Nelson Mandela Metropolitan University

for tomorrow

Port Elizabeth & George

Centre for Academic Engagement and Collaboration

Engagement Information and Development Unit (EID)

Consolidated Executive Report:

2014 Engagement Advancement Fund (EAF)

Dr Belinda du Plooy

Manager: Engagement Information and Development

http://caec.nmmu.ac.za/Engagement-Information-and-Development/Engagement-Advancement-Fund

Project title: Science to Schools Outreach Project 2014
Project Leader: Dr Gletwyn Rubidge (Chemistry Department)

Project Leader's executive report:

The project aims to steer a greater number of children into science related careers. To achieve this aim the Science to Schools project takes fun and exciting science experiments to schools. We not only use existing experiments, but actually create a few of our own adding a research component to the project. The focus is on all grades particularly the earlier grades where young budding scientists first step onto their future paths. In addition we leverage the process by teaching others to do what we do – i.e. focus on teachers as well as children so that the teachers may carry it forward independently. 2014 was a testing and pilot phase that was well received by all. The project has been a learning path for children, teachers and even for NMMU students and staff who assisted. A series of syllabus-related science experiments has been developed for each school grade – primary and secondary. A portable fume hood and chemical filter has been developed – this unit is very helpful to allow us to perform reactions that produce smoke of noxious gases in any venue that does not have a fume hood. Science displays and shows have been developed for introducing scholars (or any non-scientist) to the ways in which chemistry and physics are the basis of our modern lifestyles – e.g. It is always an eye opener for scholars and teachers to perform the chemical reaction wherein two liquids are mixed to form a voluminous froth that becomes a foam that is used to make car seats, matrasses or lifejackets.

Future plans for the Science to Schools project include:

- Expand the project beyond pilot phase with emphasis on leveraging through teacher training
- Seek industrial funding and support
- Focus of leverage through teacher training
- Increased collaboration with the Nelson Mandela Bay Science Center
- Introduction of recycle and reuse in waste streams generated by the project through a B Tech chemistry project

Acknowledgements:

- Funds were made available by NMMU for this project allowing chemistry to be taken schools in the form of chemistry & physics shows that were designed to be grade-specific and entertaining.
- Eastern Cape Department of Education for endorsement of the project and invitations to events.
- Nelson Mandela Bay Science Center for the opportunity to interact at various levels with scholars and center staff.
- NMMU staff and students who assisted.

A demonstration at a Walmer Township after care facility

The kids loved the magic of chemistry

Igniting hydrogen gas made from household chemicals

Some fun chemistry and making batteries with lemons, copper and zinc

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P.O. BOX 5285 6065 PHONE: (041) 581 4231 FAX: (041) 581 5155
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19 May 2014

Dr G Rubidge
c/o Zephyr
Grade 4 K

Dear Dr Rubidge

My apologies for the lateness of this letter but I would like to thank you for all the time and effort you spend preparing and then presenting the science experiments to our Grade 4, 5, 6 and 7 classes.

Feedback from the teachers was very positive and as a group, they are keen to use experiments in order to make science more exciting for the pupils.

Regards

ALAN LONES

NMMU student teaches the teachers how to do specific experiments

Floating bubbles at the grade 4 Science Visit to NMMU

Making an arc red with strontium – this element is used in distress flares.

A fireball at the grade 4 to NMMU science day

Cannon-fired sweets take to the air for children

Look we just made awesome blue pods from seaweed and calcium – it's edible.

A portable fume hood developed during the project to take experiments to classrooms or venues without fumehoods.

Project title: NMMU Racing Projects 2014
Project Leader: Mr Trevor Stroud (Mechanical Engineering)

Project Leader's executive report:

The Mobility Research Group is dedicated to the training and development of young engineers in various aspects of vehicle engineering, by building road-going and off-road racing vehicles, and promoting Master's and Doctoral research into cutting edge vehicle technology.
The MRG consists of three distinct focus areas, namely SAE Baja, Formula Student and Postgraduate Research projects. Although distinct in their focus, each supports the other, ultimately leading to students entering post-graduate qualifications.

1.1 SAE Baja Project

Students are required to build and race a SAE Mini Baja off-road vehicle powered by a 7.5kW Briggs & Stratton engine, with a self-designed gearbox, chassis, suspension and steering controls. An annual competition is held at Gerotek Pretoria, which includes a variety of events including a four hour endurance race, hill-climb, and tractor pull. The competition rules govern safety aspects such as the roll cage, brake system and ergonomics, and students are also awarded points for the presentation of their design.

Due to the Sasol Mini Baja competition being held annually at Gerotek testing facilities in Pretoria, NMMU Racing is committed to compete every year against other local universities with a freshly-designed vehicle, with the goal of winning the competition. NMMU Racing achieved second place overall in the 2014 competition, along with third place in the endurance event and second place in design.

1.2 Formula Student Project

The Formula Student concept was founded in 1981 as an international student competition, requiring the development and manufacture of a single-seater formula race car. At the event, the vehicle is not only put through rigorous testing on a racetrack, but undergoes close scrutiny by the judges, who evaluate all aspects of the vehicle design, manufacture and performance. The competition is therefore not just based on which car can go the fastest, but which team presents the best overall package. Formula Student vehicles can either be powered by a 600cc motorcycle engine or an electric powertrain with a maximum of 85kW.

NMMU Racing has produced two vehicles in the combustion engine category, of which one competed successfully at the German Formula Student event in 2011. An electric vehicle is also under development which features a brushless-DC electric motor, a 400V battery pack and a self-design battery management system based on the National Instruments Compact Rio architecture.

Due to the lack of a local Formula Student competition, NMMU Racing has to travel abroad to compete in an official race. This requires significant organizational and financial input, and therefore can only be accomplished every 3-4 years. The team therefore focuses its attention on competing in the local Knysna Hillclimb race with the Formula Student racing car, and has done so on three previous occasions, achieving a third position in its class in 2012.

1.3 Post-Graduate Research

The MRG has produced two Master's Degrees to date, and has one Master's and one PhD in progress. The main research focus area is vehicle dynamics, however research projects in the field of electric vehicle technology are also in the pipeline. The research projects conducted by the MRG include collaboration with Prof Schalk Els from the University of Pretoria, and Prof Udo Becker from Ostfalia University in Wolfsburg Germany.

DibaTwo in the Pitts next to a Formula Ford Single-Seater

Vishek Mohanlal and Bryndan Roberts admiring the car

Fueled-up and ready to race: Sasol Mini Baja Competition 24-25 October

On the starting line: Sasol Mini Baja Competition 24-25 October

The Sasol Mini Baja Competition Team posing with their awards

Project title: Bambanani Mental Health Project 2014
Project Leader: Ms Lisa Currin (Psychology)

Project Leader's executive report

The Bambanani Project was positioned within the current context of enhancing Mental Health in South Africa. Specifically, the aim of the project was to enhance the wellbeing and mental health of vulnerable groups (women, children, the elderly) in the Nelson Mandela Bay Metropole. The word 'bambanani' was selected to indicate the coming together of NMMU's Psychology Clinics (UCLIN) with the communities we serve through a state of psycho-social holding and empowerment. UCLIN comprises psychology clinics on both the South Campus and Missionvale Campus and a number of partnerships with various community organisations have been strengthened through the Bambanani Project.

The project provided both undergraduate and postgraduate NMMU Psychology students with unique developmental opportunities where they could develop more holistically as young professionals through the practical experience of working with communities. Throughout all aspects of the Bambanani project, students had opportunities to live out the NMMU values. Through the Bambanani Project we were able to enhance the health and wellbeing of children in the Nelson Mandela Bay Metropole by focusing on scholastic assessment and protective, health enhancing behaviours. Children were assessed through group screenings and appropriate recommendations for school placement and remedial assistance was made. Learners from the Missionvale area attended protective behaviour workshops, a preventative measure targeting the risk of abuse of children in the area. Furthermore, lifeskills and psycho-educational workshops were also conducted with child and youth care centers.

Through the Bambanani Project we continue to enhance the psycho-social wellbeing of adolescents at a youth care center which provides a home for male street children or boys whose home environments are not conducive to development. Various interventions were conducted with the boys and scholastic assessments were conducted for some of the boys who had no foundational learning in place and could not be placed in mainstream schooling. Appropriate recommendation and monitoring was then conducted throughout the year in collaboration with the staff of the youth care center to enhance the boys' learning potential. An area of concern was the boys' emotional and psychological development, and the boys entered group therapy at UCLIN for the duration of 2014. The group therapy was then expanded to include sixteen sessions of equine assisted therapy for three of the boys. Equine Assisted Therapy has been shown to be effective in addressing trauma, delayed development as well as enhancing empathy and teamwork.

Through the Bambanani Project we empower adults in the Nelson Mandela Bay Metropole to provide protective and health enhancing functions for their peers and families and home-based care workers across the NMBM received support and psycho-education on a monthly basis. Furthermore, prototypes of educationally stimulating toys made from upcycling (recycling) common household materials were made with the aim of teaching pensioners how to make these toys for children in the community. This is in line with UCLIN's commitment towards environmental sustainability and awareness as well as community empowerment.

Teaching preventative behaviours to vulnerable children in Missionvale

Upcycling pensioners project: constructing educational toys from discarded materials

Children of Missionvale eagerly awaiting a puppet show

Equine assisted therapy programme: learning about caring, nurturing and teamwork

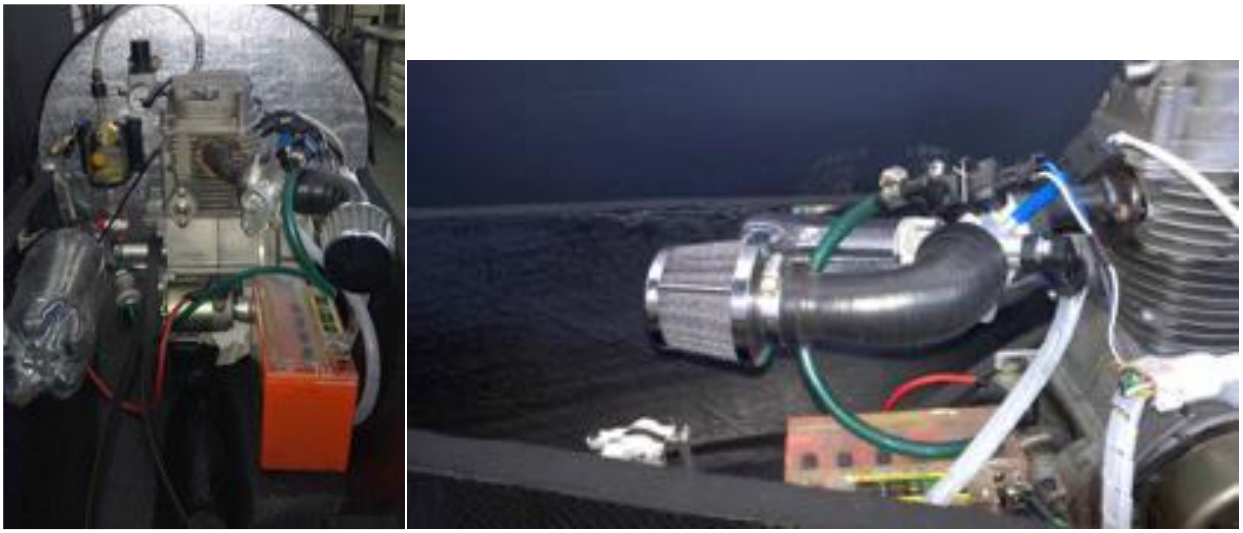
Project title: Shell Eco Car Marathon Project 2014
Project Leader: Mr Karl du Preez (Mechanical Engineering, AMTC)

Project Leader's executive report:

The Shell Eco-Marathon is based on student/school teams producing an ultra-lightweight vehicle, built specifically to travel as far as possible on a liter of fuel, thereby exposing students/scholars to the concepts of efficiency, lightweight design and more economical solutions to the challenges presented to society in respect of carbon-footprints. This also exposes the team members to a focus on science, technology and engineering in order to achieve these outcomes.

The project was initiated at the invitation of the NMMU to attend a presentation by Shell in Cape Town regarding potential participation in the Shell Eco-Marathon (Africa Middle-East). The event not only has a venerable history, a significant worldwide profile, but provides an excellent potential platform to further the NMMU's and AMTC's desire to expand our projects in the area of sustainable energy both for the benefit of our students and our industry partners. As such, it was decided to participate in the event as one of the first South African teams to do so, and the project was initiated under the auspices of the AMTC as part of the projects existing in the Renewable Energy Lab's activities.

Major outcomes achieved thus far include rear drive system design progress, engine development design, mentoring and training of students and marketing and public relations.



Thermal protection and mounted lines, wires and components (left). Manufactured air intake manifold with air intake filter fitted (right)

Above and below: 2014 Shell Eco Marathon Project: Swiss Federal Councilor and Swiss Business Delegation visit to NMMU

Project title: Eskom Expo for Young Scientists Project 2014
Project Leader: Ms Marilyn Gibbs (Education)

Project Leader's executive report:

The aim of the Eskom Expo for Young Scientists is to better enable, encourage and inspire our youth to become the next generation of researchers and scientists for our country. It takes learners beyond the rote learning of science and memorizing of facts to a level of higher thinking, overcoming problems, creative thinking, working collaboratively and presenting their ideas. It encourages innovative thinking and instills confidence in communicating their scientific ideas to others, as well as assisting the learner to leave school equipped with the necessary skills to become the innovators and scientists of the future.

Learners from Grade 3-12 conduct a research project in a wide range of subjects from Physics, Mathematics, Engineering, Medical and Health science, Social Science, Chemistry and many other fields and participate in a mini, district or school Science Expo. The school will then register their top 5-20 top projects into the Eskom Expo for Young Scientists PE Regional event. This is held in August at the Nelson Mandela Metropolitan University Indoor Sports Centre. Every project must pass an ethical clearance and is then assessed by two different judges using a matrix rubric and an interview procedure. The learners may win a gold, silver, bronze or participation award for their project. A team of 15- 20 learners are selected to represent the region at the International Science Fair (ISF) in Johannesburg. Here a number of prestigious awards are presented, including bursaries, laptops and opportunities to attend an International Science Fair outside of South Africa.

This project is in alignment with the vision and mission of Nelson Mandela Metropolitan University. It is interdisciplinary and across various Faculties and involves students. The project integrates various stakeholders allowing networking across from University academics, business, professional bodies, department officials, school leaders, parents and learners of the community. It involves 26 regions across South Africa and has a both a National and an International footprint. Since development of skills is critical in the sustainability of our economy in the Eastern Cape, it is imperative to train our youngsters in the research, innovation and higher order critical thinking skills. This project assists learners and educators to develop these skills to become innovators, researchers and scientists of the future.

2013 and 2014 Eskom Expo for Young Scientists participants: Phinda Runeli: Masiphatisane High School (left) and Luan Staphorst: Framesby High School (right)

Eskom Expo for Young Scientists winners


Eskom Expo for Young Scientists judges at work

Eskom Expo for Young Scientists stations

Project title: Mobile Clinical Laboratory Project 2014
Project Leader: Prof Esmeralda Ricks (Clinical Care Studies)

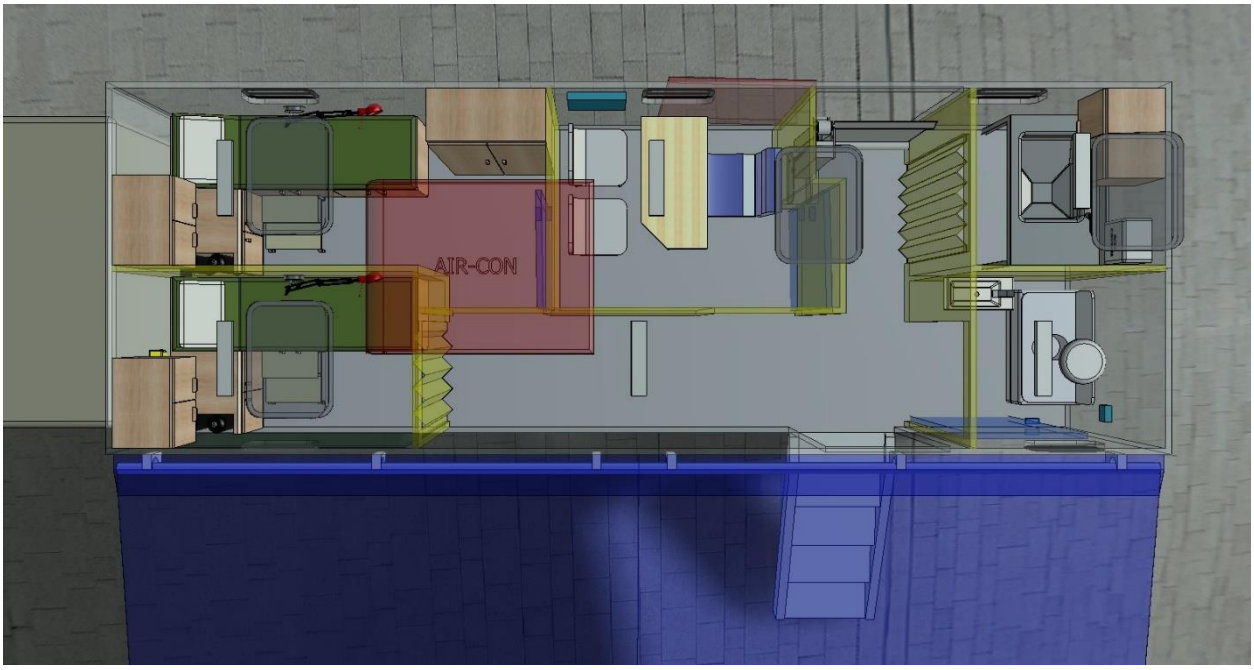
Project Leader's executive report:

The number of under- and post-graduate nursing students has increased steadily over the past five years. Due to the increased numbers and limited practical placement areas for our students, a need arose for us to explore how we could extend the teaching and learning platform of our students in the community. A truck was purchased and adapted as a mobile clinical laboratory (funding was received from the DoE Clinical Training Grant). Students are able to practice their counseling skills, perform screening tests (e.g. monitoring blood pressures, blood sugar, cholesterol testing), conduct assessments, diagnose and treat under the direct supervision of their lecturers and mentors in the community. Extensive health education on various health topics can also be provided to individuals, families and communities. Knowledge is power, thus through health education all community members are taught how to take responsibility for their own health and also how to recognise the need to consult with professionals when necessary.

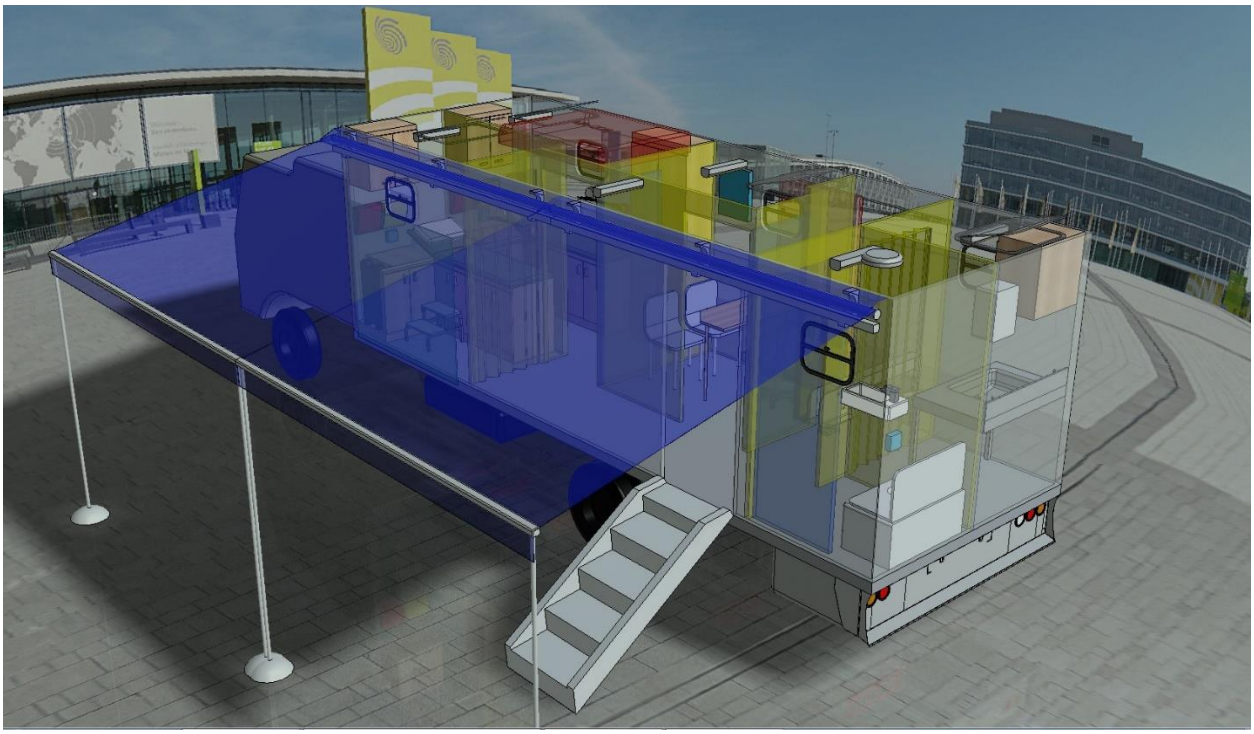
The Mobile Clinical Simulation Laboratory will operate throughout the year in different communities where the need for such care is the greatest. All disciplines in the Department of Nursing Science will use the Mobile Clinical Simulation Laboratory. It is envisaged to develop this project into a multidisciplinary team approach by including other departments in the faculty who need to do outreach projects for example the Departments of Psychology, Social development, Human Movement Sciences and Pharmacology. Discussions have already taken place between the Departments of Nursing Science and Psychology.

The project objectives are to:

- Provide a wide variety of experiential learning opportunities for students with regard to home based nursing care thus ensuring better skilled nurses
- Provide the necessary resources to facilitate the mentors in teaching home based nursing care skills to students at the point of care
- Provide a base for students to work from in the community and also privacy for student debriefing before leaving the area each day (Currently mentors and students are using the homes of the willing volunteers in the community which does not promote privacy and confidentiality. Students need to debrief because of all the challenges that they face in the community.)
- Enhance the interdisciplinary and multidisciplinary team approach to healthcare through extending an invitation to the psychology and social work students to accompany the nursing students on the mobile home based nursing care clinical laboratory
- Empower community members and the Community Care Workers through extensive health education, health promotion campaigns and by assisting the community to recognise their needs



Above and below: 2014 Mobile Clinical Laboratory (Project Leader: Prof Esmeralda Ricks, Department of Clinical Care Studies, Nursing Science)



Project title: Mobile Community Health Learning Space Project 2014
Project Leader: Prof Darelle van Greunen (Information Technology and Communication)

Project Leader's executive report:

The Mobile Community Health Learning Space Project set out to use technology about social issues amongst women and children in vulnerable communities. The project makes use of a Living Lab approach and therefore also co-creation of knowledge. The beneficiaries of the project were young children and teenagers from the Northern Areas of Port Elizabeth and women form low-income backgrounds in the same areas. Community stakeholders who partnered with NMMU on this project include Dr Jeff Govender and the staff from the FamHealth MediPark in Gelvandale, members of the Gelvandale community, learners from schools in the suburbs of Gelvandale and Helenvale and the Sr Jacobs Hope Foundation.

The project has the primary aim of addressing real social problems of one of the primary feeder areas of the NMMU. Social problems include health, education, substance abuse and many more. In accordance with Vision 2020 and NMMU's values this initiative sets out to achieve respect for others, acting in the true spirit of Ubuntu with a view on creating pockets of excellence in the Northern Areas of Port Elizabeth. Students from different levels are involved in the project in terms of practical training, skills transfer and research.

This project contributes to making public engagement a distinctive feature of education in the Faculty of Engineering, The Built Environment and Information Technology (EBEIT) and to the development of rigorous, systematic evaluations of all outreach and engagement initiatives in EBEIT. This was achieved by active participation of different members of staff and students of EBEIT. In addition, results of this project were shared using peer-reviewed conference papers and articles in the local press. It also resulted in radio interviews and recordings for television. The project enhanced existing partnerships and attracted new industry and community partners to connect industry and community engagement to on-campus research and educational strengths. The project also continues to promote stronger collaborations and partnerships between the university and its stakeholders that can strengthen research. The project continues to contribute to the scholarship of engagement as it is not only a real-life intervention but also creates best practices and lessons learnt that can be applied to other initiatives.

2014 Mobile Community Health Learning Space Project: Nelson Mandela Day Outreach at the FamHealth MediPark in Gelvandale, Port Elizabeth

Above and below: 2014 Mobile Community Health Learning Space Project: Nelson Mandela Day Outreach at the FamHealth Medipark in Gelvandale, Port Elizabeth.

Project title: Cyber Safety Calendar Competition Project 2014
Project Leader: Prof Johan van Niekerk (Information Technology and Communication)

Project Leader's executive report:

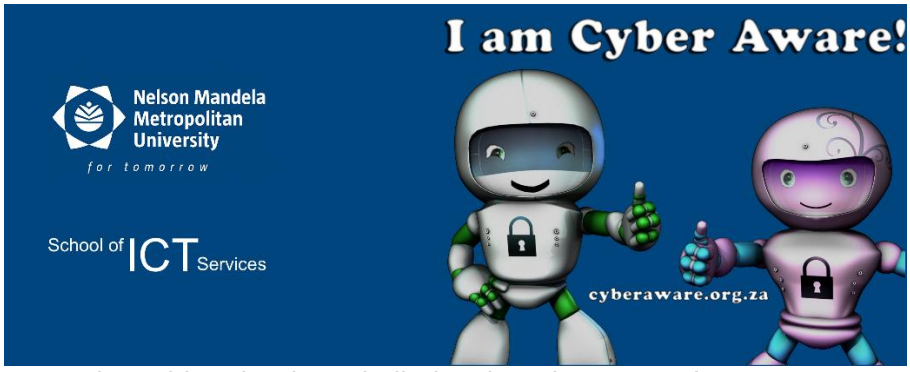
Most South Africans have a culture of personal security. We're all used to locking our doors at night and we're very aware of possible risks in and around our homes. Parents also routinely teach their children how to be aware of safety and security risks and how to deal with possible incidents. However, this culture currently does not extend to cyberspace.

Most South African parents are themselves not equipped to transact safely online and are often unaware of the risks cyberspace poses to children. They are thus not equipped to teach their children how to be safe whilst online. The responsibility to ensure the safety of children in cyberspace thus falls largely to society in general. Cybersecurity awareness for citizens, industry and government at all levels has been identified by the Department of Science and Technology in a draft National Cybersecurity Research, Development and Innovation Agenda as one of the national priorities. However, there are currently very little formal efforts to address this problem.

At the NMMU School of ICT we have been active as researchers in the fields of information and cyber security for more than 20 years and currently have the single largest research unit focusing on this subject area in South Africa. As such we decided that it would be appropriate for us to actively try to address this problem as part of our social engagement activities in the form of an annual cyber safety poster competition for school children.

The poster competition is one of our flagship projects towards this end. The contest is not "just" a contest but, rather the culmination of many other efforts to foster a culture of cyber security awareness amongst school children. Other efforts include the development of material for teachers, visits to schools to talk to children, the development and distribution of educational games regarding this topic and many more.

In 2014 we distributed a curriculum consisting of 24 lessons on cyber safety and security related topics to primary schools in the Nelson Mandela Metropolis. These lessons are also available, on request, to parents who wish to discuss issues related to cyber safety with their children.



Cyber Sid and Cyber Sindi, developed as campaign mascots

Prof Johan van Niekerk (Project Leader), Prof Kerry-Lynne Thomson and Prof Rossouw von Solms at the 2014 Cyber Safety Teacher's Workshop

Materials produced as part of the Cyber Safety project

Project title: Science Discovery Week Project 2014
Project Leader: Prof Andrew Leitch (Faculty of Science)

Project Leader's executive report:

There are many choices available for learners nowadays. Unfortunately, many learners make the wrong choice when coming to university and either drop out of studies, or end up changing programmes and taking much longer to complete their studies. The Science Discovery Week is therefore aimed at helping grades 11 and 12 learners to make an informed choice regarding whether or not to choose science and maths as a broad field of study.

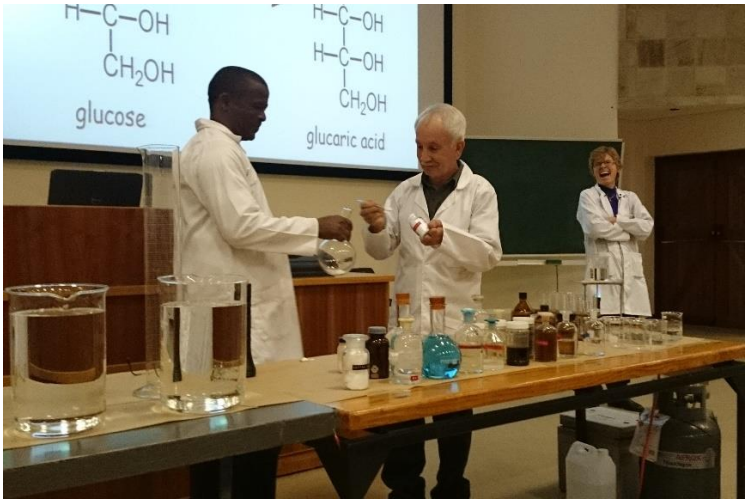
In a university Science Faculty, there are many disciplines which are not normally encountered at school. Examples include: statistics, biochemistry, microbiology, physiology, applied maths, geology, GIS, etc. The program of the Science Discovery Week provides learners with a brief introduction to these subjects as well. It is well known that South Africa does not have enough learners who choose maths and science for matric subjects. Consequently, science and maths are considered scarce skills in the country today. The Science Discovery Week is aimed at encouraging those students who have chosen these subjects to excel at school, by exciting them about possible employment opportunities with science and maths. Through the Science Discovery Week an increased number of matriculants will choose one of the many Science options for tertiary studies. These include programs at the NMMU such as the newly launched Diploma in Chemical Process Technology, which is unique in South Africa and the rest of Africa.

The program has been refined over the years. Learners, divided into 5 groups (Groups A – E), cycle through all the activities during the course of the week. Each day (except the final morning) commences with a plenary session where top scientists present lectures of a topical nature. Our experience is that the following are considered highlights of the program:

1) The Chemistry presentation ("Chemistry Unplugged") to all the Learners on the Tuesday during the plenary session has proved to be extremely popular
2) Doing the 5 km Greysbok Hiking Trail on the NMMU campus is a highlight for the learners, many of whom have not had an outdoor experience of this nature before
3) The Statistics and Computer Science demonstrations are always very popular
4) The Biochemistry and Microbiology activities where (on the 1st day) bacteria cells from various surfaces are collected (eg, back of cell phones, a piece of clothing, a friend's hand, etc), cultured and examined later in the week are also popular and very educational

The 300 learners who attended the 2014 Science Discovery Week

Dr Tim Pittaway (Agriculture and Game Management) at one of the plenary sessions.



Eric Bashman, Harold Marchand and Dr Benita Barton at the Chemistry Unplugged plenary.

2014 Science Discovery Week learners discover the wonders of physics