieter)		
16:15-16:30	Using the media to develop your educational programmes.	Mike Bruton, MTE Studios, Bahrain Science Centre	15
16:30-16:45	How Science concepts are lost in translation.	Malekantshe Johannes Segooa, SciEnza	10
16:45-16:55	Maybe it's time for children to teach scientists.	Smeetha Singh, SciEnza	15
16:55-17:10	Waking up communities to the amazing world of science and technology and evolving trends in South Africa that give hope.	Busisiwe Maqubela, ArcelorMittal Science Centre Saldanha	15
17:10-17:25	Questions to the Panel		15
16:15-17:30	Topic : Working with Exhibitions Session 12 (Chair : Mike Bruton)		
16:15-16:30	Exhibition Nightmares... Big Monsters and Small Bugs	Stuart Hopwood, Sci-Bono	15
16:30-16:45	From "Take home message" to "Take home thinking"	Michael Wolf, Formula D interactive	15
16:45-16:55	Impact of science and technology exhibits as teaching aids, for enhancing teaching and learning of physical science.	Luleka Menzi, FOSST	10
16:55-17:10	Exhibits for career advancement.	Martin Potgieter & Annelize Potgieter, Science Education Centre, UL	15
17:10-17:25	Questions to the Panel		15
17:40-18:40	Delegates go by bus to hotels		
19:30-22:30	Conference Dinner @ Bayworld (Delegates walk to venue from hotels)		

Thursday 20th November 2014

Time	Activity	Delegate	Mins
08:00-08:30	Registration at Conference Venue Morning Tea		30
08:30-09:30	SAASTECC AGM (Voting year)	All	50
09:30-10:15	DST to update the community about strategic development, inform the DST strategic direction for SC's, among others.	DST	45
10:15-10:35	HSRC to present the findings from the latest survey of Public Understanding of Science & SKA at the SAASTECC conference	HSRC	20
10:35-10:50	Tea & Poster Session		15
10:50-11:45	Panel discussion on 'The Future of Science Centres in Africa: Reflections from the World Summit' Mike Bruton (Chair)	Beverley Damonse, Michael Peter, Derek Fish, Shadrack Mkansi, Tebogo Gule	55
Parallel Sessions			
11:50-12:35	Topic : Marketing Session 13 (Chair : Julie Cleverdon)		
11:50-12:00	Finding our Nemo: ArcelorMittal Science Centre Brand Identity	Puleng B. Tsie, ArcelorMittal Science Centre, Newcastle	10
12:00-12:10	Re-thinking pedagogy for the digital age: pros and cons of social networks -	Zukile Ndyalivana, FOSST	10
12:10-12:25	Hello, World!	Anja Fourie, Scifest Africa	15
12:25-12:35	Questions to the Panel		10
11:45-13:05	Topic : Promoting Literacy Session 14 (Chair : Penny Haworth)		
11:50-12:05	A page a day – literacy campaign.	Ginny Stone	15
12:05-12:20	The Library never sleeps.	Sally Schramm, SAIAB	15
12:20-12:30	Questions to the Panel		10
12:35-13:10	Topic : Tackling Health Issues Session 15 (Chair : Thami Mphokela)		
12:35-12:50	If you 'Are what you Eat', do you 'Know what you eat'? -	Helga Nordhoff, Sci-Enza	15
12:50-13:00	Eggs for breakfast, or for science? How much you know about the most obvious part of your breakfast - I would suggest goal 5, as this is "best methods" more than "diverse audiences"	Modungwa Reletile Tshepiso Sci-Enza	10
13:00-13:10	Questions to the Panel		10
12:35-13:10	Topic : Promoting Nanotechnology Session 16 (Chair : Annelize Potgieter)		
12:35-12:50	Comprehension of Size and Scale.	M.J. Schwartz, UniZulu	15
12:50-13:00	Where the little things matter most – public awareness on the growing importance of nanotechnology in our daily lives.	Sinazo Mselana, FOSST	10
13:00-13:10	Questions to the Panel		10
13:10-14:10	Lunch		60

Parallel Sessions			
14:10-15:15	Topic : Innovation in Informal Learning Session 17 (Chair : Chris McCartney)		
14:10-14:20	Promoting Dialogue in Science Centres.	Martin Braund and Anthony Lelliott, Wits	10
14:20-14:30	The Secret to making hand puppets an effective medium for Science communication	Annelize Potgieter, JS Brits, MJ Potgieter ULCS	10
14:30-14:40	Celebrating IYCR – Developing a low cost workshop for Science Centres.	Tanja Reinhardt, STEC	10
14:40-14:50	You know what they say about dynamite...	Anja Fourie and Pumza Tshebe, Scifest Africa	10
14:50-15:00	The role of science centres in schools.	Joseph Sibiyi, Mondi Science, Career Guidance & FET Skills Centre	10
15:00-15:15	Questions to the Panel		15
14:10-15:15	Topic : Enhancing Thinking Skills in Informal Learning Session 18 (Chair : Gilbert Lekwe)		
14:10-14:20	Innovating towards STEM-I	Thami Mangena, Sci-Bono Discovery Centre	10
14:20-14:30	Implementation of techniques to improve the quality of thinking and understanding to learners towards curriculum based practicals.	Netshiongolwe Khathutshelo Emmanuel, ArcelorMittal Science Centre	10
14:30-14:40	Entrenching thinking skills-The new Role of Science Centres in the Information Age -	Abel Garwe, Osizweni Education and Development Centre	10
14:40-14:50	Enriching young minds.	Mthobisi Mhoni, ArcelorMittal Science Centre, Newcastle	10
14:50-15:00	Using worksheets during a school field trip to the zoo.	Jenna Dick and Anthony Lelliott, Wits	10
15:00-15:15	Questions to the Panel		15
15:15-15:25	Conference Wrap-up – Michael Peter		
15:25	Tea (Posters Down)		20
Buses Depart for Hotels / Airport People who are not staying for workshop on Friday are free to leave. FREE EVENING			

Friday 21st November 2014

Time	Post Conference Workshop (SAASTA) Nelson Mandela Science & Technology Centre
09:00-14:00	Bloodhound Project

The theme for this conference is “Science Centres - lighting up the way”.

The sub-themes have been aligned to the 7 goals from the SCWS2014.

1. Engage more effectively with local communities and increasingly diverse audiences.
2. Continue taking actions that have a positive global impact and that will make people everywhere more aware of the opportunities that science and technology hold for the sustainable advancement of humankind.
3. Draw the attention of decision makers and the media to the essential role of public engagement with science and technology by setting up high-profile global activities.
4. Position science centres as “trusted” places to introduce the public to new technological solutions and sustainable technologies, and to broaden the potential use of these solutions.
5. Develop the best methods for engaging learners and optimizing their education in both formal and informal settings.
6. Engage the public more directly with research, to help empower people, broaden attitudes and ensure that the work of universities and research institutions is relevant to society.
7. Work together in a creative celebration of the International Science Centre Year 2019.

Charlie Trautmann, PhD

Bio Sketch

Charlie Trautmann is executive director of the Sciencenter, a hands-on science museum in Ithaca, NY, USA, located about 350 km northwest of New York City. Charlie has been at the Sciencenter since 1990 and is responsible for organizational leadership, strategic vision, and fundraising. He is also an adjunct professor of Civil & Environmental Engineering at nearby Cornell University.

Charlie's work has centered on developing the most effective ways to connect youth with science, with the goal of promoting civic science literacy and empowering youth to create a better future for themselves, their community, and the world they will soon inherit. His efforts have involved dozens of exhibitions, programs, and collaborations, along with large-scale projects involving thousands of volunteers.

He serves on the board of the Association of Children's Museums and has served on the board of the international Association of Science-Technology Centers, both based in Washington, DC. He also serves on many local educational, professional, and civic boards.

Charlie has received two Alexander von Humboldt fellowships from Germany, most recently to pursue research in Europe on how museums educate their audiences about climate change and other topics related to sustainability. Under his leadership, the Sciencenter has received the prestigious international Roy L. Shafer Leading Edge Award for Innovative Business Practices three times in the past decade and is the only museum to have received the award more than once.

Charlie presents regularly at museum conferences and has published over 100 articles in the fields of education, non-profit management, and engineering. He holds a BA degree in physics from Amherst College, MS degrees in geology and engineering from Stanford University, and a PhD in engineering from Cornell University. He and his wife Nancy live in Ithaca.

Abstracts

1 **Building Communities through Science**

Charlie Trautmann

Executive Director, Sciencenter, Ithaca, New York USA

Our future leaders will be people with capabilities, often called 21st Century Skills, that include creativity, confidence, critical thinking and other key attributes. Science centres are ideal places for families who want their children to develop these skills early in life, when learning comes easiest. By reframing themselves as catalysts for science-based youth development - rather than as science content providers or teachers of science - science centres can become highly effective at empowering children with the tools for success. The Sciencenter, a science museum in New York, USA, began as a volunteer-based science education program and has involved its community in nearly every aspect of its growth over the past three decades. By focusing on empowering youth with 21st Century Skills using science as an educational platform, the museum has made a deep and lasting impact on most of the youth in its community.

Topic : Lessons from far and wide (Plenary)

Session 1

(Chair : Shadrack Mkansi)

2 **Lessons from a science centre in the Middle East.**

Mike Bruton

MTE Studios, Cape Town

Informal science education through a science centre in Bahrain faces very different challenges to those that we experience in southern Africa. Although funding is readily available in principle it is difficult to pin down in practice. The work ethic of the staff is very different to that in South Africa and the public is very fickle. Some science centre events that are successful in southern Africa do not work at all in Bahrain. Some scientific topics, such as evolution, are tricky to teach in an Islamic country. The steps that have been taken to overcome these obstacles and to make the Bahrain Science Centre a success are described and lessons that we can learn from this experience in southern Africa are outlined.

3 **Towards the development of Namibia Science Centre.**

Generosa Simon

NAMSCIENTER, Namibia

Science Centres are a new concept for Namibia, and the NAMSCIENTER will add a new dimension to the country's education system by being curriculum-based, thereby forming an additional tool for educators and learners. This curriculum-based, interactive science centre will be a significant resource to schools for the delivery of mathematics, science and technology subjects.

The benefits of the NAMSCIENTER will also extend to the broader community. Opportunities that will be created by the centre include collaboration and supporting the industry as well as support the City of Windhoek's position as an environmentally friendly city in Africa. It will also support the country's aim of economic development as well as increase a broader understanding and participation of public in science, engineering and technology.

4 **A preliminary study of public visitors at the science centre exhibition during 3rd National Science, Technology and Innovation week in Kenya.**

E. Odoyo, K. Monjero, C. Kariuki, and C. Mutie,
Kenyan Agricultural Research Institute, Nairobi, Kenya

This paper investigated the status of popularization of Science Centre concept in Kenya by doing a preliminary study of public visitors at the Science Centre exhibition during the 3rd National Science, Technology and Innovation (ST&I) Week, held from 19th -23rd May 2014 Nairobi, Kenya. The objective of the study was to gain insights into visitor's perceptions, ideas and motivations on their encounter with Science Centre concept and exhibits. A semi-structured questionnaire was administered to willing visitors. A total of 56 respondents provided feedback after participating in the demonstrations. After data analyses results showed that majority, 71% of visiting respondents were male with 29% female. 70% of respondents had never heard about a Science Centre and the 30% who knew about Science Centres, stated that they had heard of it from schools. Almost all respondents 98% said they had learnt simple science from the demonstrations. 42% of respondents affirmed that the most attractive exhibition was simple DNA extraction from carrots. Over 60% responded that county and national governments should fund science centres and 100% supported the idea of having a Science Centre in Kenya. Study concluded that despite majority of public visitors not having an idea about Science Centres, the concept and demonstrations are readily appreciated. For more effective dissemination, it is recommended that at least one Science Centre be established in Kenya to enlighten, engage and empower the public through science.

5 **Online Resources from the Cornell Lab of Ornithology.**

Nancy Trautmann

Director of Education, Cornell Lab of Ornithology, Cornell University

Using data submitted by volunteers throughout the world, the eBird citizen science project has assembled over 200 million data points representing observations of practically every bird species. These can be built into exhibits or used in programs to involve your participants in citizen science. Maps and graphs on the eBird website illustrate the distribution and abundance of each bird species. Using these resources, you can find out what birds have been seen lately and discover the best places to go birding in your region. If you contribute your own bird sightings to eBird, you will help to better represent South African birds in this global effort.

This session will demonstrate use of these web resources and promote discussion about how they might be used by science centres. It also will introduce a free downloadable curriculum developed to inspire young people to care about birds and conservation and a website designed to give youth a way to showcase their efforts along these lines.

6 **Science Centres: Educating, Enriching, Empowering or just Existing?**

Derek Fish

UniZulu Science Centre, Richards Bay

In five years' time, in 2019, the world science centre body plans to celebrate the international year of science centres, 50 years after the San Francisco Exploratorium (and the Ontario Science Centre) opened in 1969. This gives us cause to reflect on what science centres are (or should be) and how they have changed in that time. In particular to consider what a South African Science Centre should be to meet the changing needs of our society. This reflection is crucial to avoid "mission creep" where the original passion we had for our Centres becomes lost under the burden of bureaucracy and the tyranny of necessity and daily survival.

Drawing on more than 20 years of experience running a Science Centre, and visits to Centres all over the world, the author will suggest what some of the driving forces in our

Centres should be to take them into the future. The Mechelen Declaration will be discussed as our latest international direction document and practical responses to it presented. Anecdotal references from the (auto)biographies of great scientists like Einstein, Curie, Feynman and others suggest environments which foster creativity and genius. These can guide us in creating experiences for children visiting our Centres which raise them above the tedium of classroom-based education. Finally workplace insights, requirements and expectations from modern industries and companies like Google will help us to continuously redirect our efforts in inspiring our future citizens and empowering our future workforce.

Topic : Strategic Thinking (Plenary)

Session 2

(Chair : Michael Peter)

7 Adapt or Die – staying on track in challenging times.

Penny Haworth

South African Institute of Aquatic Biodiversity, Grahamstown

The SAASTEC 5-year strategic framework 2103-2018 quotes Michael Porter of the Harvard Business School: “Museums (and Science Centres) should be clear about who they are, what makes them different, and why and how they exist as part of a value chain in society.”

National Research Facilities are not Science Centres, nor are they Museums. Although we reach out to similar audiences, our approaches have to differ and, in some ways, be more inventive, as we lack both the infrastructure and the capacity to draw large audiences to our institutes. In 2009 SAIAB lost our Communications and Education Unit and we had to ask ourselves the very questions Porter alludes to:

Who are we?

What makes us different?

How do we exist as part of a value chain?

This included rethinking our approaches to outreach and adapting our strategic direction. Where we had a division of five people, we now have no positions officially dedicated to outreach. Driving science communication (including public engagement and outreach) is shared across two positions that have been absorbed into separate divisions in the Institute. So what are we to do to maintain our profile in the Science Centre landscape? - Adapt or Die.

This presentation provides an overview of SAIAB’s strategic approach to science communication over the past 3-5 years and how we have adapted what we do so that we continue to add value and remain relevant in a changing research and science communication landscape.

8 How to build a sustainable relationship between the youth and the industrial- port activity?

Candice Potgieter

The KZN Science Centre, Durban

The pass rate of those in their final year of school published, paints an extremely bleak picture for the future of our youth in South Africa. In the year 2012 the pass rate for physical science was under 60% and mathematics was under 50%.

This performance has far reaching effects in that these school leavers will not be able to study further, be employable or be a contributing member of society. In terms of the local port industry in and around Durban, there will not be a pipeline of employable youth to continue with the important work undertaken by these industries.

To combat this problem The KZN Science Centre has been tasked by local industry to assist these learners in increasing their pass rate in these gateway subjects, understand the

benefits of science related subjects, and be motivated to study further toward science related careers becoming employable and engaged members of society.

The KZN Science Centre is a registered non-profit and public benefits organization focussed on inculcating the importance of education in learners, educators and the general public using funded learning projects, curriculum based resources and interactive exhibitions. Work conducted by The KZN Science Centre is undertaken through corporate social investment tying into the needs of the community and the funder.

This paper will examine these tools of mediation used to reach out to the public through private economic stakeholders such as SAPREF PTY LTD in providing access to the youth and contributing to the competitiveness of the whole port city region of Durban.

9 **Aligning Science Centre Plans with National Priorities.**

David Kramer

Sci-Bono Discovery Centre, Newtown, Johannesburg

As we approach the deadline for achievement of the Millennium Development Goals, many governments are reviewing their progress. South Africa has a new government. In education and in SET there are some priorities that have been reconfirmed by the new government but also many that are new. Provincial governments have also adopted new priorities. These priorities will impact significantly on the relationships that science centres have with donors, provincial governments, national ministries such as DST and other key influencers of the destiny of science centres.

Science centres would benefit from understanding these priorities and from seeking to align their own goal and outputs to both provincial and national priorities.

The presentation will look to summarise global, national priorities and to discuss what alignment means for individual science centres.

Topic : Playing and Competing

Session 3 (Parallel Session)

(Chair : Rudi Horak)

10 **Nurturing talent for building our scientific heritage.**

Shadrack Mkansi

SAASTA, Johannesburg Observatory

Talent must be identified and nurtured through our interventions at science centres for the sake of our countries' future development. This paper will illustrate the need for searching talent and the resources needed for such talent to develop. The main resource identified by the paper is commonly available at science centres, which is motivation. Different talent searching activities will be discussed but the main activity for this paper is the Astronomy competition because of South Africa's geographic advantage in this regard. We are host to the SKA, which will become the largest astronomy facility in the world. Science centres should be seen playing a role in this area of science. Most competitions identify only the winner and reward only such a person. The Astronomy Quiz, called Astro Quiz, identifies nine groups of talented learners through a group competition and rewards the group of four. The winning group (not a person) receives prizes that are of a high value to encourage them to stay within the science field. The competition starts at school level and all science centres are encouraged to participate since they all have schools near their centres. The next level is a provincial competition and it culminates in the national competition. The astronomy community values this competition and this paper will highlight the significance of having such a competition and the kind of tracking methods used to measure the impact of the competition, then that of a science centre. The paper will conclude by highlighting the current participating centres and the impact of their role in this national competition.

- 11 **The law of Win-Win!**
Sinah Magolo & Kogie Moodley
Johannesburg City Parks

This paper introduces the engagement with communities and diverse audiences in settings where exposure to scientific and environmental concepts has been historically very limited. There-after the paper analyses the role competitions played in having more meaningful interactions with communities. Thus, by making use of competitions as a medium of learning and teaching, individuals or teams in communities are encouraged to take ownership and responsibility and make practical contributions towards better management of local environmental issues which enhance sustainable development. Competitions promote greater participation in science centres education and awareness programs and projects.

There are conflicting views about competitions with one view being that competitors is alleged to be the attention of the competition and they must be beaten whilst the other view professes that competition's focus on some outward thing that leads to teamwork (Verhoeff, 1997). Case examples of competitions that were implemented at Johannesburg City Parks and Zoo will be presented. Finally the paper illustrates that through competitions we found that there was a greater public interest and enthusiasm for the environment and science that has led to enhanced environmental management within communities creating a win-win situation.

- 12 **Performance analysis of rural-based versus urban-based schools in the science and mathematics- a case study on Min-Quiz national competition results.**
Zimasa Dubeni
FOSST

This paper entails a scientific analysis of performance differences between rural based and urban-based schools in mathematics and physical sciences using Min-Quiz National Competition results. Both Qualitative and Quantitative analysis were employed to ascertain the main contributing factors for performance differences amongst the two groups. Min-Quiz National Competition results were compared and surveys were conducted to selected participation schools. It transpired that urban-based schools performed better than rural based schools in both mathematics and physical science. The reasons for the difference in performance can be attributed to teaching and learning resources, redeployment of educators to migration of learners to affluent provinces and syllabus pacing amongst them. It concluded that the performance is not entirely due to learner's intelligence but to a variety of educational systemic challenges like resource availability and usage, quality of teaching etc. It is imperative that for future competition that Mintek has to consult and capacitate participating schools for improved results.

- 13 **The use of Cooperative Competition to enhance Life Science Education -**
Armstrong Mashakeni
National Zoological Gardens, Pretoria

The National Zoological Gardens of South Africa has developed the competition for life science as a way to intrigue learners to a constructive learning and knowledge construction for grade 10 learners. The type of competition is based on hands-on practical activities that require learners to work cooperatively with their peers as they compete against other schools. Competition has been seen as the opposite to co-operation. Competition occurs whenever individuals struggle for a goal which cannot be shared. Co-operation, on the other hand, is marvellously successful at helping children to communicate effectively, to trust in others and to accept those who are different from themselves. This kind of cooperative competition is used as a tool to help learners become more inquisitive, research interdependently, and learn to work with others, whilst aiming for that number one spot. The life science competition has been designed to stretch learners to strive to do

more than is required in a normal class. The aim of this competition is to get learners to gain knowledge of life science concepts through participatory learning approaches, whilst striving for the best at the same time.

14 **The Science in Chess : the benefits of hosting chess in a science centre.**

Rosslyn Kekana

Sci-Enza, University of Pretoria, Pretoria

Chess is a two-player strategy board game played on a chessboard which consists of 64 squares arranged in an eight-by-eight grid. Chess is an exercise of infinite possibilities for the mind, one which develops mental abilities used throughout life. It helps with concentration, critical thinking, abstract reasoning and problem solving. It is believed that people who play chess are often good in mathematics and concentrate better than people who don't play chess. Chess is a never-ending learning process. Sci-Enza is a science centre situated inside the University Of Pretoria and it offers students and non-students an opportunity to play chess. A chess board and pieces are provided to students during working hours in the week. A survey was conducted to see how playing chess at the science centre benefited the students, as well as to find out whether any of them play too much chess and what the negative consequences are. Questionnaires were given to chess players and non-chess players. The aim of hosting chess in the science centre is to build some kind of communication between students from different backgrounds, help them in problem solving and enhance their creative thinking. Though chess is an old game, it is still a relevant way of getting the new generation to think.

15 **Directing Play for Purpose.**

Silindile Mthembu

UniZulu, Richard's Bay, KZN

Many studies have proved the importance of play in early childhood development. Play is the child's work. It allows children to learn to communicate emotions, to think, be creative and solve problems. However we question how confidence affects play. There are different types of play; social play, physical play, constructive play and fantasy play just to name a few. Most of these types of play are found in informal environment like museums, science centres, play fields and zoos where children are free to do what they want. The question of what degree of play is encouraged in rural area should also be raised. This is an important question to be asked taking into account that most children who visit the centre are from deep rural areas. They are shy, and lack confidence. Could this be the result of chronic restriction in freedom, which is a necessary breeding ground for creativity? With this in mind we ask the question, "Can high creativity be obtained by free roaming in the absence of confidence?"

The Unizulu Science Centre will see to answer the question by conducting a study. The focus of the study will be based on how the children interact with a specific exhibit. We propose that the structure that will give children extra skills is necessary. The results will be presented and some interesting conclusions will be shared.

Topic : Sustainable Development

Session 4 (Parallel Session)

(Chair : Tebogo Gule)

16 **Greening the 16th SAASTEC Conference.**

Chris McCartney

Nelson Mandela Bay Science and Technology Centre, Uitenhage

The Nelson Mandela Bay Science & Technology Centre (NMBSTC) strives to be environmentally conscious. A number of initiatives including recycling, the use of water tanks for gardens and planting indigenous trees in schools and community centres are some of the ongoing initiatives.

Conferences, like the SAASTEC conference which will be hosted by the NMBSTC, have a significant carbon footprint. On average the carbon emissions for one passenger on a return flight within South Africa amounts to approximately 350 kg. Added to this are the additional emissions from travel to and from the airport and the conference and function venues, food, printing, water consumption, laundry services, etc. In order to make delegates more environmentally aware, a carbon audit will be undertaken of the impact of the whole conference. In order to reduce this impact, all suppliers will be requested to as far as possible make use of re-usable or recyclable materials and packaging and all waste materials generated will as far as possible be recycled.

This paper will present projected carbon emission figures for the conference. Delegates will then have the option of covering the cost of planting one or more indigenous trees in one of the schools in the Nelson Mandela Metro to partially or wholly offset their carbon footprint. It is hoped that by highlighting this issue, other Centres will implement similar projects in their areas of influence.

17 **Science Centres creating awareness of possible solutions for global problems.**

Ntandoyenkosi Masango
Sci-Enza, University of Pretoria, Pretoria

Society is on a quest to fight hunger, poverty and overpopulation. By 2050 there will be about 9 billion people on the planet, already there is concern about where everyone will live and if there will be enough food, water and energy to sustain the ever-growing population. We investigated the role of science centres in creating awareness and finding viable solutions. By facilitating discussion about the problems facing the planet, we found the public's opinion on solutions and we tested creating awareness about some potential solutions, with mixed reactions.

We created awareness with a controversial, but lesser-known potential solution to the environmental crises facing us: "The story of the fly-and how it could save the world." The solution entails recycling waste nutrients and generating sustainable protein to spare the fish in the ocean and feed the people of the earth. This could make people see that some solutions are right under our noses, or should we rather say - in our own waste. The International Year of Family Farming 2014 highlights the importance of agriculture, although it is overlooked. With family farming, countries and nations can feed families (eradicating hunger and poverty) and improve livelihoods by promoting entrepreneurship. It is each and everyone's responsibility to ensure that our planet is protected, using nature itself, management and science - starting today with what we have. Science centres are a useful interface to communicate these issues to the public and possible platform to generate more ideas that could save the planet.

18 **How best can science museums and centres integrate themselves into the long-term sustainable development plan of a city?**

Allison Ruiters
Durban Natural Science Museum, Durban

Far too often we enter collaborations and partnerships with other organisations and mostly with our communities, thinking that we have all the information; we are the experts and yet, as Jacques Ranciere has said, we rather need to have the approach of "those who know something, engage with those who know something else".

With this in mind, we need to look at our surrounds and harness partnerships from all sectors as a centre of convergence, looking at local authorities, organisations and communities that can utilize our research, programmes and facilities for public engagement, making our institutions relevant to their immediate needs and service delivery.

This co-creation in science museums and centres needs to feed into the long-term sustainable development plan of our communities and cities. In doing this, we can transform our institutions into relevant agents of change; protecting the environment,

driving social equity and promoting economic prosperity, ultimately creating access to lifelong learning so that citizens are personally empowered and confident.

19 **I can see clearly now that the centre is here.**

Kagisho Seitshiro

ArcelorMittal Science Centre, Sebokeng

The Vaal triangle comprises a great extent of land. Can ArcelorMittal Science Centre, situated in the heart of the Vaal “light up the way”/ Bring the light at the end of the tunnel closer and closer to the community? The impact that the science centre has had on Vaal high school learners since its existence has been evident and very crucial in the science, mathematics and technology education awareness.

With the outstanding work the centre has done it now time to broaden this work to the ordinary community member. The aim of the project is to provide research and shift ways of impact that the Science centre has to provide public understanding of science, mathematics and technology to the ordinary community member. The Vaal community is threatened by some of the earlier school leaver where interest now mainly lies in drug abuse and alcohol use. Ways of bringing back interest in science education is essential to cater to the rising unemployment rate. The emphasis has to be given to science education because of the region mainly being an industrial area with plenty of opportunity that can arise from science, mathematics and technology.

The scope of the project entails - providing a possible solution or suggestions that the AMSC has tried to engaging the community member in the public understanding of science, mathematics and technology.

20 **From booze to books. Can such an initiative bring science to life in a lost and forgotten, yet rich and pristine environment?**

Siphesihle Bukhosini

Isibusiso Esihle Science Discovery Centre, Kosi Bay

The paper showcases the development of a concept where a science discovery centre is used as a trusted place to engage even more effectively with local communities and increasingly diverse audiences. The aim of this is to enable the local community to take actions that have a positive global impact and that will make people everywhere more aware of the opportunities that science and technology hold for the sustainable advancement of humankind.

Once a tavern - a place for fun, entertainment, drinking, where the behaviour of both woman and the young were polluted - the building housing the science discovery centre is now a place of learning and discoveries. Isibusiso Esihle Science Discovery Centre was conceptualized in 2008, established in 2012, and launched in February 2013. The Science Discovery Centre is located in northern KwaZulu-Natal, uMhlabuyalingana Local Municipality, KwaNgwanase, Velabusha Village in Maputaland. There are 5 focal areas building up the Science Discovery Centre namely: Critical thinking, Astronomy, Environment, Library and career guidance.

It is under the environmental wing that the Isibusiso Esihle Science Discovery Centre aims to “adopt a wetland” and use it as an educational tool for school and community visits. The wetland will be used to teach the fundamentals of ecology, environmental conservation, and how important the local community is in bringing science alive in their environment. The main objective is to engage the community more directly with research, hence empowering people, broadening attitudes and ensuring that the work of universities and research institutions is relevant to society and to wider social concerns on a global scale.

21 **Impact of gardening for learners with disabilities: a case study of Mzamomhle Disabled School in Alice, Eastern Cape.**

Vuyokazi Nongogo
FOSST

This paper explores the impact of effective ways to develop and advance learning skills of children with disabilities through engagement in gardening and nutritional education activities. In recent years, increasing emphasis has been on the importance of ensuring that children with disabilities have the same opportunities as other children in terms of perceptual motor development and learning skills. Research has shown that there is a strong link between nutrition and disability issues. Some of these main issues include perceptual motor development of children with disabilities, determination of learning preferences and nutritional education. The study was conducted at Mzamomhle School of the disabled located in the rural village of Alice. Various activities were done with the disabled learners and educator to develop .Pre and posts interviews were conducted and analysed. It was found that various gardening activities have good benefits to learners in terms of determining learning preferences, physical activities, motor development and nutritional benefits. The majority of disabled learners were found to prefer the kinaesthetic type of learning .It can be concluded that activities of this nature are not only developing learners' motor skills but have a variety of primary and secondary benefits like nutrition, learning skills etc. It can be recommended that learners with disabilities be engaged intellectually as well as physically to unveil and develop.

Topic : Capacity Building

Session 5 (Parallel Session)

(Chair : Busi Maqubela)

22 **Seven years later: Reflection on the investment in the NYS programme for Science Centres.**

Rudi Horak
Sci-Enza, University of Pretoria, Pretoria

The National Youth Service (NYS) volunteer program hosted by SAASTA endeavours to fulfil two goals. Firstly, the program aims to empower young unemployed graduates by teaching them skills and experience in the working environment. The second objective is to build capacity by finding and training young graduates that can work in the science communication environment, specifically in science centres. DST has invested in this program since 2008, and seven year later, the program is still going strong. Have the objectives been met? In my opinion, the program has been a resounding success. Volunteers at Sci-Enza have all had success in finding jobs, and definitely left the centre better trained as science communicators. Sci-Enza, and other science centres have benefited enormously from the availability of volunteers to help with day-to-day activities. However, in the long term, the second objective of the program fails when it comes to implementation. Though many of the graduates are trained as effective science communicators, they have to leave the science communication world to look for jobs in their field, or often even in an unrelated field. The capacity for new science centre staff that is built through the program is often lost, because new positions in science centres are limited. I propose a model for not only building capacity, but keeping it at the science centres.

23 **You don't know what you are losing until you build the relevant capacity.**

Shadrack Mkansi
SAASTA

The development of science centres in South Africa has been a collaborative effort by a number of players. The science centre community (represented by SAASTEC), the Department of Science and Technology (DST) and the South African Agency for Science and Technology Advancement (SAASTA) identified various skills development needs at South

African science centres. They concluded that these needs could be addressed by a series of capacity development interventions. The DST, through SAASTA, then developed courses geared towards addressing the capacity needs in the sector, and contracted various service providers to implement the courses. These training courses changed science centres in many ways. The changes are visible in the increased capacity of science centre staff as well as improvement of the infrastructure. This paper is aimed at sharing the changes at science centres as a result of these interventions. The role of SAASTEC and the “big science centres” will be outlined and its benefit lifted for others to learn various lessons from it. It will look at the impact of the capacity building programme since its inception in both South Africa and participating neighbouring countries. We will share comments from the science centre community on this programme. The paper will also demonstrate how science centres in this country moved ahead from 2005 because of the support by government. The paper will conclude by showing the need for further capacity building interventions to ensure continuity in the management and running of science centres in South Africa and the neighbouring African region.

24 **Building a Solid Foundation: Models for Effective Science Communicator Training.**

Michael Ellis

Sci-Bono Discovery Centre, Newtown, Johannesburg

Explainers, animators, mediators, facilitators, volunteers, science communicators ...the staff who work on science centre floors go by various titles but their role is essentially the same. They are mediators between science and society and therefore at the forefront of what we do as science centres. Science communicators stimulate our visitors to think independently by encouraging observation, creating surprise, arousing curiosity and helping visitors to place their past experience in perspective. Their tasks are diverse and range from providing guided tours of exhibits to presenting interactive workshops, science shows, laboratory experiments and science drama and possibly even running teacher training sessions. How do we as science centres ensure that these essential members of our staff are trained effectively and that they remain dynamic and enthusiastic? This paper explores various models and modes of training used in science centres and it identifies some practical ways for us to improve our staff training programmes.

25 **Astro-teacher project.**

Tony Dhlamini

HartRao, Pretoria

The HartRAO will be participating in a project in collaboration with UNISA.

The research aims to address problems with teaching science in primary schools using the Earth and Beyond astronomy theme as a basis. In this talk we discuss the community engagement project and research involving schools that will be carried out.

26 **The nuclear new build: what it means for us in particular the role that science centres can play.**

Gilbert Lekwe

Necsa, Pretoria

This presentation will highlight in line with nuclear build, how South Africa will position itself for the nuclear power generation. South Africa should prepare itself by setting training programmes to train its people in the field of Nuclear. These includes: Nuclear Engineers, Nuclear Scientists, Artisans, Radiation Protection and many related fields.

Nuclear education and awareness is critical to the success and acceptance of the current and envisaged nuclear expansion programme. South Africa has been active in the nuclear business for about 50 years and has acquired extensive experience in many aspects of nuclear technology. Thus, this need to be clearly communicated to the South African public. Different role-players, in particular, the nuclear industry and Government have been

engaging communities and other stakeholders through various means, highlighting the benefits of nuclear technology. Government through the Integrated Resource Plan (IRP) for 2010-2030, stated that nuclear energy will provide 9 600 MW of energy by 2030. The possibility of the nuclear expansion programme has revived discussion in media and public forums about nuclear technology. Therefore, the public require more information on nuclear energy and its importance to economic growth.

The presenter will conclude by asking the audience to give their input as to what are their opinion regarding the communications programmes and what can other science centres do.

Topic : Outreach
Session 6 (Parallel Session)
(Chair : Allison Ruiters)

27 **Durban Natural Science Museum's Rotating Exhibitions Programme.**

Busi Gumede
Durban Natural Science Centre, Durban

Past experiences of the Durban Natural Science Museum, has changed the concept of temporary exhibitions, ensuring greater success. This is an idea that was conceived by the significant research work and crucial information that, in most cases, still remained current and relevant, and yet was packed away after the conclusion of the temporary exhibition. Taking into consideration recommendations from our users (both schools and the general public), on the limitations that prevents them from effectively engaging with our temporary exhibitions when they are launched, gave rise to the "Durban Natural Science Museum Rotating Exhibitions Programme".

The programme has been able to take the museum into a greater number of outlying areas; bring together communities of diverse generations and backgrounds to share ideas, information and resources; supported the school curriculum; and has been able to inform our public on some of the behind-the-scenes research undertaken at our institution.

The presentation will touch on some of the challenges faced at the initial stages of the programme, how the programme has developed since then, and future plans to ensure its sustainability."

28 **Taking the Museum to the people.**

Sindi Nzama
Durban Natural Science Centre

Museum education is devoted to developing and strengthening museums' role as public institutions. The purpose of museum education is to enhance the visitors' ability to understand and appreciate museum collections. However the majority of old and young individuals from rural communities know very little about museums and other science centers as they cannot afford to travel to museums. As the Durban Natural Science Museum (DNSM), we have made it our responsibility to take museum specimens and information to the deep rural communities. For the past years, we have reached many different areas of eThekweni Municipality and beyond using small museum vehicles outfitted with collections and other education resources. DNSM recently introduced new curriculum based educational programmes that are targeted at Life Science learners. These educational programmes were developed to engage more effectively with learners, local communities and increasingly diverse audiences. The first eThekweni Municipality's Mobile Museum, called "GO-WILD" is one of these programmes. The idea of mobile museum was motivated by seeing the number of schools and communities reached by the small museum vehicles. It was also motivated by the large number of disadvantaged schools that find it impossible to visit the museum because of financial barriers. We believe that Go-Wild and its accompanying programmes are the best methods for engaging learners and optimizing their education in both formal and informal settings.

29 **Outreach as a means of bringing Science to the people**

Vuyelwa Mlandeli

Nelson Mandela Bay Science & Technology Centre, Uitenhage

One of the main objectives of the Nelson Mandela Bay Science & Technology Centre is to provide access to science and technology to the public. We believe that education is key to solving the socio-economic challenges faced by the communities of Uitenhage and Despatch.

Our programmes revolve around the public understanding of science, demystifying some of the common misconceptions that the public might have about science.

However, the people in poor communities surrounding the centre cannot access it due to financial constraints as many have to take public transportation to access the centre. Hence the centre has an Outreach programme that reaches out to schools and public spaces within those communities to give lessons, science shows and practical activities.

Dealing with people who do not have extensive science background is one amongst the challenges that we face daily. Some of the challenges experienced helped us in finding better ways of implementing our programmes in order to achieve our aims and objectives.

This paper will share some of the methods developed by the outreach team in successfully communicating science to the people to clarify any misconceptions they might have about science.

30 **What do you do if you don't have a Science Centre?**

Vanessa Rouhani

South African Institute of Aquatic Biodiversity, Grahamstown.

... Create a Pop-Up Science Centre!

There are several different reasons for creating a Pop-Up Science Centre at SAIAB.

First of all, SAIAB (the South African Institute for Aquatic Biodiversity) is not a science centre per se; funding is a challenge, as is a lack of dedicated staff to run science advancement activities and space is also an issue for any permanent Science Centre setup.

But the National Science Festival in Grahamstown - Scifest Africa - creates an opportunity for a unique Pop-Up, or temporary Science Centre at SAIAB. This Pop-Up Science Centre, in the form of Water World, is a venue for aquatic-related activities at Scifest.

Growing a Sustainable Science Centre

Session 7 (Plenary Session)

(Chair : Derek Fish)

31

Growing a Sustainable Science Centre

Charlie Trautmann

Executive Director, Sciencenter, Ithaca, New York USA

We all want our science centres to be “sustainable.” But what does that really mean? And more importantly, how can we achieve it? In search of an answer to these questions, the Alexander von Humboldt Foundation of Bonn, Germany sponsored a project involving research at 50 European museums and science centres. Visits, interviews, and follow-ups led to the formation of a framework for museum sustainability that consists of the three elements of the “triple bottom line” (environment, society, and economy) viewed from both inside and outside the museum, leading to six targets for sustainability activities. Museums that address all six areas are most likely to succeed in the long-term. The presentation will explore both the research process and how the results can be applied to the management of organizations.

32 **Quality assurance, key to success within the NSI system.**

Shadrack Mkansi and Luyanda Mahlanza

SAASTA

Measuring the worth of the work done by science centres is necessary for the recognition of the network of science centres in South Africa. This goes beyond government and private sector recognition since our international benchmarking and recognition is necessary for our global growth. Science centres in South Africa are recognised and supported by government but they are also significant players in the region and beyond. This paper will use lessons from the global peer review results and processes to outline the necessity of peers in the science centre development, using proper evaluation criteria. Various sectorial peer evaluation scenarios and results based on such processes will be the basis for lessons we need to learn from our national evaluation process. Accessing funding through proposals within the science awareness environment becomes a challenge in the absence of quality assured information and process that can assist the funder in understanding the impact of your work. This may as well assist in understanding the intended value of their investment. It remains significant to prove that what science centres are doing is worth the investment one is asking for. This paper must assist in answering questions such as: Are we making any impact? Is what we are doing worth any funding? Are we funded enough? What is our value worth? Can we measure what we are doing? Does our work have any impact? In which areas of our government niche areas are we making an impact? Should we continue to do what we are doing? The paper will conclude by outlining the impact of project and institutional evaluation in conceptualising, building and development of science centres.

33 **International Science Centre Study: Do science centres prepare students for life?**

Michael Peter* and Tony Lelliott[†]

*Sci-Bono Discovery Centre, Johannesburg

[†]Marang Centre for Mathematics and Science Education, Wits University

It is becoming increasingly common that prospective employers are asking about 'soft skills' that they require: creativity, motivation, interest and passion for example are regarded as indicators of potential. It is acknowledged that good examination results do not necessarily reflect the enthusiasm of students for science studies or science careers. Often students who show interest, creativity and motivation for science appear to have acquired these skills via programmes outside of schools.

This presentation will present findings on the South African leg of an international science centre study focussing on selected participants' perceptions of the role of science centres in developing students with the requisite soft skills. The data was collected using a focus group methodology (which will be replicated elsewhere in the world) whereby nine participants were asked their reactions to a series of statements about science centres. The presentation will also look broadly at other issues such as the role of science centres as opposed to schools, the relationship between science centres and industry and the long term impact of science centres.

34 **Sasol TechnoX (Planting seeds for a better tomorrow).**

Mbali Mahlayeye

Sci-Enza, University of Pretoria, Pretoria

Sasol TechnoX is a programme that brings technology and science awareness to learners from all backgrounds. It aims to encourage learners to be enthusiastic and passionate about science and technology. Science can be a career for many, but it is a necessity for everyone. Everybody has encounters with science in everyday life, so it should be appreciated. Bringing awareness through expos does not only incite the curiosity of learners, but it also

brings light and understanding so they can see that science is actually all around us in different forms. We wanted to find out how the expo changed the learner's view of science, and whether it helped them to make more informed career choices. A survey was conducted among some of the learners. Since many of them were from a disadvantaged background, they had not had the opportunity to visit a science centre and this was their chance to be exposed to the world of science. We trust that the seeds we plant now through these exhibitions will later produce good fruits in this world of science and technology, since this expo showed learners careers they never knew about, and how to make better career choices.

35 **Investigation into University of the Witwatersrand students, opinions and knowledge of science and technology issues: in particular their beliefs about earth sciences and evolution and palaeontology icons like Mrs Ples.**

I.J. McKay

Evolutionary Studies Institute, Wits

As human population exceeds 7 billion, technology becomes more sophisticated and invasive, and global issues like climate change and biodiversity loss loom, it is becoming more and more important that citizens become scientific literate and especially earth sciences literate so that they can contribute to discussions about the best policies to ameliorate these crucial global issues. This study used the University of the Witwatersrand National Science Week 2013 activities as an excuse to survey, via the online programme Survey Monkey, students of the University of the Witwatersrand scientific literacy, whether they optimistic about science and technology as tools for solving future problems, and their beliefs about evolution and knowledge of palaeontology icons like Mrs Ples. While the results are still being analysed preliminary findings are most interesting. 641 Responses were received, fairly evenly distributed across all faculties, and from various proportions of first, second, third, fourth years and postgraduates. Wits students performed similarly or even better than their counterparts in similar surveys in the USA and were for the most part optimistic about the role that science and technology have played in human progress in the past and will play in the future. While many of them struggled to identify the most common gas in the atmosphere, or identify the fossil fuel extracted in fracking at least 70 and 90% agreed that humans evolved from earlier species of animals, and approximately, 60% felt that understanding human evolution is an important scientific? However, 40% to 60% felt that creationism should be taught alongside evolution in schools. The majority had heard of Mrs Ples, and between 20 and 30% correctly identified *A. sediba*. These results are discussed in the context of a recent Public Understanding of Science survey South Africa as well as similar international studies. The results show that, in general the public are not at all science literate demonstrating the crucial role which science centres need to play in South Africa and abroad.

Topic : Career Education and Nurturing Talent

Session 9 (Parallel Session)

(Chair : Koki Selepe)

36 **How are you “wired”? A survey on how your personality traits can influence your career choice.**

Thandiswa Magqeleba

FOSST

This paper is about capacitating science centre communities to recognise their personality traits so as to make informed decisions about their career choices. It is hence imperative that one should understand ones personality traits in order to choose a career that best suits him/her. This study is based on John Holland model and other related theoretical approaches. Participants at Grade 9 from nine? schools were given aptitude tests based on the above theories. A similar study was conducted on another group consisting of participants who already had made their career choices.

Over 80% of Grade 9 learners agreed that this model was effective in influencing their

decision to choose careers. Most of the participants that had already chosen their careers confessed that should they had been exposed to the Model at their early stages of life, they would have made alternative choices. It is concluded that performance in your studies at work is mostly influenced by your personality traits and how it is related to your career choice. It is recommended that this model be used by science centre communities, education sectors and work industries for better performance and productivity.

37 **STEM Ambassadors Illuminating the future of Science Centre.**

Buzani Khumalo

South Africa Astronomical Observatory, Cape Town

It is important to not only educate children, but to also inspire them. Inspiring them to want to do better or to become world-renowned in their field, or to inspire them to think differently. One method that has been shown to help is inspiration by example. Scientists, technologists, engineers and mathematicians through STEM Ambassadors help out in a variety of events and activities. Find out what the presenter do through STEM ambassadors to help inspire students.

“You can see exhibitions about STEM, you can be told about it, you can look at pictures, watch videos and read books, but until you’ve had a go yourself you haven’t experienced the thrill of it! At first I was interested. Now I’m addicted.”

38 **Siyophumelela – iThemba LAB’S Corporate Social Engagement.**

Ambrose Yaga

iThemba LABS, Faure, Western Cape

iThemba LABS is one of the National Research facilities with a mandate from the NRF to generate many Ph.D.’S in the next few years . While the emphasis needs to be undergraduates as some of the areas of focus for recruitment purposes into the research sciences, we need to be well aware of other contributions we could potentially make for the benefit of the general public. We need to take a closer look at possible projects that would be for the development and upliftment of the local communities.

Siyophumelela (Nguni word meaning “*We shall succeed*”) is a primary school project aimed at assisting local schools with the learning and teaching of mathematics and science subjects . This we believe could be our small contribution in beefing up the “leaky education pipeline” that sees us losing the bulk of our learners by the time we are at the very top end. It also looks at attempting to address the issue of total development of the learners by incorporating life skills enhancing activities into the project. The presentation concludes by examining some challenges encountered and how tackling these can improve the project going forward.

39 **Mentoring as the key to Education success in South Africa.**

Lekgabe Dihlabi and Siphosethu Dudumashe

ArcelorMittal Science Centre, Saldanha, Western Cape

Mentoring is a powerful personal development and empowering tool. It is a way of helping other people to realize their full potential. When a child at the age of 10 says, ‘I left school because it is boring to do mathematics and science’ then scientists of today should be concerned and do something about that.

Hence the theme of this year’s conference: Science Centre’s lighting up the way is vital because the problems faced by schools and the education system at large ranges from the lack of time and resources in the normal schooling hours; absenteeism of positive role models for science, mathematics and technology due to the lack of science and technology applications. Our schools simply fail to bring science to life. ArcelorMittal Science Centre in Saldanha has embraced this need in the entire West Coast and has come to the aid of the schools, by mentoring learners to spark their curiosity about science and taking teachers under its wing to support and give confidence to make their classrooms come alive.

Through programs like science clubs, theme directed holiday programs, after school tutoring, active involvement with Eskom Expo for Young Scientists and science shows, learners and teachers have seen another side of science they never knew existed. More importantly, having the NYS volunteers spearheading most of these programmes has meant that a comfortable trusting line is easily established with both learners and teachers and the future of the West Coast and South Africa is definitely getting brighter.

40 **Exposed to Science at a very young age.**

Phinah Manamela

ArcelorMittal Science Centre, Saldanha, Western Cape

The early childhood period is considered to be the most important development stage in the lifespan of a child. The Science Centre plays a vital role in bringing the world of science to life and stimulating an interest in STEMI for the young ones through our ECD programme as we believe it is important to start growing an interest in Science at young age.

Our ECD enhancement programme through technology exposure, story-telling and hands on experimentation at the centre reaches these learners at the most vital stage of their lives thus forming a perfect foundation in building them into confident, great thinkers of the future.

41 **Growing our own timber in Marine Science.**

Garth van Heerden

South African Institute of Aquatic Biodiversity, Grahamstown

ACEP *Phuhlisa* is a strategic DST initiative to encourage black South African postgraduates to study marine science at HBUs. The programme has been designed to assist HBU researchers and students to overcome the barriers that limit their participation in marine science. *Phuhlisa* is run in partnership with the University of Fort Hare and Walter Sisulu University and offers financial as well as logistical support, academic and professional development including various scientific and life skills courses. Students go into the following fields - marine microbiology, marine geology, marine biology and Coastal GIS.

The programme ties into the NRF HCD pipeline and is fed by events like the annual SAIAB summer school, Scifest Africa as well as National Science Week where both interns and *Phuhlisa* students are required to participate and assist with exhibitions and demonstrations. Possible exits are through the various internship programmes available to post graduates through DST, DEA, SANBI and others.

Phuhlisa was established in 2012 and three years on we have learnt that early awareness of the marine environment, the place and importance of marine science and possible careers in marine science are essential for people choosing marine science as a career. Towards achieving this, *Phuhlisa* uses social media platforms to interact with and excite learners about marine careers. This model could be extended through Science Centres nationally to reach learners, educators and the public.

42 **Career Matters!**

Singathwa Poswa & Noluvuyo Yumata

Nelson Mandela Bay Science & Technology Centre, Uitenhage

Is the university route the only pathway to success? It is known that although University provides a strong academic base, not a lot of people get accepted due to factors such as; limited space, intellectual capability, financial limitations etc. However there are alternative routes such as vocational studies and it is widely accepted that artisan shortage is a chronic problem in our country.

The 2012 president's state of the nation address introduces SIP's (Strategic infrastructure projects) as means of addressing the unemployment rate and poverty in our country and also to give our economy a kick. The SIP's include the building of schools, roads, harbors as well as other social and economic infrastructure. They require a significant number of

qualified and competent artisans which our country is lacking. The government departments and other relevant stakeholders still continue to invest in the development of these artisans to help support our local economy.

With all the support and focus that has been put on developing our artisans this section of a career is still overlooked or looked down on. A huge number of people go into trades as their last resort due to how our society views artisanship. The idea that artisanship is only for those who are not smart enough is deeply ingrained in our society and it has detrimental effects on the ability of the country to develop the skills required by the labour market.

This paper will look into how the Nelson Mandela Bay Science & Technology Centre plays a role in communicating and exposing the Uitenhage/ Despatch schools to alternative routes to success i.e. vocational studies opportunities so that it can be seen as a career of choice.

Topic : New Ways of Learning with Technology

Session 10 (Parallel Session)

(Chair : Michael Ellis)

43 A Slice of humble Pi...from simply interacting to creating technology -

Akash Dusrath

Sci-Bono Discovery Centre, Newtown, Johannesburg

Science centres are known to be platforms for science engagement and interaction. This often sends young minds on a creative roller coaster to what the limits of science and technology could be. With the development of Technology being so rapid, one needs to be constantly exposed to keep abreast with the latest innovations. We often restrict our minds to using a particular gadget for the purpose it is built for rather than exploring its capabilities that could stretch far beyond its intended use. In most instances, that which inhibits us is the lingering fear of breaking something that most likely is very costly. In this paper we will attempt to explore how we can position science centres as “trusted” platforms to introduce the public and learners to new sustainable technological solutions and ignite their creativity to broaden the potential use of these solutions in both the formal and informal setting. With the ongoing success of the Electronics club at the Sci-Bono Discovery Centre in developing technical skills and the prospective introduction of the Raspberry Pi as a sister club to develop programming skills, this could make for an innovative advancement for “Science centres- lighting up the way”.

44 Alternative innovative ways to revitalize performance of chemistry experiments using virtual laboratory techniques.

Iviwe Dofi

University of Fort Hare, FOSST Discovery Centre

This study examines the effect of virtual laboratory software on learners’ achievements. In earlier times, experiments were used to prove theoretical knowledge but lately they have turned into environments where students freely discover knowledge as an individual or in groups. Research has shown that virtual laboratory software enables a friendly environment for the performance of chemistry experiments. Studies were carried out on Grade 12 high school learners attending Saturday classes for Maths and Science at the University of Fort Hare. The learners were exposed to both real and virtual laboratory chemistry experiments for a period of 3 months. Pre- and post-assessments on their performance both in theoretical and experimental procedures were conducted. Also, semi-structured questionnaires and unstructured observations were employed. The results showed that virtual chemistry laboratory software was just as effective as real chemistry laboratory equipment and it positively affected the facilitating of learning environment. Also, results showed that the interaction between the educator and the learner improved - independent from time and place. Virtual laboratories emerged as an alternative to perform chemistry experiments, especially in rural-based schools where there is a lack of chemistry equipment. It can be concluded that virtual laboratory software can serve as a supportive alternative

educational tool and is an essential instructional material in terms of both the economy of the nation and the persistency of learning.

45 **Effect of HP graphing calculators in promoting active learning environment, learners achievements and attitudes. - A case study of rural-based science schools in Alice.**

Viwe Kwinana

University of Fort Hare, FOSST Discovery Centre

This paper explores the impact of use of HP graphing calculators as a supplementary tool to enhance teaching and learning of physical sciences. It also aims to promote an active learning environment in order to improve achievement and attitudes among learners. This stems from the fact that active learning can positively impact learning of practical subjects like physical sciences and improve learners' attitudes.

The survey was done in 3 local science schools and learners in the experimental group were loaned HP 50g graphing calculators for use during class and tests while others used ordinary scientific calculators. Both groups were taught and assessed in physical sciences learning activities. No educators had used HP 50g graphing calculators prior to the study. The data from both groups were collected and analysed. Also, post attitudes surveys were conducted. It was found that over 20% of learners in the experimental group completed activities successfully in comparison to their counterparts. It was also found that the use of the graphing calculators encourages active learning and can help learners make connections between numeric, symbolic and graphic representations. It was evident that graphing calculators can improve problem solving skills of learners. Post attitude surveys revealed that learners' attitude in the experimental group was more positive and the activity encouraged positive learning.

This research has shown that learners' achievement can be positively affected by the use of graphing calculators as a primary tool. It is recommended that educators' perceptions regarding graphing calculators be accessed for integration of this teaching tool in high schools.

46 **Breaking the walls of traditional classrooms: Impact analysis of blackboard and MOODLE as forms of eLearning systems.**

Lizo Masikisiki

University of Fort Hare, FOSST Discovery Centre

This paper presents an impact analysis of blackboard and MOODLE eLearning systems as means of technology integration in the teaching and learning environment. This is due to the fact that institutions of higher learning have to take the lead in "breaking traditional walls" of classrooms by adopting teaching and learning systems that cater for the 21st century generation. Hence, successful implementation of any of these systems can be applied to another environment such as high schools. Computer science and chemistry departments in the University of Fort Hare were surveyed on the use of these systems. Both lecturers and students from these departments were given - evaluation forms to complete. Some lecturers and students were interviewed on how they found these systems. Data was collected from both evaluation forms and interviews and it was then analysed. 60% of the respondents preferred blackboard over MOODLE. They cited the following amongst others: user friendliness, automated report (student performance) generation and individual performance evaluation. Some of the challenges that are faced by the users of these systems were that both systems become offline on several occasions making it impossible to solely rely on them. Some students struggle to use these systems due to computer illiteracy. Some lecturers reported that, students residing off-campus and those residing in residences that do have internet access are at the risk of not being able to timeously access information posted the systems. It can be concluded that eLearning systems are a way to go and can ease learning even in other environments such as high schools.

47 **Disruptive technology innovation, an effective way to advance learning of science, mathematics and technology.**

Mncedi Rani

University of Fort Hare, FOSST Discovery Centre

This paper presents disruptive technology innovations that have added value in the improvement of learning science, mathematics and technology. The main purpose is to analyse paradigm shifts that influences learning and teaching in the 21st century. Disruptive technology innovations in the past, present and the future were analysed and compared with specific emphases on educational advancements. A qualitative approach was used to obtain data through structured questions conducted with relevant stakeholders and participants in the Eastern Cape region (education and information technology sector). It has transpired that disruptive technology innovation invokes competition alertness of changes in technology and sustainability. The, education sector found disruptive innovations to be beneficial in the enhancement of teaching and learning practices.

It is recommended that the community at large should be capacitated to survive and sustain disruptive technology and ultimately learn to develop disruptive technological innovations themselves.

48 **Virtual reality technology instruction: An effective supplementary model for enhancing teaching and learning of science in the rural-based Alice schools.**

Abongile Pekana

University of Fort Hare, FOSST Discovery Centre

This paper presents studies conducted in the rural-based Alice schools with the aim of augmenting teaching and learning of science using virtual reality technology instruction. The initiative was triggered by the fact that the majority of these schools have inadequate or no laboratory equipment. Participants' performances on the understanding of scientific concepts were analysed before and after use of virtual reality technology instruction; such as, computer interface experiments, interactive virtual laboratory activities, and Eureka educational software. They were also given feedback forms to complete based on the activities.

The research finding strongly supports the use of virtual technology instruction as a catalyst for learners' achievement. It has also been found as catalyst for improving performance and to stimulate a more conducive teaching and learning environment. It can be concluded that the model is effective to help learners to comprehend scientific concepts. Also, it is a cost effective alternative to lack and/or absence of science laboratories. This model is recommended to be adopted by schools that lack or have no laboratory equipment as a supplement teaching technology tool.

49 **Accelerated Mentoring and Coaching Learner Programme.**

Thami Mphokela

ArcelorMittal Science Centre, Sebokeng.

Accelerated Mentoring and Coaching Learner Programme (AMCLP) is an e-learning, high education standards programme initiated to address challenges and problems in Education. It aims at developing independent, self-reliant, problem solving individuals that may be turned into scientists and engineers of tomorrow.

Learners solve subject problems (Physical Sciences and Mathematics) and communicate with their mentor through e-mails. Mentors provide high order questions, marks learner's answers and provide feedback online. This is not limited to office hours, and therefore learners can send their answers at any time of the day (24/7). This becomes more efficient when each learner is provided with a tablet or smart phone.

50 **The TouchTutor™ Maths and Science Schools Competition on Mxit– an innovative application of mobile technology for promoting learning.**

Philip Collett and Peter Weisswange

Govan Mbeki Maths Development Unit, Port Elizabeth

The Govan Mbeki Mathematics Development Unit and FRF Chair at NMMU has developed an assessment system which uses mobile technology and the Mxit messaging system to administer Mathematics and Science tests at the FET level. One application of the system is the TouchTutor™ Maths and Science Competition which currently caters for participation of any grade 9 and 11 Mathematics or Science learner who has access to Mxit on a mobile device such as a phone or a tablet. Three rounds are run annually with merit selection for rounds two and three. The competition is in its second year and interesting patterns of participation and cooperation are emerging. The primary purpose of the competition is the popularisation of Mathematics and Science in a non-threatening environment. An important secondary purpose of the competition is to register learners for on-going scaffolding support via formative assessment through multiple choice tests and feedback. Tests are carefully aligned with the CAPS curricula and provide comprehensive coverage of all topics from grade 10 to 12 in both subjects. The database of questions is being extended systematically to provide a greater variety of questions and a range of cognitive as well as technical difficulty level. The Competition and Curriculum Support applications provide a cost effective means of scaffolding support for learning in any context but particularly where traditional forms of support are absent. There is potential for extending the current Mxit support model to a range of exciting applications to promote Maths and Science amongst school learners. This includes the installation of self- tutoring and testing using consoles installed in public spaces such as Science Centres.

Topic : Communicating Science

Session 11 (Parallel Session)

(Chair : Candice Potgieter)

51 **Using the media to develop your educational programmes.**

Mike Bruton

MTE Studios, Bahrain Science Centre

Examples are given, based on the author's experience in South Africa and Bahrain, of how to use the media to help develop the in-reach and outreach educational programmes of your science centre. Hints are shared on how to arrange to have articles published in the media, the definition of the target audience, the optimal length and structure of articles, the ideal topics and take-home messages, and the likely outcomes and benefits.

52 **How Science concepts are lost in translation.**

Malekantshe Johannes Segooa

SciEnza, University of Pretoria, Pretoria

Publishing an article in a scientific journal is an achievement every scientist aims for, but often communication ends there. The work might contribute to a breakthrough for one of the world's most challenging problems, but without communication a layman can understand, its value could go unnoticed by entrepreneurs and the people it will benefit. People from disadvantaged backgrounds also need access to science – not necessarily because it is a solution to a problem – but because misconceptions cause many misunderstandings. Among these people, science is often seen as a “monster” and it is often confused with witchcraft. For example, if someone dies from, or is born with a genetic disorder the granny from next door could get the blame for placing a curse on them. Science doesn't reach the communities in need, but with more scientific knowledge, many misrepresentations could be curbed and relationships could be restored. Using questionnaires and interviews, we set out to find out how the average citizen in South Africa gets hold of science news: which tool they use to access scientific knowledge, and

how they perceive it. This survey was conducted on a small scale with school-going children (grade 4-12), as well as adults above the age of eighteen in the Pretoria-region. The findings shed light on the various areas where there was a lack in basic scientific understanding, and based on these findings, we make recommendations as to how better communication could bridge the science communication gap.

53 **Maybe it's time for children to teach scientists.**

Smeetha Singh

SciEnza, University of Pretoria, Pretoria

Is it not true, that the true mark of intelligence is the ability to explain complex concepts in the least complex way? Young scientists communicate within a research facility and it is understandable that they forget how to speak in simple terms. As a scientist currently working at a science centre, I was faced with my complex terminology when trying to explain scientific concepts to one of our most regular visitors- a seven year old. The moment when a child's eyes light up as they understand your explanation is truly rewarding. More importantly than a child learning from you, you learn...how to communicate! Currently, extensive research is being conducted at academic institutes, but non-scientists often do not understand the research. Perhaps scientists lack the ability to explain their research to non-scientists. Whatever the reason, academics can benefit from the skill of communication especially now, when science is growing rapidly in South Africa.

An opportunity for scientists to explain their research to a child in three minutes was proposed and the children's understanding of the research was measured using questionnaires. Scientists should be taught how to communicate in simpler terms, and with an opportunity to impress the selected child again, the results should look very different. Benefits of this study were that children were inspired, educated and met a real-life scientist. More importantly, the scientists gained a better appreciation of what it takes to share their work with the world. Without simple words...what a boring world it would be!

54 **Waking up communities to the amazing world of science and technology and evolving trends in South Africa that gives hope.**

Busisiwe Maqubela

ArcelorMittal Science Centre Saldanha

During this year's National Science Week, ArcelorMittal Science Centre Saldanha saw an opportunity to focus on the general public differently. Implementation plans that will be shared take science to the people in a none-intimidating manner; these include partners and stakeholders joining forces in community halls and other public places where people are willing to partake in the activities and be empowered about the future prospects.

We have found that controlled intimate surroundings do enhance and create a 'relaxed' education environment that works well to bring critical information sharing to the general public. People are interested in programmes but have no knowledge of how to acquire it and are information starved as well for their children's successes.

Families are brought closer to engaging with various department forums seen as 'taboo' and issues that affect the communities are addressed but then South African research and relevant science activities are included to enhance these talks by the science centre. Crucial issues like healthy living lifestyles, crime scenes, lending support to your children's education by constantly seeking information and understanding the world of science better so that they can play a better role in their children's lives are engaged in.

These engagements have been an eye opener for us as we realised we still had miles to travel in terms of community enrichment and this operation serves as a dynamic marketing vehicle as well for science inclusion. Personal growth has amazingly been another positive spin off for some community members.

55 **Exhibition Nightmares... Big Monsters and Small Bugs**

Stuart Hopwood

Sci-Bono Discovery Centre, Newtown, Johannesburg

Only having a 144 Square meter platform to show case careers in mining, sponsored by the SAIMM was rather challenging when it comes to housing a four Tone Super tyre making it safe, fun and interactive. Mining by its nature has rather large items and happens on a huge scale. So how did we try maintaining the wow factor of these big items?

Trains are pretty big things but how does one move a model train set built over 5 years with extreme care to detail, the dismantling, moving relocating on an upper level and then the re-commissioning and making child proof.

56 **From “Take home message” to “Take home thinking”.**

Michael Wolf

Formula D interactive, Cape Town

Traditional Science centre exhibits are construed around clear “Take home messages”, which are measureable learning outcomes visitors may be taking away from their activity during their visit.

But is this approach still suitable in the context of 21st century learning, which aims at preparing learners for a rapidly changing world of often conflicting messages through teaching how to learn instead of delivering finite learning outcomes? Is there a need to revise the interpretive strategies of science centres towards a concept of “Take home thinking”, which would aim at getting visitors to think about certain dilemmas instead of predominantly supplying facts?

By examining best (and worst) practise examples of science centre exhibits, Michael Wolf of Formula D interactive will open up a discussion around these questions and present concepts and ideas of possible alternatives to the traditional “take home message” using a wide repertoire of media from text to touch screens.

57 **Impact of science and technology exhibits as teaching aids, for enhancing teaching and learning of physical science.**

Luleka Menzi

University of Fort Hare, FOSST Discovery Centre

This paper focuses on exploring how science exhibits can enhance learners’ understanding of physical sciences scientific concepts concerned in their school syllabus. This is imperative because for teaching to be effective in promoting learning, it must involve interaction between teachers and learners. The majority of schools based in rural areas have inadequate or no equipment for performing - scientific experiments. Research has shown that learning is enhanced by hands-on interaction; hence science exhibits and experiments are classified as promoters of kinaesthetic learning.

This paper focuses on exploring how science exhibits can enhance learners’ understanding of physical sciences scientific concepts covered in their school syllabus. Grade 10-12 science learners from five different schools in the Fort Beaufort district were subjected to an oral test using Ink Survey class response system, before and after exposure to science exhibits, after which results were captured and analysed. The performance in all classes improved more than 20% after exposure. Most of them showed high interaction levels and interest. Being exposed to science exhibits have proved to increase participation levels, understanding, interest and performance of students. It is recommended that instructors expose their learners to interactive exhibits and experiments to improve academic performance.

- 58 **Exhibits for career advancement.**
Martin Potgieter and Annelize Potgieter
Science Education Centre, University of Limpopo, Polokwane

Exhibits present a unique opportunity to assist learners in career choices. However, the type of information delivered and manner of knowledge transfer is important. The Science Education Centre of the University of Limpopo conducted a pilot survey using 80 Grade 10 learners interested in potential careers in Geography and Geology, to investigate the impact of various geography/geology-related exhibits, as well as different presentation methods in advancing career choices. The results were statistically analysed, and are presented at this conference.

Topic : Marketing
Session 13 (Parallel Session)
(Chair : Julie Cleverdon)

- 59 **Finding our Nemo: ArcelorMittal Science Centre Brand Identity.**
Puleng B. Tsie
ArcelorMittal Science Centre, Newcastle, KZN

ArcelorMittal is one of the largest steel companies in the world with an unmistakably brand position and visual identity. The ArcelorMittal brand is associated with quality steel, of course, and employment opportunities both local and international. This brand association is one of misperceptions that have trickled through to the dynamic identity of the new interactive ArcelorMittal Science Centre (Newcastle). Science Centre branding plays a critical role in an organization's identity, providing value and maintaining relevance.

This paper will look at the science centre's brand and contribute to the understanding of where the science centre fits in the ArcelorMittal umbrella brand. It will explore the implications of the science centre brand misconceptions. Furthermore, it will particularly investigate using public value and audience insight to build the centre's brand.

- 60 **Re-thinking pedagogy for the digital age: pros and cons of social networks.**
Zukile Ndyalivana
FOSST

This - paper examines the pros and cons of the social networks integrated into the teaching and learning environment. The exploratory study is to show the potential opportunities and pitfalls that social networks could bring to the teaching and learning practice. Surveys were conducted in small classroom settings of rural based science schools in the Alice area in the Eastern Cape. Learners were exposed to both e-learning (with specific emphasis to social networks) and traditional teaching methods. Feedback forms were given to all learners to complete and they were analysed. It was found that, while social networks have a potential to advance teaching and learning using digital technologies gives a few pitfalls like barriers to use of cell phones at school and attitudes of educators towards social networks (e.g. that social networks tend to waste too much valuable time on educational engagement etc.), hindered progress on learning tools. It is concluded that social networks can be effective in the transformation of education practice if they can be used for educational purposes most of the time. Also, it transpired that both educators and learners explore more opportunities on the use of social for educational enhancement.

- 61 **Hello, World!**
Anja Fourie
Scifest Africa, Grahamstown

Scifest Africa, South Africa's National Science Festival, is the largest science festival on the African continent. The 2014 festival was opened by the Minister of Science & Technology, welcomed contributors from 12 countries, and attracted media coverage to the value of

R4,8 million over a period of three months.

This presentation will share tried and tested tips on how science centres/events can increase the profile of an event by attracting decision makers to their event; encourage international participation in their event; broadcasting their event to the world; and securing media coverage of their event in the most cost-effective way.

Topic : Promoting Literacy

Session 14 (Parallel Session)

(Chair : Penny Haworth)

62 A page a day – literacy campaign.

Ginny Stone

Pretoria, South Africa

The Kha ri Gude mass literacy Campaign launched by (then) Minister of Education, Naledi Pandor, was intended to enable 4,7 million adults to become literate between the April 2008 and the end of 2012. This project was mainly aimed at adults who had been denied the opportunity of an education in the past. It appears to have been hugely successful.

These days, most of our children are receiving an education and yet still cannot read properly. In his opening speech at the 15th SAASTEC Conference in 2013 (ex) Minister Derek Hanekom tasked science centres to rise to the challenge of assisting with the abysmal maths and literacy predicament in South Africa.

Later that same day we had an entertaining debate about signage – to have or not to have? This may be a moot point if many of the visitors to science centres cannot read the signs anyway.

We all know that people, specifically children, do not go to science centres to read. They go to have fun and discover new things – and yet there are many missed opportunities where fun reading occasions could be created without them even realising it.

This talk also explores possibilities for science centres to get involved with their local libraries and ABET programmes.

63 The Library never sleeps.

Sally Schramm

South African Institute of aquatic Biodiversity

Virtual reality - Access to information 24/7!

The Library at the South African Institute for Aquatic Biodiversity (SAIAB) is named after Margaret Smith, the first director of what was then the JLB Smith Institute of Ichthyology. Today, the Library is locally and international recognised as a special library supporting marine and freshwater research at SAIAB.

We are also an academic library. In conjunction with Rhodes University Library, resources are made available to staff and students, particularly those in the Rhodes Department of Ichthyology and Fisheries Science (DIFS).

However, our library has limited opening hours. Access to both print and online material requires library registration or other permissions and we are open to the public only by appointment.

To compensate for this, we are making online resources accessible 24/7 through a website, blog and other social media. We want to expand library services to our regular users but, as many of the resources are available without restriction and they can be freely used by a wider public, we are exploring various Open Access and Creative Commons initiatives.

Margaret Smith was known for sharing and exchanging scientific information willingly and widely. Our aim is to follow that tradition of enhancing citizen science – even when the library doors are closed.

64 **If you 'Are what you Eat', do you 'Know what you eat'?**

Helga Nordhoff

Sci-Enza, University of Pretoria, Pretoria

We eat, not only because we have to, but because we enjoy eating and food plays a central role in most celebrations from birth to death.

In the last 10 years access to processed and fast foods has become much easier not only for urban but also for rural South Africans. Convenience foods are known to have high fat, salt and/or sugar levels and with often dense energy content they are linked to the increasing obesity levels of adults and children. It is estimated that young people in South Africa consume fast foods and cold drinks at least four times per week.

To protect the consumer, new food labelling regulations were promulgated by the South African government in 2010, but they only came into effect in March 2012.

This paper will look at a few activities done with the grade 12 UP with SCIENCE learners as part of a general 'Science Communication' module to unpack the information on food labels and to make the labels more understandable. What are some of the ingredients listed, why are they added to food, and what are possible side effects of consuming them?

With an ever increasing obese population, science centres could play a valuable role in demystifying food ingredients and encouraging healthy eating habits.

65 **Eggs for breakfast, or for science? How much you know about the most obvious part of your breakfast.**

Modungwa Reletile Tshepiso

Sci-Enza, University of Pretoria, Pretoria

Eggs not only provide breakfast meals, but the calcium carbonate eggshells can be composted to fertilize the soil. Most people do not consider an egg to be an interesting object, but it has some extraordinary properties. We speculated that people don't know much about eggs, and that it would be a good topic for a science show. We conducted a survey amongst science centre visitors, and did some basic research about egg facts that could create a good science show. The survey questions were basic, but the responses showed that many people don't know much about eggs. Our survey showed how most people like to eat their eggs, and that people like to eat eggs as a protein supplement. We came across some research with eggs that would create a great science show. For example, rotten eggs have a terrible smell (H₂S), and a fear of getting this on your clothes or hair can create tension during shows due to the "afraid of the smell" factor. We've concluded that most people don't know much about eggs, and their interesting scientific properties give them potential for a science show with a difference.

Topic : Promoting Nanotechnology

Session 16 (Parallel session)

(Chair : Annelize Potgieter)

66 **Comprehension of Size and Scale.**

M.J. Schwartz

UniZulu, Richard's Bay, KZN

The concept of scale is of paramount importance in an age where the advancement of science is taking place at the extremes of scale. It has been shown that students have great difficulty with regard to scale. Does this difficulty arise from a deficiency in the student's estimation ability? Estimation has been shown to be a key aspect in grasping the scale concept. A deficiency in the estimation ability of students may not necessarily be

mathematical in terms of algebraic skills but may be due to weaknesses students have with being able to perceive spatial visualization.

The ability to navigate oneself in the web of scales is vital in the understanding of the scale concept. To move from one scale to another without loss of comprehension requires facilitation. What is the nature of this facilitation? Is this facilitation in the form of dual representation, where understanding of one scale is obtained by recalling similarities of another? Or does this facilitation take on the form of expertise (skills) that one uses to decipher the unknown? A nanotechnology programme was run at the Unizulu Science Centre where special emphasis was given to the topic of size and scale. A study was conducted with science advisors from DoBE and students to investigate their comprehension of size and scale. The results were used for the establishment of benchmarks that will allow science centres to make informed decisions on how best to communicate the topic of size and scale, and therefore by extension, nanotechnology.

67 **Where “the little” things matter most – public awareness on the growing importance of nanotechnology in our daily lives.**

Sinazo Mselana

FOSST Discovery Center, University of fort Hare

This paper focuses on the public awareness of nanotechnology and its benefits to the community. This is due to the fact that nanotechnology is increasingly being employed in various fields of specialisation; hence public perception will be crucial to the realisation of its technological advances. Public awareness campaigns and surveys on nanotechnology were conducted in some relevant education sectors and local companies of the Eastern Cape.

Data based on the understanding of physical, chemical, biological etc was collected. The public responses - were analysed accordingly. Results showed that less than 40 % of the participants know something about nanotechnology. The majority of participants showed interest in the application of nanotechnology in their respective field. It can be concluded that more advocacy is needed to popularise the technology and applications of this emerging field. It is recommended that basics on this field be introduced at high school levels as it is a future technology.

Topic : Innovation in Informal Learning

Session 17 (Parallel Session)

(Chair : Chris McCartney)

68 **Promoting Dialogue in Science Centres .**

Martin Braund and Anthony Lelliott

University of the Witwatersrand, Johannesburg

What can educators in the informal sector learn from research and practice in schools that will improve learning experiences using questioning and make them more satisfying and challenging?

The aim of this presentation is to provide anyone working with visitors to informal learning settings with knowledge and ideas to help provide high quality learning experiences through better social interactions using questioning. Questions can be among learners and between learners, and (in the case of younger visitors) any number of adults. Good questions come from listening to provide further points in dialogue that challenge thinking and promote deeper learning. In science centres the challenge, for people not trained and experienced as teachers, is often to interact without reproducing the formalities of the classroom. Providing worksheets of closed questions can deaden the experience and excitement and limit meaningful free exploration. What is needed are careful strategies, sympathetic to informal learning environments, but capable of stimulating the sort of ‘breakthrough behaviours’ that lead to deeper engagement.

In the presentation we discuss research on what makes questioning most productive and

how this can be applied to informal settings. Several examples, to help museum staff, docents, volunteers and teaching assistants interact with learners are shown and discussed. We conclude by discussing what can be achieved through training and collaboration with educators in the formal sector.

69 **The Secret to making hand puppets an effective medium for Science communication.**

A Potgieter, JS Brits, MJ Potgieter
University of Limpopo Science Centre, Polokwane

Knowledge empowers people of all ages to make informed decisions. In South Africa, the Nanotechnology Public Engagement Programme (NPEP) was launched in 2008, with the aim to promote public understanding of, and engagement with, this new emerging scientific field. Since 2008, nanotechnology as a field has progressed tremendously, necessitating the upgrading of existing forms of information and the introduction of new types of material to cater for learners of various ages.

In this regard the University of Limpopo's Science Education Centre in South Africa has focused on the use of life-size puppets to convey difficult concepts in an easy and friendly manner to learners of a young age. Puppets were selected as a medium because they facilitate social interaction, thereby enhancing communication through role playing, imagination, story-telling, and listening for young children. It is therefore the ideal interactive teaching aid.

70 **Celebrating IYCR – Developing a low cost workshop for Science Centres -**

Tanja Reinhardt
STEC, UKZN

Every year Science Centres around South Africa are faced with the challenge to design activities revolving around "International year" themes. Specific sciences on which an "International Year" focuses need to be promoted to learners.

The Science and Technology Education Centre (STEC) carried out a crystallography workshop to promote the International Year of Crystallography at Science Centres and at Science Festivals. One of the requirements for the workshop was that we would be able to complete the workshop within 60-90 minutes. It also needed to be low cost, not computer-dependant, hands-on and suitable for South African higher-grade learners.

Research on the International Year of Crystallography website revealed that the education material offered was not always suitable for the age group we wanted to target or they were too time-consuming such as the crystal growing activities. We therefore decided to design our own workshop around the theme. As crystallography includes many different aspects such as symmetry and crystal structures we needed to focus on a particular facet.

Mineralogy and in this case the understanding of crystal structures of minerals covers abstract concepts of chemistry where learners are required to understand atomic or molecular structures in three-dimensions- concepts that learners and even university students have difficulty in grasping. It has long been recognized that physical three-dimensional models of crystal structures are useful tools to help learners visualize these structures. We therefore decided to let them rebuild the crystal structure model of an "unknown" crystal and compare the model to a variety of other structures in order to determine what the unknown crystal is. This workshop has been introduced at Scifest Africa in Grahamstown and we made the workshop available at various Science Centres around the country. The learners' response to this workshop was evaluated using a feedback questionnaire.

71 **You know what they say about dynamite...**

Anja Fourie and Pumza Tshebe
Scifest Africa, Grahamstown

Scifest Africa, South Africa's National Science Festival, uses a variety of event types to promote the public awareness, understanding and appreciation of science. But a festival need not consist of 500 events in order to be effective...

This presentation will use the example of the NASA Comet Siding Spring Outreach Programme, implemented by Scifest Africa, to look at the use of regional science festivals as a method to engage learners, educators and school management and to support their education in both formal and informal settings.

72 **The role of science centres in schools.**

Joseph Sibiya
Mondi Science, Career Guidance & FET Skills Centre

Science centres are not science schools nor are they there to teach the science curriculum. They are a bridge between schooling and community life. What role do science centres play in schools? To teach the science curriculum? If yes, then they (science centres) are science schools and they have to teach the science curriculum in totality. If no, then what role do they play in schools: foundation, intermediate and FET phases in particular?

A lot of schools have the majority of their enrolment in foundation, intermediate and senior phases. These are critical phases of learning (formal and informal) in which learners' interest of science, science awareness and science related careers can be developed. Most times science centres focus their attention, help and awareness of science more on the FET phase than the lower phases. This has a minimum impact as far as science awareness is concerned because most of these learners have already made their decisions as far as career choices is concerned. If science centres could spend more time in the lower phases of schooling doing science awareness campaigns, teaching them about careers in sciences, demonstrating application of science in daily life activities and model learners around sciences, there is more will be - achieved than is the case now.

Topic : Enhancing Thinking Skills in Informal Learning

Session 18 (Parallel Session)
(Chair : Gilbert Lekwe)

73 **Innovating towards STEM-I.**

Thami Mangena,
Sci-Bono Discovery Centre, Newtown, Johannesburg

In Kenya they celebrate the National Science, Technology and Innovation week, in South Africa we celebrate the National Science Week. The Kenyan government has identified Science, Technology and Innovation as a catalyst towards Kenya's industrial growth. A culture of Innovation is born in Kenya.

Science Centres in South Africa are better placed for cultivating a culture of innovation in the country. We as a country can use innovation as a catalyst towards scientific literacy, knowledge growth as well as economic growth. This paper looks at initiatives that can be taken by the Science Centre community in ensuring a culture of innovation is grown in the country. I also look at how as a community we are taking on a responsibility of educating our communities and learners on important issues around innovation such as intellectual property, prototyping, technology that is available already to assist in bringing these ideas to reality and sources of funding those ideas. I also pose thought provoking questions to the community..."How far are Science Centres willing to be involved with new innovations that come knocking on their doors?" Is it our space to be involved and are we equipped to get involved?" How do we embrace STEM-i?

74

Implementation of techniques to improve the quality of thinking and understanding to learners towards curriculum based practicals.

Netshiongolwe Khathutshelo Emmanuel
ArcelorMittal Science Centre,

The collaboration between science centres and science teachers can play a significant role in improving the quality of thinking and understanding of learners towards curriculum based practicals'. The first point that can help is to deal with the mindset of learners from grade 10, when they start to make the choice to follow the maths and science stream. Grade 10 is the genesis of career planning as the choice of subjects starts to build vision and mission that the learners want to achieve after completing their grade 12 commonly known as "Matric".

Before learners can start doing their practicals, teachers must go through the practical manual with the learners so that during the time of experiment learners have a good background about the objectives of the experiment- that helps as learners will perform to better as every procedure- is clearly clarified before they start doing an experiment. As it is a challenge to learners during the time of experimentation, if they fail to recognise the main aim of the experiment. It is also crucial for a teacher to be in the laboratory from the starting time until the end of the experiment, as learners get faster assistance in terms of help they need at that particular time.

For classroom management, a teacher must also be responsible to see that all learners are fully participating on the experiment because at the end of the day all learners must gain knowledge and understanding on the experiment being conducted.

75

Entrenching thinking skills-The new Role of Science Centres in the Information Age.

Abel Garwe
Osizweni Education and Development Centre

School mathematics and science play a critical role in the development of scientists, engineers and technologists required for development. Although many African countries recognise this, the teaching and learning of mathematics and science have not received the necessary support and attention as foundational subjects in the school curriculum. This necessitates the need for research to try and establish factors that influence performance of learners and how best they can be addressed to improve results - and, in particular how science centres can contribute to these developments. Traditionally Science Centres are tailor-made to arouse and stimulate interest and passion in Maths, Science and Technology. They further enhance curiosity as to why certain things happen in certain ways, i.e an inquiry mindset through interactive exhibits, puzzles, audio and visual displays. They however do not entrench thinking skills per se. These are some of the most valuable mental skills that can be learnt nowadays. Thinking skills are key to creativity, innovation and invention. They are however mental faculties that are not necessarily taught in school. From an abstract-objective standpoint; virtually all of today's activities including learning require application of a wide range of thinking skills. The corollary is that science centres can play an integral role in encapsulating use of judgement; collecting, analysing and using information, teamwork in problem-solving, decision making, contribution to both existing and new ideas as well as being creative in general. This problem of why Maths and Science subjects are perennially performed unsatisfactorily in National Senior Certificate examinations is a problem that needs to be solved by a future theory.

76

Enriching young minds.

Mthobisi Mhoni

ArcelorMittal Science Centre, Newcastle

Most learners in our community still believe that Maths and Science are difficult subjects. They either do not want to do these subjects in Secondary School or do not do well in these subjects, which increases the skills shortage in science related career fields. Educators and policymakers have come to realize that increasing student science achievement and literacy will require partnerships between schools, other educational and corporate organizations. To contribute to the solution of skills shortage in the science field, ArcelorMittal Science Centre offers afterschool workshops for the primary schools (Grade R-7) every Tuesday and Thursday with the aim of instilling the love of science at a young age and relating science to everyday life. These Hands-on workshops include science experiments, Robotics, Technology, Crafts and CAMI (Computer Added Maths Instruction) and provide a platform for abstract thinking, innovation, self-motivation, group work, problem solving, positive attitude and confidence. These skills are essential to tackle life challenges no matter what their careers or life situations are.

77

Using worksheets during a school field trip to the zoo.

Jenna Dick and Anthony Lelliott

University of the Witwatersrand, Johannesburg

The success of school field trips to sites of informal learning relies, in part, in the ability of teachers to effectively mediate the experience. An analysis of the literature shows that there is a mismatch between researcher recommendations and teacher practices.

This study sought to provide insight on the ability of a teacher to create a best-practice worksheet. It involved two visits to the Johannesburg Zoo, with two different groups of Grade Eight learners, where they were observed and their conversations audio-recorded whilst completing one of two worksheets. The first worksheet was designed before the teacher was aware of best-practice recommendations. The second worksheet attempted to improve on the first using researcher recommendations.

The study presented here shows the extent to which the worksheets promoted curriculum-related conversations among groups of learners. Analysis of conversations showed evidence that learners cognitively and affectively engaged with worksheet tasks. However, the nature of cognitive engagement tended to be on a superficial level, suggesting learners do not have the necessary language skills to initiate and conduct exploratory discussions.

In view of these findings, it was concluded that it is difficult to translate best-practice recommendations into actual field trip experiences. The agenda of the teacher as well as the ability of his or her learners strongly influence how a worksheet is devised and used.

Posters

1 **Engage more effectively with local communities and increasingly diverse audience.**

Manqoba Ndhela & Njabulo Mpanza
ArcelorMittal SC, Newcastle, KZN

The youth in our communities face challenges of unemployment and drug abuse. These challenges hold back their chances to succeed in life thereby having a negative impact on the economy of the country and the whole world.

As ArcelorMittal Science Centre we have identified that lack of basic skills, information and recreational activities are the major contributing factors towards unemployment and drug abuse.

To contribute towards the solution of these social ills, ArcelorMittal Science Centre intends to offer employability workshop which will cover CV, cover/application letter, interviews, basic computer and presentation skills. The workshop will run for 3 months, after which the science centre will offer 10 people an opportunity to volunteer for 3 months, to help them gain work experience to increase their employability chances.

2 **2019 International year of science.**

Bulelani Tokwana
Nelson Mandela Bay Science & Technology Centre

2019 is declared the international year for science. This poster will discuss the following;

- How science centres and other relevant stakeholders can work together in a creative celebration of this year
 - The programmes that can be implemented together with the implementations strategies for effective execution of programmes.
- how long term cooperation in education and research could be strengthened

3 **Translating science to a language that is accessible to the public.**

P. Nodo, N.C James, A-R. Childs and M.D.V. Nakin
South African Institute of Aquatic Biodiversity, Grahamstown

I am going to present a poster that I presented in the South African Marine Science Symposium (SAMSS) (14-18 July 2014) for my Masters project, which is entitled 'The distribution of demersal fish in the Great Fish and Kariega estuaries'.

My poster presentation at SAASTEC will aim to show how I have translated the science in this poster into an understandable language through which I will try to make the research that I am doing accessible to a public audience.

4 **What is Water?**

Nangamso Myoli
South African Institute of Aquatic Biodiversity, Grahamstown

We use it to cook, clean our clothes and nourish our bodies. It can be hot, cold or can change into vapor. We can immerse ourselves in it, travel on it or use it to manufacture products. With 70% of the earth's surface covered in water, it is undoubtedly the world's greatest natural resource.

Formed from the covalent bond between one oxygen atom and two hydrogen atoms, water

molecules are naturally attracted to each other and stick to each other. This is what allows plants to take water in through their roots. Water is also the only substance that occurs naturally in liquid, solid and gas form which can be seen during the water cycle when evaporation, condensation and precipitation occurs.

The poster will not only illustrate the special properties of water but also shed light on why salt can disrupt the freezing point of water and how heat breaks the bonds between water molecules. With so much to learn about water this is only the tip of the iceberg.

5 **GOING GREEN COST-EFFECTIVELY: organic versus inorganic plant nourishment.**

Hombakazi Nqandeka

FOSST Discovery Center, University of fort Hare

The paper investigates cost effective technique of going green by comparing organic and inorganic plant nourishment. This is triggered by the need to eliminate gases that negatively impact global warming and climate change. The earth is warming up and there is now an overwhelming agreement that it is happening and is human induced. This is mostly caused by the removal of vegetation, burning of fields and increased use of fossil fuels. A study was conducted at the University of Fort Hare Alice (Eastern Cape) by comparing two parameters: use of farm manure and the use of inorganic fertilizers. Spinach was planted in a glasshouse with 3 blocks with three replicates each. In two plots farm manure was used to fertilize and on the other two plots a fertilizer (NPK) was used. All the other treatments such as irrigation and weeding were carried out commonly in all the blocks. The experiment was carried out for 3 weeks. Three parameters leaf diameter, leaf length and stem height were measured and analyzed. The results showed that there was no significant difference between the fertilizing methods. The inorganic fertilizers however have an adverse effect on soils on a long run, such as the alkalization of the soils. They are also costly and may kill nutrients needed by plants to grow. That brought up a conclusion that farm manure can be used instead of inorganic fertilizers for cost effective greening. By going green cost effectively the project will be carried out by many rural-based communities in a cost effective way. Therefore working towards a remedy to global warming and climate change.

6 **Going green with renewable energy- a case study of rural-based community project on biogas digesters .**

Nolufundo Sintwa

FOSST Discovery Center, University of fort Hare

This study focused on introducing biogas digesters as part of renewable energy to rural communities of Alice, Eastern Cape. This is due to the fact that cow-dung is in abundance in the area. The main aim was to extract methane for use as an energy resource. Cow-dung was collected and used as an alternative means of producing energy to feed the digester. Following this, parameters like CO₂, temperature and methane content were monitored and recorded. It was found that the optimum yield of the Biogas was seen on the 16th day of the 30 day test. Furthermore, at 30 °C a maximum production of 60% CH₄ (methane) content was observed. The bacteria were most active at a pH of 6.9 and hence there was maximum production. From the findings it was found that there is enough biogas produced from cow-dung which could be used for heating and cooking for approximately two households. Thus, it is recommended that further research should be conducted on kitchen waste as a potential digester feed for energy production since animal wastes may not always be available.

7 **“Merging two worlds” through use of satellite images and geological maps to locate suitable human dwelling sites - A case study in the Alice region.**

Sisanda Makubalo

FOSST Discovery Center, University of fort Hare

Humans have an ability to destruct the environment without being aware of the impact they may have in it. The term “natural disaster” is a convenient scapegoat because it allows a person (or a whole world) to blame nature for its own poor planning. A great example is

the New Orleans Hurricane Katrina. The impact of human activities such as removal of trees that buffer rainfalls, paved over grasslands to allow water to soak into the soil causes flooding, and building homes in the middle of gullies and drainage channels. Some of the homes are built in flood paths of local rivers. This study was conducted to explore better ways of determining characteristics of land for dwelling purposes in the Alice Region, Eastern Cape. This was done using two investigative ways, viz (a) Geological maps and (b) satellite images. The study was also aimed at educating people about methods and tools they can use to prevent natural disaster occurrences. To achieve this, satellite images were obtained and compared with geological maps for the area of interest. This was followed by mapping and measuring of strike and dip assist in locating groundwater and dolerite dykes for human dwelling suitability. Analysis of both investigative methods was done and results were obtained. Results show that some aspects like groundwater occurrence and vegetation were not explored before the land was used for dwelling purposes. This was only revealed by the use of both investigative systems. It was also found that plantation companies exploited the area for commercial purposes, a contribution that further commercial degraded the land. It can be concluded that both investigative tools should be used to determine a proper land for dwelling purposes. It is recommended that the municipality should explore both investigative tools for making informed decisions.

8 **Learners' knowledge and views of human origins in the Cradle of Humankind.**

Anthony Lelliott

University of the Witwatersrand, Johannesburg

Maropeng and Sterkfontein Visitor Centres (MVC and SVC) are institutions which aim to provide school learners with positive experiences of human origins, yet their impact is relatively unknown. The study provides valuable information on how learners view the concept of evolution, what features of the visitor centres may influence their views and what knowledge they possess about human ancestors.

The principal method of data collection was a survey of the school learners visiting MVC and SVC. Over 1000 learners who exited the Visitor Centres were invited to complete a survey questionnaire between July and September 2013.

The results analysed so far show that while the vast majority of learners have heard of "Mrs. Ples" (the Australopithecine discovered in the area in 1947), relatively few are familiar with the newly discovered Australopithecine (*A. sediba*). The participants were also asked about their acceptance of evolution of humans from an ape-like ancestor. The majority of learners do accept the concept of human evolution. Those who do not accept the idea of human evolution mostly invoke religious reasons for their view, while those who accept evolution refer to the evidence provided by fossils and comparative anatomy in support of their opinion. The analysis of the learners responses to 5 multiple choice questions shows very limited knowledge of early hominin features although a basic out-of-Africa-theory is embraced by one in two learners. Further findings will be presented at the conference.

9 **Parenting the Digital Generation**

A Fana* and P Kwinana

Faculty of *Science and Agriculture; Science and Agriculture Foundation Programme,
University of Fort Hare

The study examines the parenting of the digital generation that generates the paradigm shift in traditional parenting. Raising a child in the digital era means hard work and tech-culture engagement. Nowadays children are born in a digitally networked world of unlimited possibilities. The method used in scrutinizing perspectives of parents and children of the digital era was a mixed method (qualitative and quantitative method). Questionnaires were distributed in Alice high schools and surroundings with the help of FOSST Discovery Center outreach programmes. Surveyed questions were carefully analyzed and the findings of the research are based on the questionnaires.

Digital generation believes that resource sharing provides virtual world and balanced information division. Children understand that modern technology customizes learning thus

synchronously enhancing learner-centered education. However, on other hand the outcomes of the research had also shown some differences between the perspectives of parents and children. The majority of parents highlighted some factors like replacement of other personal activities, forsaking of school work and relationship negligent. The study concludes that it's necessary that parents focus on conscious than habitual use of modern technology. It is highly recommended that parents of the digital generation need to be flexible and reasonable when setting up limits to use of technology and must be active in parenting than supervising.

10 **Rhinos and pangolins on the road to extinction**

Ulrich Oberprieler

National Zoological Gardens of South Africa

South Africa's Black and White Rhinos as well as the African Pangolin are on the slippery road to extinction due to unsustainable poaching and overutilization. This poster explores the forces driving these enigmatic animals towards extinction and suggests ways in which science centres can assist: creating awareness about the extinction crisis and encouraging behaviours to halt it.

11 **Tutoring as a way of giving back to the community using SANSA Science Centre**

Thandile Vuntu

SANSA, Hermanus

The SANSA Tutoring project was started with the aim of using SANSA Space Science Researchers in collaboration with Science Centre staff to reaching out to high school learners and also giving back to the surrounding communities. The tutoring programme is mainly aimed at grade 11 and 12 Physical Science and Pure Mathematics students. The tutoring project has been not only been able to assist students but it also has helped the educators because every subject/topic that is covered every Saturday at the SANSA Science Centre is obtained from the teacher involved with that particular subject. The team aimed to develop best methods for engaging and optimizing their education in both formal and informal settings by always providing a learner friendly learning method. This poster will focus on the SANSA Tutor project which was initiated with the aim of developing skills and also to provide learners with an opportunity to gain confidence to believe in themselves as individuals.

12 **Inspiring learning through hands on activities**

L.Y. Molebatsi & B.G Marope

North-West University Mafikeng Science Centre

North-West University Mafikeng Science Centre is running an exciting school holiday programme for grade 8 and 9 learners, which is called Techno-youth. This programme aims to stimulate learner's interest in science hands –on- activities using their knowledge and technical skills. Several studies have shown that participation of learners in hands-on-activities can help them to explore array of things in art, science and maths. Touching, moving and manipulating materials help learners to explore their surrounding environment, make new discoveries for themselves and understand new content. This was evident when 30 learners from Tetlano secondary school were given different tasks to conduct in their groups during the techno-youth programme. During this programme, different presentations were presented to enrich learner's minds about science and technology. Groups were instructed to design a lift using recyclable material. At the end of the programme, each group presented its model to the judges. All models were judged based on the design, neatness, rigidity, ability to carry weight and the presentation. Questionnaires were used to assess the programme and the results revealed that all learners (100%) have enjoyed the presentation and have learnt something from them. They also indicated that they have learnt to solve problems and work as a team. Furthermore, majority of the group (96%) indicated that they have learnt new technical skills and they have interest in STEM (science, technology, engineering and mathematic) careers.

Delegates

Name	Surname	Organisation	Country	Email
David	Muller	Actor	SA	merryscholar13@gmail.com
Jeff	Makopole	Anglo American Science Centre	SA	jeffmakopole@gmail.com
Solly	Simelane	Anglo American Science Centre	SA	solly.simza@gmail.com
Kagisho	Seitshiro	ArcelorMittal SC (Sebokeng)	SA	kagishoseitshiro@yahoo.com
Khathutshelo	Netshiongolwe	ArcelorMittal SC (Sebokeng)	SA	netshiongolwe@gmail.com
Njabulo	Mpanza	ArcelorMittal SC (KZN)	SA	asoggamza@webmail.co.za
Manqoba	Ndhlela	ArcelorMittal SC (KZN)	SA	manqobandhlela@gmail.com
Puleng	Tsie	ArcelorMittal SC (KZN)	SA	puleng@amsasciencecentre.co.za
Mthobisi	Mhoni	ArcelorMittal SC (KZN)	SA	mthobisi@amsasciencecentre.co.za
Thami	Mphokela	ArcelorMittal SC (Sebokeng)	SA	thami.mphokela@mssc.co.za
Busi	Maqubela	ArcelorMittal SC (Saldanha)	SA	Bqubs22@gmail.com
Lekgabe	Dihlabi	ArcelorMittal SC (Saldanha)	SA	dihlabi.lekgabe@gmail.com
Dudu	Dudumashe	ArcelorMittal SC (Saldanha)	SA	dudumashes@gmail.com
Phinah	Manamela	ArcelorMittal SC (Saldanha)	SA	phinam@mailbox.co.za
Gillian	Watson	Bay World	SA	gill@bayworld.co.za
Vanessa	Isaacs	Bay World	SA	
Lane	Wade	Bay World	SA	
Dave	Rowley	Bloodhound SSC	SA/UK	dave.rowley@bloodhoundssc.com
Wendy	Maxwell	Bloodhound SSC	SA	sabloodhound@gmail.com
Leapotswe	Bantsi	Botswana International University of Science and Technology	Botswana	bantsil@biust.ac.bw
Moswetsi	Kabelo	Botswana International University of Science and Technology	Botswana	
Julie	Cleverdon	Cape Town Science Centre	SA	Julie@ctsc.org.za
Guy	Lynton	Cape Town Science Centre	SA	guy@ctsc.org.za
Phumla	Nocanda	Cape Town Science Centre	SA	phumla@ctsc.org.za
Nancy	Trautmann	Cornell Lab of Ornithology, Cornell University	USA	
Zanele	kaMagwaza-Msibi	Deputy Minister, DST	SA	
Nthabiseng	Maoela	DST	SA	Nthabiseng.Maoela@dst.gov.za
Sinenhlanhla	Ntanzi	DST	SA	Sinenhlanhla.Ntanzi@dst.gov.za
Tebogo	Gule	DST	SA	Tebogo.Gule@dst.gov.za
Koki	Selepe	DST	SA	Koki.Selepe@dst.gov.za

Name	Surname	Organisation	Country	Email
Isaac	Ramovha	DST	Sa	Isaac.Ramovha@dst.gov.za
Mokgadi	Madiga	DST	SA	Mokagi.Madiga@dst.gov.za
Mathoto	Thaoge	DST	SA	Mathoto.Thoge@dst.gov.za
Takalani	Nemaungani	DST : Astronomy Unit	SA	Takalani.nemaungani@dst.gov.za
Busi	Gumede	Durban Natural Science Museum	SA	busisiwe.Gumede@durban.gov.za
Sindi	Nzama	Durban Natural Science Museum	SA	Sindisiwe.Nzama@durban.gov.za
Allison	Ruiters	Durban Natural Science Museum	SA	allison.ruiters@durban.gov.za
Ian	McKay	Evolutionary Studies Unit, Wits	SA	ian.mckay@wits.ac.za
Michael	Wolf	Formula D interactive	SA	michael@formula-d.com
Zukile	Ndyalivana	FOSST	SA	t9zuga@gmail.com
Nolufundo	Sintwa	FOSST	SA	nsintwa@ufh.ac.za
Hombakazi	Nqandeka	FOSST	SA	hngandeka@ufh.ac.za
Sisanda	Makubalo	FOSST	SA	smakubalo@ufh.ac.za
Abongile	Pekana	FOSST	SA	200600011@ufh.ac.za
Mncedi	Rani	FOSST	SA	MRani@ufh.ac.za
Viwe	Kwinana	FOSST	SA	vkwinana@ufh.ac.za
Iviwe	Dofi	FOSST	SA	idofi@ufh.ac.za
Luleka	Menzi	FOSST	SA	lmenzi@ufh.ac.za
Thandiswa	Magqeleba	FOSST	SA	thandiswamagqeleba6@gmail.com
Vuyokazi	Nongogo	FOSST	SA	vnongogo@ufh.ac.za
A	Fana	FOSST	SA	afana@ufh.ac.za
Lizo	Masikisiki	FOSST	SA	lmasikisiki@ufh.ac.za
Zimasa	Dubeni	FOSST	SA	zdubeni@ufh.ac.za
Sinazo	Mselana	FOSST	SA	smselana@ufh.ac.za
Daniel	Tokwe	FOSST	SA	200702796@ufh.ac.za
K J	Golele	Giyani Science Centre	SA	tsakvbaloyi@gmail.com
BT	Ngobeni	Giyani Science Centre	SA	tsakvbaloyi@gmail.com
Michael	Akinleye	Global Spheres Children's Museum & Science Centre	Nigeria	olu.akinleye@globalspheres.org.ng
Taiwo David	OLALEYE	Global Spheres Children's Museum & Science Centre	Nigeria	
Akinpelu Olusola	MALAOLU	Global Spheres Children's Museum & Science Centre	Nigeria	
Fisayo Timilehin	SHOKUNBI	Global Spheres Children's Museum & Science Centre	Nigeria	
Phil	Collet	Govan Mbeki Maths Development Unit	SA	Philip.collett@nmmu.ac.za
Tony	Dhlamini	HartRAO	SA	tonyd@hartrao.ac.za
Simphiwe	Madlanga	HartRAO	SA	simphiwe@hartrao.ac.za
Mlungisi	Sibiya	Isibusiso Eshile Science Discovery Centre	SA	mludaaaa@gmail.com

Name	Surname	Organisation	Country	Email
Philile Sphelelo	Nxumalo	Isibusiso Esihle Science Discovery Centre	SA	philizwide@gmail.com
Nqobile Miranda	Zungu	Isibusiso Esihle Science Discovery Centre	SA	mirandazungu@gmail.com
Siphesihle	Bukhosini	Isibusiso Esihle Science Discovery Centre	SA	siphesihlebukh@gmail.com
Ambrose	Yaga	iThemba LABS	SA	yaga@tlabs.ac.za
Leandra	Taylor	iThemba LABS	SA	bugme100@gmail.com
Sinah	Magolo	Joburg City Parks	SA	smagolo@jhbcityparks.com
Kogie	Moodley	Joburg City Parks	SA	kmoodley@jhbcityparks.com
Elizabeth	Ooyo	Kenya Agricultural Research Institute	Kenya	obethokiri@yahoo.com
Kenneth	Monjero	Kenya Agricultural Research Institute	Kenya	kentrizakari@gmail.com
Candice	Potgieter	KZN Science Centre	SA	candice.potgieter@kznsc.org
Trevor	James	KZN Science Centre	SA	trevorj@kznsc.org
Kesigan	Govender	KZN Science Centre	SA	kesigang@kznsc.org
Celiwe	Chauca	KZN Science Centre	SA	celiwec@kznsc.org
Nazley	Giquel	KZN Science Centre	SA	nazleyk@kznsc.org
Tony	Lelliot	Marang Centre for Maths & Science Education	SA	Tony.Lelliott@wits.ac.za
Joseph	Sibiya	Mondi Science, Career Guidance & FET Skills Centre	SA	cjisibiya@yahoo.com
Granny	Moatshe	Mothibistad Science Centre	SA	chrisencia@webmail.co.za
Ernest	Kgadi	Mothibistad Science Centre	SA	ekkgadie@gmail.com
Nomusa	Keninda	Mpumalanga ICT Club	SA	nomusakenindan@gmail.com
Mike	Bruton	MTE Studios	SA	mike@metstudios.com
Ludo	Verheyen	MTE Studios	SA	ludo@mtstudios.com
Generosa	Simon	National Commission on Research, Science and Technology	Namibia	gsimon@ncrst.na
Mweneni	Kashea	National Commission on Research, Science and Technology	Namibia	mshahungu@ncrst.na
Beverley	Damonse	National Research Foundation	SA	beverley.damonse@nrf.ac.za
Armstrong	Mashakeni	National Zoological Gardens	SA	armstrong@nzg.ac.za
Ulrich	Oberprieler	National Zoological Gardens	SA	ulrich@nzg.ac.za
Gilbert	Lekwe	Necsa	SA	Gilbert.lekwe@necsa.co.za
Vuyelwa	Mlandeli	Nelson Mandela Bay S & T Centre	SA	
Chris	McCartney	Nelson Mandela Bay S & T Centre	SA	chris@nmbc.co.za
Justin	Downey	Nelson Mandela Bay S & T Centre	SA	
Singathwa	Poswa	Nelson Mandela Bay S & T Centre	SA	
Bulelani	Tokwana	Nelson Mandela Bay S & T Centre	SA	
Lwando	Dayimani	Nelson Mandela Bay S & T Centre	SA	
Name	Surname	Organisation	Country	Email

Noluvuyo	Yumata	Nelson Mandela Bay S & T Centre	SA	
Siphokazi	Lamla	Nelson Mandela Bay S & T Centre	SA	
Nontuthuzelo	Ngxakaza	Nelson Mandela Bay S & T Centre	SA	
Bongobakhe	Dinwayo	Nelson Mandela Bay S & T Centre	SA	
Sibulele	Mbici	Nelson Mandela Bay S & T Centre	SA	
Xolisile	Ndlovu	Olwazini Discovery Centre	SA	olwazini@tsogosun.com
Slindile	Ndamane	Olwazini Discovery Centre	SA	olwazini@tsogosun.com
Samkelo	Khumalo	Olwazini Discovery Centre	SA	samkelo.khumalo@tsogosun.com
Spar	Duma	Olwazini Discovery Centre	SA	Spar.Duma@tsogosun.com
Abel	Garwe	Osizweni Educat. & Develop. Centre	SA	garwe.abel@gmail.com
Peter	Horszowski	PERT	SA	peter@pert.co.za
Jan	Smit	Potchefstroom Science Centre	SA	jan.smit@nwu.ac.za
Buzani	Khumalo	SAAO	SA	buzani@sao.ac.za
Shadrack	Mkansi	SAASTA	SA	mkansis@saasta.ac.za
Thandi	Mtsweni	SAASTA	SA	thandi@saasta.ac.za
Penny	Haworth	SAIAB	SA	p.haworth@saiab.ac.za
Nngamso	Myoli	SAIAB	SA	n.myoli@saiab.ac.za
Vanessa	Rouhani	SAIAB	SA	v.rouhani@saiab.ac.za
Garth	Van Heerden	SAIAB	SA	g.vanheerden@saiab.ac.za
Sally	Schramm	SAIAB	SA	s.schramm@saiab.ac.za
Phakama	Nodo	SAIAB	SA	p.nodo@saiab.ac.za
Thandile	Vuntu	SANSA	SA	tvuntu@sansa.org.za
Michael	Ellis	Sci-Bono Discovery Centre	SA	michael.ellis@sci-bono.co.za
Stuart	Hopwood	Sci-Bono Discovery Centre	SA	Stuart.hopwood@sci-bono.co.za
David	Kramer	Sci-Bono Discovery Centre	SA	david.kramer@sci-bono.co.za
Akash	Dusrath	Sci-Bono Discovery Centre	SA	akash.dusrath@sci-bono.co.za
Thami	Mangena	Sci-Bono Discovery Centre	SA	Mangena.Thami@sci-bono.co.za
Michael	Peter	Sci-Bono Discovery Centre	SA	Michael.Peter@sci-bono.co.za
Annelize	Potgieter	UL Science Education Centre	SA	potgieterannelize@gmail.com
Martin	Potgieter	UL Science Education Centre	SA	Martin.potgieter@ul.ac.za
Charlie	Trautmann	Sciencenter, Ithaca, New York	USA	ctrautmann@sciencenter.org
Modungwa	Tshepiso	Sci-Enza	SA	u04413547@tuks.co.za
Helga	Nordhoff	Sci-Enza	SA	helga.nordhoff@up.ac.za
Ntandoyenkosi	Masango	Sci-Enza	SA	
Rudi	Horak	Sci-Enza	SA	Rudi.Horak@up.ac.za
Mbali	Mahlayeye	Sci-Enza	SA	mahlayeye@yahoo.com
Rosslyn	Kekana	Sci-Enza	SA	Rosslynrk@gmail.com
Smeetha	Singh	Sci-Enza	SA	smeetha999@gmail.com

Name	Surname	Organisation	Country	Email
Johannes	Segooa	Sci-Enza	SA	malekantshe@gmail.com
Anja	Fourie	Scifest Africa	SA	anja@scifest.org.za
Pumza	Tshebe	Scifest Africa	SA	pumza@scifest.org.za
Sam	Rametse	SKA SA	SA	sam@ska.ac.za
Robyn	Cuyler	Somerset Educational	SA	robync@isat.co.za
Malcolm	Beech	Somerset Educational	SA	mbeech@isat.co.zab
Tanja	Reinhardt	STEC	SA	stec@ukzn.ac.za
Nondumiso	Ndlovu	STEC	SA	stec@ukzn.ac.za
Isabel	van Gend	NMMU STEM in ACTION	SA	isabel.vangend@nmmu.ac.za
Tarin	Roberts	NMMU STEM in ACTION	SA	
Patricia	Gouws	UNISA	SA	GOUWSPM@unisa.ac.za
Jan	Smit	Univ. of North West - Potch	SA	jan.smit@nwu.ac.za
Lerato	Molebatsi	Univ. of North West - Mafikeng	SA	Lerato.molebatsi@nwu.ac.za
Boitumelo	Marope	Univ. of North West - Mafikeng	SA	mmamarope@gmail.com
MJ	Schwartz	Unizulu Science Centre	SA	mj@unizulsc.com
Silindile	Mthembu	Unizulu Science Centre	SA	slim@unizulsc.com
Derek	Fish	Unizulu Science Centre	SA	thefish@iafrica.com
Alfred	Tsipa	Unizulu Science Centre	SA	atsipa@unizulsc.com
Disampras	Mathebe	Vuwani Science Resource Centre	SA	sampie.mathebe@univen.ac.za
Vaith	Sankaran	Vuwani Science Resource Centre	SA	Vaith.sankaran@univen.ac.za
Ginny	Stone	Writer / SAASTEC	SA	squigglez@telkomsa.net

Tips for Chairing a Session Well



Make Contact

Contact your speakers before the conference to answer any questions they may have and to make sure they know when and where their presentation will take place.



Be Prepared

Familiarize yourself with the general topic of the session and read abstracts (and full papers if they are available) to familiarize yourself with the content of the individual presentations. If you think two speakers are in danger of covering the same issues contact them in advance to give them an opportunity to tailor their presentations.



Face-to-Face

Arrange to meet your speakers at the conference venue to ensure they know the time and venue of their presentation, and that they bring any problems or special requirements to the attention of the conference organizers.



Think and Plan

Plan the general format of your session, think about how to introduce the speakers and state that questions will be taken at the end of the session.



Introduce Session

Get the attention of the audience, introduce the topic of the session and present the format of the session.



Introduce the Speakers

Prepare some information to introduce each of the speakers. Keep the introductions short and accurate.



Timing

Monitor the timing of each speaker closely, speak up and remind them they have only 2-3 minutes of speaking-time left if they show no sign of concluding their presentation. 10 minutes for questions at the end of each session.



Discussion

Have a few questions ready in case the audience doesn't. If questions are too long, or complicated interrupt and suggest that the issue is discussed after the session.



Closing -

Conclude the session with a short summary of the content of the session, acknowledge the speakers and announce the next sessions.



The End

Before they leave the room, thank each of the speakers for their contribution.

Thank you for chairing the session.

Notes

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