

2006 Annual Research Report



innovation research
technology

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2006 Annual Research Report

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Introduction

Nelson Mandela Metropolitan University (NMMU) is a new generation university intent on doing things differently in order to make a difference in the society we serve. This includes our approach in developing problem-solving research for the new South Africa. New generation universities operate far more broadly than the traditional “ivory tower” institution, crossing the traditional divide between universities and technology-orientated institutions. They aim for a wider, integrated approach in serving society, and particularly those closest to home.

NMMU with its main focus areas of teaching, learning, research and community service, hopes to meet these challenges – and indeed, already does in many instances – by offering a greater set of learning programmes, covering a wider spectrum of qualifications. These range from an entry-level certificate through to PhD research to give students the opportunity of taking new learning pathways between career-orientated courses to research-driven programmes. This approach means NMMU will offer discipline-based and inter- and multi-disciplinary-based learning programmes enabling us to respond better to changes in the knowledge environment, such as the emergence of new learning areas like business ethics.

The same practical approach is envisioned for research since a new generation university focuses on problem-solving and user-inspired research. Research should serve society in terms of sharing beneficial knowledge or transferring technological know-how with industry, business, government authorities or civil society. With this in mind, NMMU established an Office for Innovation Support and Technology Transfer in 2006.

In line with the mandate of new generation universities, NMMU will identify its strategic plan for research by working with external stakeholders – those who know the needs of society. As a new generation university, we should not feel threatened that external pressures will encroach on our autonomy or academic freedom, but welcome the opportunity to make a real difference to real problems.

NMMU is open to exploring relationships with external stakeholders and to networking with other institutions in order to improve our research capabilities and output. This networking is simply a reflection of the networked society within which we now live. NMMU is committed to research. We are committed to serving society. And in developing our research-related activities, we will strive to make the university and our immediate community internationally competitive.

Dr Rolf Stumpf, Vice-Chancellor & CEO

NMMU's Research, Technology & Innovation (RTI) strategy

NMMU aims to create a coherent research, technology and innovation (RTI) system which is conducive to promoting and rewarding excellence among staff and students. Strategic direction for RTI activities is provided by the NMMU RTI Committee which has a number of sub-committees: the Research Committee - Human and Animal - and the Publications Committee. An RTI Committee was established in each faculty and is chaired by a Faculty RTI co-ordinator.

The research strategy of NMMU is aligned with its vision of being “the leader in optimising the potential of our communities towards sustainable development in Africa”. In attaining this vision, NMMU will be able to:

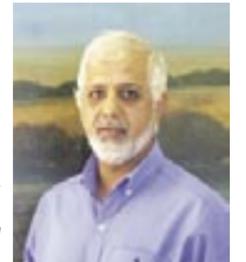
- Contribute to the transformation and development of local communities in terms of the full spectrum of their needs through research, technology and innovation solutions.
- Empower NMMU, staff, graduates and communities to contribute and compete, both locally and internationally, as researchers of note.
- Continue to make a major contribution to sustainable development in Africa through research projects that are informed by societal needs.
- Make South African industry internationally more competitive.

In creating a coherent and integrated RTI system, three essential principles form the basis of the strategy:

1. The development of a critical mass of academics and students in a limited number of research focus areas that are informed by the central thrust of sustainable development.



Dr Rolf Stumpf
Vice-Chancellor & CEO



Prof Mohammed Jeenah took
office as Deputy Vice-Chancellor:
Research, Technology and
Planning in January 2007.



Dr Pieter van Breda
Director: Research Management

2. It will be based on creating an environment that encourages the development of a research culture and ethos. Such an environment encompasses physical, financial and administrative components.
3. It will be grounded on the critical role of the university in promoting the values of equity and social justice. Equity and social justice deal with issues of demography, access, as well as the research agenda.

A crucial component of NMMU's RTI strategy is the development of research and innovation themes aligned with the eight academic focus areas of NMMU. These are:

- Health and wellness
- Economic and business development with a focus on job creation and entrepreneurship
- Materials, infrastructure and process development for industry and manufacturing
- Emerging information and communications technology for development
- Environmental and natural resource management
- Culture, communication and language
- Leadership, governance and democracy
- Educational development in support of excellence in teaching, learning and curriculum

The academic focus areas are, by their very nature, relatively broad to provide some latitude for academics and researchers to develop more specific research areas that will address the national, regional and local imperatives underpinning these focus areas.

In developing a critical mass of excellent researchers at NMMU, it is important that these academic focus areas are analysed more critically to develop constituent research and innovation themes that promote existing and emerging areas of research excellence at the university.

In terms of the limited capacity and resources available at NMMU, support would be strategically directed to achieve the strategic priorities and objectives of the university. This support will therefore be concentrated around the research and innovation themes and entities.

Each research theme will be spearheaded by a research entity integrated in the structure of a faculty. Entities are classified as institutes, centres, units and research groups depending on the stature of the researchers as well as the size of the research group. The process of entity classification started in 2005 and continued in 2006. Currently, there are 21 research entities at NMMU. Within five years it is intended that all research entities at NMMU will be headed by nationally and internationally acclaimed researchers assisted by other senior academics, emergent researchers and students. The emergent researchers will be mentored by established researchers.

Another component of the RTI strategy is to develop incentives to foster research collaboration within NMMU, encourage partnerships with other South African universities and to involve the university in collaborations internationally.

The research strategy is based on optimally utilising the competencies within NMMU. A strong culture of value-adding research support and capacity development is being nurtured. In 2006 this resulted in a decision to re-organise the functions of the Department of Research Management and to establish a Department of Research Capacity Development as well as an Office for Innovation Support & Technology Transfer. The latter office is financially supported by the Innovation Fund of the Department of Science and Technology.

The successful implementation of the research strategy depends on the extent to which the human resources of NMMU are nurtured. The programme to nurture research talent at the university will encompass three critical components, namely acclaimed researchers, academics with the potential to become outstanding academics, and postgraduate as well as undergraduate students. In line with the transformation agenda, special attention will be given to developing black and female staff and students with the potential to become excellent researchers.

Dr Pieter van Breda, Director: Research Management

Research benefits automotive industry

Nelson Mandela Bay is often called the "Detroit of Africa" because of the size and breadth of its motor manufacturing, component and related industries. Since the automobile industry is both the biggest employer and the major money-spinner for the area it goes without saying that support for it, is crucial for NMMU.

The Faculty of Engineering, the Built Environment and Information Technology has a strong automotive industry focus and works closely with industry partners in its teaching and research. NMMU is the only comprehensive university to offer a BEng degree in the cutting-edge field of mechatronics and the development of this programme has been extensively supported by industry. The mechatronics programme and other automotive industry-related projects – the Advanced Mechatronics Technology Centre, the VWSA/DAAD International Chair in Automotive Engineering, the Siemens Mechatronics Laboratory and the AMTS Robotics Laboratory – have attracted some R18m in investments since 2004 from industry, government, the NMMU Trust and NMMU.

Friction stir welding is cutting-edge technology with immense potential for the automotive industry, and an NMMU research team is internationally recognised as a leader in this field.

NEW FRICTION STIR WELDING PLATFORM

Friction Stir Welding (FSW) was invented at the World Centre for Materials Joining UK (TWI) in 1991 and is now being applied (under licence) to an increasing number of joining applications worldwide, primarily in aluminium alloys although several facilities have reported experiments on titanium alloys and steels.

The potential of the FSW technique is enormous and is finding new applications at an exponential rate. Other related friction stir processes are also imminent and will impact on the way we join, repair and process certain materials and components.

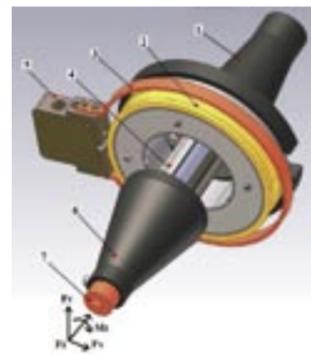
The Manufacturing Technology Research Centre (MTRC) at NMMU has over the past number of years established itself internationally in the field of FSW and processing. A new FSW platform will replace the existing one as research has moved so rapidly that the old platform is no longer suitable. The focus today is moving into the joining and processing of high temperature light alloys such as titanium for the aerospace industry.

The Intelligent Stir Welding for Industry and Research (ISTIR) Process Development System is a leading-edge FSW system developed by MTS Systems Corporation to provide the advanced capability and versatility to explore a wide range of FSW technology applications and facilitate the transition of FSW from the laboratory to the production floor. This system is the first fully-instrumented FSW research system capable of performing load-controlled welds along three independent axes – X, Y, and Pin.

The FSW research area will consist of a state-of-the-art laboratory in new joining and fabrication methods. The lab will not only serve research in the development of lighter and more cost-effective automotive and aerospace products, but the manufacturing industry as a whole. One of the joining technologies to be developed in the centre is FSW of curvilinear seams. The fabrication and joining processes to be developed include a wide range of materials and thicknesses. FSW technology offered by MTS will create a research and prototype development capability unique to South Africa.

Massive funding of R5.7m for the new platform has been secured from the National Research Foundation (NRF), NMMU, the NMMU Trust, the Automotive Component Technology Station (ACTS) and the Manufacturing Technology Research Centre (MTRC).

The Faculty of Business and Economic Sciences is also involved in a range of automotive industry-related research, from lean manufacturing, logistics and supply chain management, to service quality, communications, and human resources management.



1. Spindle and data telemetry holder
2. Transmitter carrier with rotor coil
3. Telemetry stator coil ring
4. Elastic element
5. Connection to power supply and data logging device
6. Tool holder
7. Tool

FOR GOOD MEASURE ... This measuring device developed by researchers in the School of Engineering at NMMU makes it possible to monitor certain process conditions online and led to an invited publication in the TWI journal Welding in the World.

Three Research Niche Areas

In 2006 six Research Niche Areas (RNAs) were funded by the NRF under its Institutional Research Development Programme (IRDP). Twenty-four staff members received a total of R4.4m, of which R3.5m was allocated by the NRF.

The six RNAs:

- Business information integration and security
- Innovation batch chemical technology
- Manufacturing technology
- Applied business research: automotive cluster
- Forest engineering and forest fire management
- Utilisation of wildlife in the Eastern Cape

The NRF launched its revised IRDP in 2006. The purpose is the development of new research capacities at higher education institutions by developing new RNAs. These are well-defined and strategically-selected research areas, previously unexploited, around which a team of researchers at a university will focus their research interests. For strategic reasons, NMMU decided to continue with only the first three RNAs which were all subsequently approved as developed RNAs. A totally new RNA - building a biodiversity-based economy in the Eastern Cape - was developed under the leadership of Prof Graham Kerley, submitted to and later approved by the NRF.

The following RNAs successfully applied in 2006 for research funding in 2007:

Innovative Batch Chemical Technology for Downstream Chemical Products and Processes

The research focus of this RNA is primarily on the development of alternative production methodologies for downstream chemicals and chemical products through the development of alternative technologies to traditional batch and semi-batch production technologies.

The research focuses specifically on opportunities to grow and develop the South African downstream chemicals sector.

Effective chemical process development (for downstream chemicals) is an amalgam of synthetic organic methods, physiochemical properties, purification technologies, and chemical engineering (reactor and separation technologies) orchestrated in a manner that will produce the desired chemical product safely, in high quality, reproducible, and cost efficient.

As a consequence, the proposed RNA also focuses on specific technologies/expertise, including organic electrochemical synthesis, catalytic oxidations, reaction calorimetry for scale-up purposes, automated synthesis, and micro-structured reactor technologies.

Business Information Risk and Security

This niche area focuses on identifying, managing and mitigating business information risks through effective information security technologies, applications and practices for knowledge flow and dissemination.

Business information has become the most important company asset today. This information is mostly gathered, stored, processed and transmitted using modern information and communication technologies.

As a critical business asset, information and associated technologies today have to be continuously governed, managed and secured to effectively address information related risks.

Manufacturing Technology

The primary focus of this RNA is the development and improvement of discrete part manufacturing processes for the automotive and related industries with the emphasis on innovative development of manufacturing technologies. This research has an integrated approach in that two well-established research groups, Materials and Controls, have joined forces to ensure an approach that will benefit end-users. This holistic approach to manufacturing has yielded extremely positive benefits and has been applauded internationally.

Another future focal point will incorporate some aspects of materials research and characterisation to form a research support base for the metallurgical cluster of the Coega Development Initiative outside Port Elizabeth.



The Research Management Office received an award from the NRF's Institutional Research Development Programme for excellent research niche area administration. NMMU was one of only three universities in the country to qualify for the award. The Research Management team are, front from left, Nicola Taylor, Visha Coopasamy, Carmen van Leeve and, back from left, Pieter van Breda, Sepi Rouhani and Kevan Johnson.

Team members, front from left, Dr Ernst Ferg (project leader), Dr Nigel Harmse, Ms Anita Noah and, back from left, Dr Gary Dugmore, Dr Nicole Vorster, Prof Ben Zeelie, Dr Shawn Gouws, Dr Gletwyn Rubidge.



Team members, from left, Prof Reinhardt Botha, Prof Rossouw von Solms and Dr Dalena Pottas.



Research leaders in the Manufacturing Technology Research Centre (MTRC), from left, Dr Annelize Els-Botes, Prof Theo van Niekerk and Prof Danie Hattingh.





NMMU Researcher of the Year 2006, Prof Richard Cowling

Researcher of the year

Prof Richard Cowling, an NRF A-rated researcher of the Botany Department in the Faculty of Science, was the 2006 NMMU Researcher of the Year and is considered an international expert in plant conservation.

During his research career, he has published 225 peer-reviewed articles, 60 popular articles and three books. He has served on the editorial board of a number of distinguished academic and professional journals and presented keynote addresses at research symposia. He is widely recognised by his peers for pioneering research on conservation planning. He has mentored and supervised 44 postgraduate students and has an impressive track record for raising research funds from a wide range of sources. He received the Distinguished Service Award from the Society for Conservation Biology (USA). His research interests are unusually broad. He has contributed to the fields of:

- patterns and evolution of plant biodiversity
- conservation planning
- spread, impacts and restoration of alien plants
- resource economics, and
- plant structure and function.

His most significant contributions have been in the first two fields mentioned. His research is aligned with NMMU's vision and mission on influencing South Africa's values regarding the sustainable use of its biodiversity resources.

Prof Cowling talks about his research

"Most of my team's research is in two related and pragmatic (mission-oriented) disciplines - conservation planning and ecosystem services research. Our approach is to embrace the concept of research for implementation. Since both of these research areas address the difficult problem of sustainability, and that the adoption of sustainable practices is contingent on human choice, we have consciously involved ourselves in all phases of the project cycle, namely assessment, planning and management. This requires immersion in a messy social process, something that most natural scientists eschew. We have found it hugely rewarding.

"As a consequence of adopting this approach, our research in conservation planning has shifted in emphasis from where to do conservation, to how and what to do. Our project in the Eastern Cape's Great Fish River valley is identifying opportunities and constraints for a suite of conservation actions through a comprehensive survey of landowner attitudes and traits. We are also using this research to crystallise the components of social assessments for conservation planning projects, a hugely neglected field. We intend to map the opportunities (e.g. willingness to sell, nature-based entrepreneurship) and assess them relative to spatial biodiversity priorities in order to identify actions that stand a good prospect of being implemented.

Integration "In another study, we are using social marketing techniques to

identify and remove barriers to pro-environment behaviour in municipalities. In particular, we are seeking to achieve the mainstreaming – or integration – of conservation planning products into municipal planning processes. This is the first application of social marketing in this context anywhere in the world. The study is employing a quasi-experimental design: three municipalities are being targeted for intervention, and three similar ones are being retained as controls.

A case for carbon farming "A third study is on the restoration of ecosystem services in the Eastern Cape's subtropical thicket biome. Owing to its 'Lilliputian forest' structure, intact thicket growing where the rainfall is little more than 300mm a year has plant biomass and carbon stocks equivalent to many forest ecosystems. Hence, it stores large amounts of carbon – an important characteristic in a world on the brink of significant, greenhouse-induced climate change. Unfortunately, some 800 000 ha of thicket has become degraded by overgrazing with livestock. In the process, carbon stocks are seriously depleted. However, our research has shown that restoration of thicket, using truncheons of the succulent shrub *Portulacaria afra* (spekboom) result in sequestration rates of 3.4 t C/ha a year, producing two-thirds of the pre-degradation stocks in less than 30 years. We have calculated that the financial returns for carbon farming in thicket – funded by the international carbon market – are between five and 20 times higher than goat farming, depending on the carbon market and the form of livestock ranching. Not included are all of the other socio-economic benefits: job creation in depressed rural areas, soil stabilisation and reduced erosion, biodiversity restoration, and options for future use as a resource for livestock or game farming and ecotourism. Having completed some of the biophysical assessment required to make the case for carbon farming, we are following a process for ensuring effective implementation through conducting social assessments and a region wide assessment for identifying geographically bound returns on investment.

"In all my research, I work in teams. I currently collaborate with more than 50 researchers from 28 research organisations, more than half of which are overseas. Given the breadth and complexities of scientific analysis these days, collaboration and teamwork is essential. I act as scientific advisor to two research groups: the CSIR's Klein Karoo Study Group (which I initiated), and Rhodes University's Restoration Research Group.

"Finally, I believe passionately in the interpretation and presentation of research findings for laypersons. To this effect, I have contributed to numerous popular articles and three popular books. Next year will see the publication of a coffee-table-style book on the conservation of the subtropical thicket, called: *East of the Cape. Conserving Eden.*"

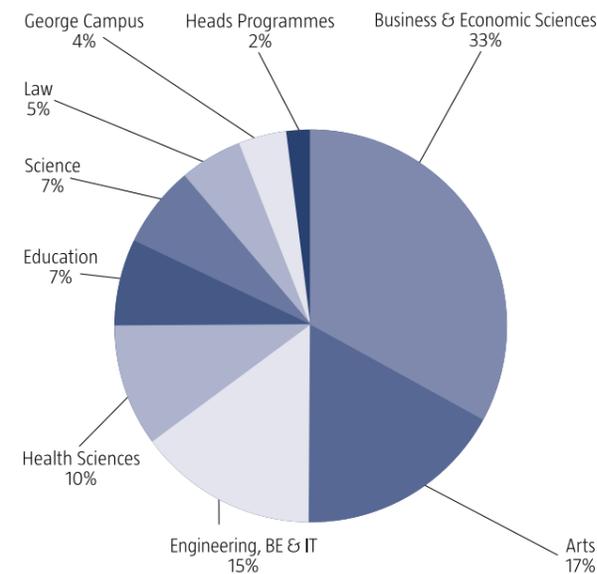
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UNIVERSITY PROFILE

Composition and size of student body

NMMU had a total of 24 413 contact and off-campus students in 2006, compared to 24 896 in 2005. A total of 20 023 contact students registered in 2006.

The diversity profile of the student body showed only slight changes between 2005 and 2006. African students remained at 60% of total enrolments, white students accounted for 26%, coloured students 12% and Indian students 2%. The ratio of male to female students remained at 49:51.



2006 postgraduate profile (graduating in 2007)

	BTech	Hons	Research Masters	Masters Doctoral	Other
Enrolled in 2006	1180	894	439	961	296
Graduates (graduating in 2007)	418	471	181	110	25

Research strengths

A number of clear strengths within the institution's eight institutional academic focus areas have been identified, including:

- The environment and ecology (including environmental law)
- Marine and estuary studies
- Optic fibres and electron microscopy
- Mathematics and science education
- Nursing and community health
- Architecture and the built environment
- Engineering technology (including friction stir welding)
- Art and design
- Chemical technology
- IT programming and IT systems support
- Academic development (especially for disadvantaged students)

Most research resources (including external funding applications) will be directed towards NMMU's research strengths. According to the university's strategic research plan, a number of research focus areas will be identified. Most resources will be directed towards these areas with the aim of establishing a research institute for each research area. These research institutes and sub-structures will be headed by researchers with an A or B NRF-rating or equivalent.

Centres of Excellence: Research Institutes, Centres and Units

Following the review of 48 existing research, teaching and engagement oriented entities in 2005 and early 2006, 29 NMMU-dependent entities were registered:

- Four institutes at the highest level
- Four centres
- Two clinics, and
- 19 units at the lowest level.

The majority of these entities are research-based. The review process ensured that the entities were streamlined and that their individual visions and missions were aligned with that of NMMU, in terms of research and innovation; academic, service and outreach activities; and community engagement. Please refer to individual faculties for detailed contact lists of the research entities.





Dr Shaleen Els, Director:
Research Capacity
Development

NRF Evaluation and Rating of Researchers

The number of NRF-rated researchers increased from 43 in 2002 to 50 in 2006. This constitutes 9% of the research/instruction staff at NMMU and places the university among the top 10 South African universities in terms of NRF ratings in 2006 (Evaluation and Rating Facts & Figures. NRF. 2007, p5).

Research Chairs

The SA Research Chairs Initiative (SARChI) is a strategically-focused knowledge and human resource intervention sponsored by the Department of Science & Technology (DST) and administered by the NRF. Its aim, among others, is to increase the number of world-class researchers in South Africa.

Prof Reinhardt Botha of the Physics Department was awarded a Tier 2 Chair in Nanophotonics in 2007 with an estimated annual budget of R1.5m for five years. The Chair in Nanophotonics will focus on the development of various semi-conducting nanostructures for optoelectronic applications. Two material systems which will be developed are the InAs/GaSb strained superlattice system, and ZnO.

Research policy development and implementation

In the wake of the merger between the PE Technikon and the University of Port Elizabeth in January 2005, a number of key research policies were developed and implemented from early 2006. These include:

- Policy on incentives for NRF-rated researchers.
- Policy, procedures and rules for postgraduate research degrees
- Policy on statistical support services available to researchers and postgraduate students
- Code of conduct for researchers at NMMU
- Policy on research, technology and innovation management structure
- Policy for the establishment, operation and review of entities
- Framework for support and funding of research activities at NMMU by the RTI Committee
- Policy on the division of output subsidy generated at the Department of Education (DoE) through research publications
- Postgraduate and postdoctoral student scholarship and bursary funding policy

Other policies and guidelines were developed during 2006 by the Department of Research Management and include:

- Agreement in respect of research leave or research sabbatical
- NMMU Researcher of the Year Awards
- Applications for NRF international travel block grants

2006 Researcher of the Year Awards

In recognition of research outputs and excellence in research, awards were presented to 17 leading and emerging researchers in November 2006. Awards were made to nine Faculty Researchers of the Year and eight Emerging

Researchers of the Year. Prof Richard Cowling (Faculty of Science – Botany) received the overall Researcher of the Year Award. Prof Cowling is an A-rated researcher and an international expert in plant conservation. His pioneering research on conservation planning is widely acclaimed, and is closely aligned with NMMU's vision and mission of contributing to sustainable development. Prof Cowling has an impressive track record of raising research funds and is heavily involved in contract research for the South African National Parks.

NMMU Researcher Of The Year

Prof Richard Cowling (Faculty of Science)

Emerging Faculty Researchers Of The Year

- Mr Mzikayise Shakespeare Binza (Faculty of Arts)
- Prof Madéle Tait (Faculty of Business & Economic Sciences)
- Dr Aletta Delport (Faculty of Education)
- Ms Darelle van Greunen (Faculty of Engineering, the Built Environment & Information Technology)
- Dr Sindisiwe James (Faculty of Health Sciences)
- Dr Avinash Govindjee (Faculty of Law)
- Dr Charmain Cilliers (Faculty of Science)
- Ms Maryna Lehmann (George Campus)

Faculty Researchers Of The Year

- Prof Bert Olivier (Faculty of Arts)
- Prof Piet Naudé (Faculty of Business & Economic Sciences)
- Prof Tilla Olivier (Faculty of Education)
- Prof Rossouw von Solms (Faculty of Engineering, the Built Environment & Information Technology)
- Prof Mark Watson (Faculty of Health Sciences)
- Prof Elmarie Knoetze (Faculty of Law)
- Prof Richard Cowling (Faculty of Science)
- Dr Laurence Watson (George Campus)
- Dr Richard Stretch (Support services)

Developing Research Capacity

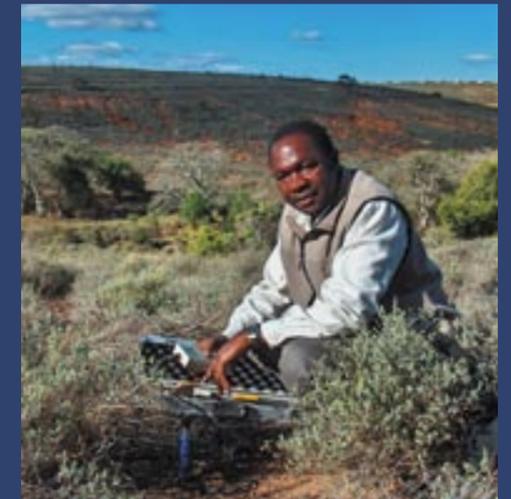
RESEARCH ASSOCIATES

Research Associates are researchers involved with research activities and projects at NMMU, even though they are not officially employed by the university. NMMU is fortunate to have excellent collaborative relationships with these high-quality researchers who contribute to the university's research output as well as the development of research capacity among emerging researchers. In 2006 NMMU had about 20 research associates, based largely in the Faculty of Science.

KHULISA

This project is aimed at developing young emerging scholars, teachers and researchers. Khulisa has a strong mentorship component and aims to develop participants' research and teaching skills. The focus of the project is equity-based, with the purpose being the empowerment, career development and retention of highly-skilled and experienced researchers at NMMU. Five participants working towards their PhD qualifications were mentored in 2006, the second year of the three-year pilot project. Funding for continuation of the project in 2007 was secured from the NMMU Council and the Ford Foundation.

Mzikayise Shakes Binza of the Political & Governmental Studies department, left, is congratulated on his award from the NRF as Top Performer in their Thuthuka Researcher-in-Training programme, by Director: Research Capacity Development Dr Shaleen Els, centre, and Deputy Vice-Chancellor Research, Technology & Planning Prof Mohammed Jeenah, right. Darelle van Greunen of the School of Information & Communication Technology was a finalist in the awards for the country's top developing researcher.



Dr Vincent Kakembo, head of the Geoscience Department, pictured, and Dr Avinash Govindjee of the Law Faculty, were ranked in the top 20 of the NRF's Thuthuka Research Development Initiative for Black Academics.

Economics lecturers Noluntu Dyubhele, left, and Ronney Ncwadi, right, were together awarded research funding of R320 000 in a South Africa-Netherlands Research Programme (SANPAD) initiative to develop emerging researchers.



POSTDOCTORAL SCHOLARSHIPS

In 2006 NMMU granted 13 postdoctoral scholarships to outstanding national and international students in various faculties and departments. Further postdoctoral scholarships were supported by external funders such as the NRF and Claude Leon Foundation.

THUTHUKA PROGRAMME

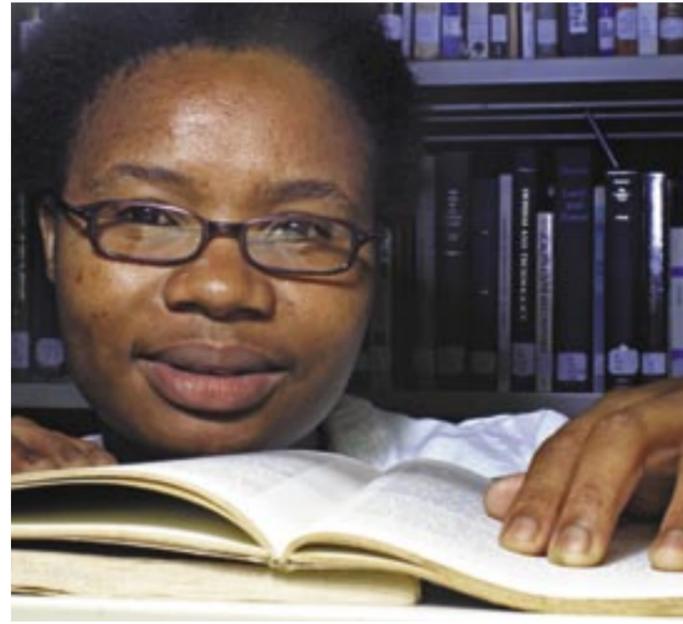
This programme captures the successes of collaboration between the National Research Foundation (NRF) and NMMU in terms of advancing emerging researchers. The university was ranked in the top five of institutions participating in the Thuthuka capacity-building programme and was commended for its commitment to training young black researchers. The programme enhanced the research capacity of 33 grant-holders in 2006 – all of them equity candidates.

More than R1.6m was allocated toward research projects, and includes

contributions towards the development of student researchers by way of postgraduate assistantships. Top Achiever awards were received by Mr Shakes Binza and Ms Darelle van Greunen within the Researchers-in-Training category, while Dr Vincent Kakembo and Dr Avinash Govindjee were among the top 20 researchers within the Research Development Initiative for Black Academics category.

SOUTH AFRICA-NETHERLANDS RESEARCH PROGRAMME (SANPAD)

SANPAD is a collaborative research programme financed by the Netherlands Ministry of Foreign Affairs since 1997 that has established a learning programme, the Research Capacity-building Initiative (RCI), to develop junior researchers. It also provides research grants. Two emerging researchers, economics lecturers Noluntu Dyubhele and Ronney Ncwadi, participated in a SANPAD research capacitation initiative in 2006. The awards together were worth R320 000.



Research Output Subsidy

The research output subsidy paid by the Department of Education (DoE) represents a crucial benchmark of research excellence as it is based on doctoral and research master's students who graduate, and subsidies generated through academic publications.

The monetary value of the subsidy decreased from R38.6m in 2004 to R36.4m in 2005, mainly as a result of a decrease in research master's and doctoral graduates.

The number of publication units (generated by articles in journals and excluding books and conference proceedings) qualifying for a DoE subsidy decreased from 183.72 units in 2005 to 172.12 units in 2006.

The number of articles published in 2005 was exceptionally high compared to historical trends and therefore the decrease in 2006 is not a serious matter of concern.

However, NMMU aims to continuously improve its performance and plans to double the number of articles within the next three to four years as part of its research strategy. A major challenge is to balance quantity with quality and to reward staff for publishing in top quality journals.

Internal Research Funding

The original 2006 strategic research allocation for research (excluding the top-up of NRF-funded equipment) was R16 572 050. This was allocated as follows:

Research, Technology and Innovation Committee	R8 499 400
Publications Committee	R115 500
Ethics Committee (Animal & Human)	R49 150
Master's & doctoral bursaries	R7 908 000

Master's and doctoral bursaries were later substantially increased with R5.4m

from the NMMU Trust and R2m from the NMMU Council. The Transformation and Equity Committee assisted a large number of researchers from previously disadvantaged backgrounds by topping-up grants approved by the NMMU Research Committee.

External Support for Research and Innovation

The major source of external funding for academic research was NRF grants and bursaries, totalling R19.4m (excluding THRIP), a 30% increase on 2005. One of the NRF funding categories, the International Travel Block Grant, assisted 23 academics to present papers at overseas conferences. Included in the NRF allocation was R2 765 000 granted to Prof Danie Hattingh for equipment in the Faculty of Engineering, the Built Environment & Information Technology. This amount was topped up by a further R1 583 170 from NMMU which was not part of the original research budget.

A further R480 000 was granted by the NRF to Dr Ernest van Dyk in the Physics Department for a large area solar simulator. NMMU topped-up this amount with R246 234. Department of Biochemistry and Microbiology head Prof Ryno Naudé was awarded a R420 000 grant under the SA-Japan Collaboration Programme for collaborative research.

Other significant external funders of academic research at NMMU included the Medical Research Council (R441 579), the Water Research Commission (R607 500) and the German Academic Exchange Services (DAAD).

The Technology and Human Resources for Industry Programme (THRIP), managed by the NRF, granted R2 640 284 to seven grant holders for 11 projects. THRIP focuses on projects that specifically promote and facilitate scientific research, technology development and technology diffusion.

All projects must include human resource development. It is a partnership programme which challenges companies to match government funding for innovative research and development.

2006 THRIP Awards

Project leader	THRIP amount	Industry amount
Dr Maryna van de Venter	R 580 000	R 580 000
Prof Jan du Preez	R 460 000	R 460 000
Prof Danie Hattingh	R 178 750	R 357 500
Prof Andrew Leitch	R 314 059	R 773 597
Prof Jan Neethling	R 337 500	R 5 606 275
Prof Janet Wesson	R 290 750	R 1 338 597
Prof Ben Zeelie	R 479 225	R 1 344 900
Total awarded	R 2 640 284	R 10 460 869

The sum of third-stream income from contract research, short courses, non-diploma courses and summer/winter schools was about R22m (excluding research grants from funding bodies such as the NRF) resulting in income generation of R3 292 608 from a 15% NMMU levy. Income derived from third-stream income is still unacceptably low in the context of NMMU's total budget. The policies pertaining to contract research will be revised in 2007.

Intellectual Property

In 2006 NMMU submitted two patents for support by the Department of Science and Technology's (DST) Patent Support Fund:

- ZA 2004/9293: Friction Stir Welding
- ZA 2004/3914 and PCT/IB2005/001373: Insect Repellent Compositions

The Patent Support Fund is aimed at providing financial support for patent portfolios of inventions emanating from research institutions.

Under the Patent Incentive Fund, also a DST initiative, five individuals were each granted R20 000 and one R25 000, for the following patents:

- ZA 2004/9293: Friction Stir Welding
- ZA 2004/3914: Insect Repellent Compositions
- ZA 2004/4465: Method for the production of Hydroxy-Substituted Phenol Ethers
- ZA 2004/1141: Continuous state of Health Sensor for Lead-Acid batteries

The purpose of the scheme is to encourage innovation and increase patenting activity by postgraduate students and researchers at publicly-funded research institutions by providing incentives to students and researchers to file patent applications at the South African Patent Office.

In 2006 two promising inventions were provisionally patented:

- Rubber Compositions
- Non-Polar Capped Nano Transition Metal Oxides and Sulphides

To enhance management of technology transfer and innovation, NMMU approved the creation of an Office for Innovation Support & Technology Transfer (OISTT) in 2006. This initiative is financially supported by the Innovation Fund of the DST. The new director Jaci Barnett, appointed early in 2007, will also act as the CEO of NMMU Innovations. One of the key functions of the OISTT is to commercialise the intellectual property of NMMU.



Highlights

- The work of **Prof Nicholas Allen** (School of Music, Art & Design), together with key features of NMMU's Chemistry Department laboratory facilities, was featured in an Easter Special documentary on the Shroud of Turin, on April 14, 2006 in Germany.
- **Prof Peter Cunningham** was appointed to the editorial board of the International Journal Advances in Developing Human Resources.
- **Prof Helize van Vuuren** (Language & Literature) was re-elected to the Literature Commission of the South African Academy for Science and Art.
- **Prof Ernst Kotzé** received the ATKV Awards in 2006 for lexicography in respect of his previously published (in Tokyo) Afrikaans-Japanese dictionary (with English translations) and Afrikaans Woordelys en Spelreëls (the officially recognised standard orthography of the language). He also received the Marnixring International Award (Belgian) in 2006 for the contribution to the development of Dutch (and Afrikaans) - the first South African to have received the award in 34 years.
- **Mariana Kriel** was awarded a Commonwealth Scholarship: PhD (third and final year).
- **Prof Bench Mkonto** (Language & Literature) was awarded the Department of Arts and Culture (DAC) Literary Award by the Inkolo kaNtu Heritage and Cultural Society for his Xhosa drama *Iphondo likaNtu*. He also published *Swamp Dancing*, a translation of his drama Emgxobhozweni.
- **Andrew Nhlanguwini** (School of Music, Art & Design) was commissioned by the Sunday Times Heritage Project to produce a work commemorating the artist George Pemba. He digitally translated a watercolour into an illuminated billboard outside Pemba's home, now the George Pemba Museum in Ferguson Road, New Brighton.

National and International Research Collaboration

- Prof Peter Cunningham, Prof Henk Pauw, Mr David Bogopa and Mr Ted Petrus are involved in a research project on "Racism and Ethnicity" under the French-South Africa Research Co-operation Agreement with colleagues from the University of Paris.
- Prof Peter Cunningham and Prof Henk Pauw are involved in a research project on intercultural communication with colleagues from the University of Applied Sciences, Nuertingen-Geislingen in Germany, Rhodes University and California State University Fullerton.
- Dr Otto Terblanche is involved in a collaborative research project on the relations between Belgium (Flanders) and South Africa, focusing on the political, cultural, academic and trade relations since 1945, with Prof Annick Schramme, of the University of Antwerpen, Belgium.
- A partnership between NMMU's Music Department and the Norwegian Academy of Music that started in October 2003 (whereby three doctoral candidates in choral music studies would be jointly trained and supervised by the two institutions) delivered its first graduate, Dr Bennie Oosthuizen, last year.

Visiting scholars

- Dr Kevin Goddard organised a symposium on "Hybridities" and hosted Prof Abdulrazek Gurnah from the University of Kent and Prof D Decaires-Narian from the University of Sussex.
- Dr Hilda Thomas hosted Mr Michel Le Roy, head of the Centre for Journalists in Paris.



Prof Thoko Mayekiso, Dean of the Faculty of Arts and Chairperson: Faculty RTI Committee



Mzikayise Shakespeare Binza, Emerging Faculty Researcher of the Year



Prof Bert Olivier, Faculty Researcher of the Year

Research Capacity Development

- Prof Peter Cunningham presented research methodology training workshops to postgraduate students in Mumbai, India.
- Prof Hilary Janks from the University of the Witwatersrand conducted a three-day workshop on postgraduate research supervision.

Inter-disciplinary and Multi-disciplinary Scholarships & Research

Dr Lyn Snodgrass is involved in a conflict intervention and research project in Walmer Township that is being co-ordinated by Prof Tilla Olivier of the Faculty of Education's Research, Technology and Innovation Unit.



Academic staff in the visual arts departments were actively engaged in the production and exhibition of a range of creative artefacts. "Bottles" (oil on canvas, 1000x1000mm) by lecturer Thys Cilliers was shown in a group exhibition by invitation at the Atlantic Art Gallery in Cape Town.



Research Entities

Raymond Mhlaba Research Unit for Public

The unit provides consultancy services to organisations, civil society movements and the business sector in South Africa and beyond. Shakes Binza: 041 - 504 2256

Unit for the Study and Resolution of Conflict

This unit offers research, training programmes and intervention in conflict management and related disciplines to the benefit of the Eastern Cape and international community. Dr Gavin Bradshaw: 041 - 504 2913

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Faculty of Business & Economic Sciences

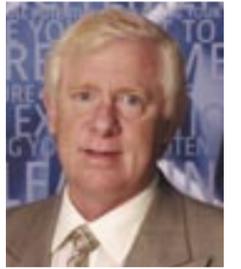
The establishment of NMMU defined a new life-cycle context for the faculty as it faced the challenges of seeking a new structural alignment, developing policy and procedural frameworks and capacity building.

The faculty made major advancements with these challenges. It constituted a Research, Technology and Innovation (RTI) committee and appointed a "faculty driver" for it, namely Prof Hendrik Lloyd. The RTI committee developed a policy and procedures framework to support, also financially, and quality-assure the research initiatives of the faculty. It also implemented a school/departmental/entity structure to provide the required leadership for future research developments.

Highlights

- During 2006 (graduation in 2007) seven staff members graduated with master's degrees and another two with their PhD. In 2007, 15 staff members published research in peer-reviewed, accredited journals and/or read papers at peer-reviewed conferences.
- The following staff members were rated by the NRF: Prof Johan Bosch (C); Prof Cecil Arnolds (L); Prof Laetitia Radder (L); Prof Miemie Struwig (L) and Prof Madéle Tait (Y).
- Various staff members also received grant funding from the NRF. In the category Institutional Research Development Programme, Prof Gideon Horn, Prof Laetitia Radder and JJ Pieterse received funding. Under the Thuthuka programme, Dr Leonie Jooste, Noluntu Dyubhele, Ronney Ncwadi, Shelley van Eeden and Dr Suzette Viviers received funding for research.
- **Prof Johan Bosch, Prof Madéle Tait and Dr Elmarie Venter** (Business Management) published a textbook for first-year BCom Business Management students titled *Business Management - An Entrepreneurial Perspective*.
- **Prof Jeff Rowlands** (Accounting) received the Deloitte Outstanding Accounting Academic Educator Award from the South African Accounting Association (SAAA) for the second time in four years.
- **Shelley van Eeden and Dr Elmarie Venter** (Business Management) presented two papers at the 51st ICSB World Conference 2006 in Melbourne, Australia, focusing on a proposed theoretical model for sibling partnerships and the importance placed on goals in small and medium-sized businesses in South Africa.

Prof Niekie Dorfling, Dean
of the Faculty of Business &
Economic Sciences



Prof Hendrik Lloyd, Chairperson:
Faculty RTI Committee



Prof Madéle Tait, Emerging
Faculty Researcher of the Year



Prof Piet Naudé, Faculty Researcher of the Year



The Founders Medal by the Economic Society of South Africa was awarded to MCom (Economics) candidate George Dimopoulos, right, with a study into the recreational value of water flowing into the Knysna, Groot Brak and Klein Brak estuaries. The degree was awarded cum laude. Prof Stephen Hosking, left, was the research supervisor and George's research was funded by the Water Research Commission of South Africa. This award was a first for NMMU.



Business Management researchers, from left, international student Ying Han, department head Prof Johan Bosch and Dr Elmarie Venter were the authors of a paper focusing on NMMU and its brand identity which was awarded the Best Paper Award at the 18th annual research conference of the South African Institute for Management Scientists (SAIMS) hosted by the University of Stellenbosch. The paper titled "Empirical findings on the impact of brand identity on the perceived brand image of a merged Higher Education Institution" was selected from the more than 86 papers presented at the conference. Ying Han obtained her MCom degree cum laude. Prof Johan Bosch and Dr Elmarie Venter were promoters of her dissertation.

Research Entities

Labour Relations and Human Resources Unit

Prof Mark Anstey: 041-504 2363

Tourism Research Unit

Peter Myles: 041-504 4089

Unit for Professional Ethics

Prof Piet Naudé: 041-504 2339

Unit for Applied Business Management

Prof Johan Bosch: 041-504 2201

Labour Relations and Human Resources Unit

This unit participated in commissioned research for the Eastern Cape AIDS Council and the Coega Development Corporation. Head of the unit Prof Mark Anstey was invited by the Electoral Institute of South Africa and the Carter Centre to address a pre-election workshop on dispute resolution in a post-election society in the Democratic Republic of the Congo. The unit consolidated its ongoing partnership with Michigan State University. Prof Anstey chaired a session at the Wits Business School organised by the Human Capital Institute, the Wits Business School, UJ & Deloitte with the aim of making Gauteng a winning province through effective talent management.

Tourism Research Unit (TRU)

In January 2006, the unit's head Peter Myles was accredited and registered as a tourism specialist with the European Commission (EC) to monitor

local economic development projects funded by the European Union (EU) in the African, Caribbean, Pacific (ACP) countries as well as South Africa and Cuba.

During the EU-SADC Tourism 2006 Partnership Meeting held in Namibia, October 2006, the Tourism Research Unit (TRU) was registered as an Intermediary Organisation (IO) with the EU-SADC Investment Promotion Programme. This means the TRU is registered to provide an intermediary service to project promoters and investors from the EU and SADC countries with specific reference to tourism investment projects.

Mr Myles was sponsored by the Eastern Cape Gambling & Betting Board (ECGGB) to attend the 5th Annual Conference on Gambling Research in Banff, Alberta, Canada. As a result of his report on gambling research, he was asked to prepare a gambling research agenda and submit a proposal requesting nearly R2m from treasury to fund the research study.

Unit for Applied Business Management

This unit, headed by Prof Johan Bosch, published 16 research papers in 2006, two of which were selected as best research papers at conferences. The unit also published an undergraduate business management textbook in which unit staff were contributing authors.

Unit for Professional Ethics

Unit head Prof Piet Naude received the Faculty Researcher of the Year award in 2006. He was elected President of Business Network of Africa (BEN-Africa) for 2005 to 2008, the organisation that won the bid to host the International Society for Business Ethics and Economics World Congress in 2008 in Cape Town.

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ROUSSEAU, G.G. The influence of gambling benefits and acceptability on casino gambling satisfaction. *Hyatt Regency*: San Antonio-Texas, USA, 24 - 27 May 2006.

VAN EEDEN, S.M. An exploratory investigation into the importance placed on selected goals by small businesses. *51st ICSB World Conference*: Melbourne, Australia, 18 - 21 June 2006.

VAN EEDEN, S.M. Factors influencing the success of sibling partnerships in family businesses: A proposed theoretical model. *51st ICSB World Conference*: Melbourne, Australia, 18 – 21 June 2006.

Faculty of Education

The research focus areas of the Faculty of Education are in line with some of the most significant needs of the education community at large and of the Eastern and Southern Cape in particular. These are: science and mathematics education, special needs education, educational management, curriculum studies, HIV/AIDS and initial teacher education. These research focus areas also coincide with the expertise and programmes currently offered in the faculty.

The directors of the two schools in the faculty (Professional Teacher Education and Specialised Studies in Education) liaise with schools in the metropole and with the Eastern and Western Cape's provincial departments of education to determine their particular needs in terms of research and continuous professional teacher development. This information is fed into the research agenda to improve service delivery and is taken into account when the relevance of the research focus areas is re-assessed.

Highlights

- Prof Nonnie Botha, chairperson of the Faculty RTI Committee, was appointed to the Advisory Committee of the Education and Challenge for Change Focus Area of the National Research Foundation (NRF) for March 2007 to March 2009.
- Prof Johanna Geldenhuys received a Witkin/Okonji Award from the International Association for Cross-Cultural Psychology for her presentations - "Career identities of South African first-year female Coloured students" and "South African street children and their aggression" - at the association's congress in Greece.

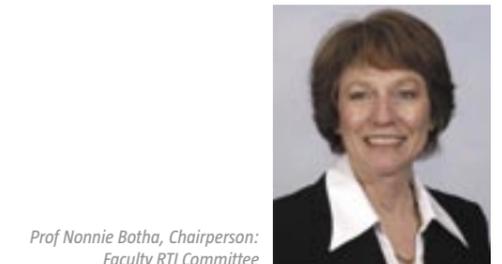
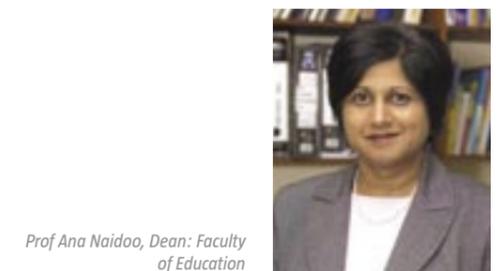
Masenze Umehluko Project, Motherwell

Dr Lesley Wood and Prof Tilla Olivier met teachers from six schools in Motherwell in 2005 to introduce a self-efficacy model designed by Dr Wood during her doctoral studies.

During 2006 these teachers were introduced to the visual methodology of photo voice and started to become change agents in their schools and community, presenting sessions to colleagues and community members.

This year video-documentaries were introduced as the third phase of the project whereby teachers could make videos that identified social issues in the community that impact on education. The various groups focused on the silence surrounding HIV.

By making a video about this issue, teachers hope to highlight the fact that remaining silent about HIV is having devastating results.





Walmer/Gqebera township teachers explored social issues using photo voice techniques as part of a multi-disciplinary development project facilitated by NMMU. The teachers took photographs in their schools and surrounding community to illustrate education in the area, with the aim of developing insight and fresh perspectives, as well as producing teaching aids that can also be used for raising community awareness.

Walmer Gqebera Township project

A four-tier project involving several staff members from various faculties under the leadership of Prof Tilla Olivier of the Faculty of Education Research, Technology and Innovation Unit (FERTI) kicked off in the impoverished Gqebera township in 2006 aimed at assessing various aspects of teaching, including conflict management and self-efficacy.

The project is also a partnership between three schools and is set to give these schools access to a host of services from the university and to give NMMU students practical hands-on research experience.

The first phase of the project focused on action research, to enable teachers to reflect on their values and analyse them in order to become better teachers. Researchers, however, discovered a contradiction since teachers involved in the project were generally not motivated. As a result, the second phase of the project, involving the use of the visual methodology of photo voice to highlight and raise awareness around a specific social issue of their concern, was introduced earlier than anticipated.

“In disadvantaged areas in particular, the teacher is perhaps the only resource available to ensure quality education continues. If we do not nurture that resource, it will be to the detriment of current and future generations and to our country at large,” says Prof Olivier.

The project is an evolving and emerging process and now also includes the

Department of Architecture in a project to decorate the high school hall.

Two more tiers of the project – youth resilience and peer mentoring – will be introduced when the teachers are less overloaded.

Faculty of Education Research Technology & Innovation Unit (FERTI)

This year this unit presented 12 conference papers, published in four conference proceedings and three papers in accredited journals. It also supervised 10 master’s students to graduation, ran eight community development/research projects, wrote 13 modules, developed an HIV/AIDS Advanced Certificate in Education (ACE) programme, generated funding for a number of projects, ran the combined international EASA/Kenton Conference at Wilderness, and facilitated a research open day for education in the Eastern Cape.

Last year the unit was equally active in various initiatives and events, including its international co-operation with the University of North Carolina on the Scientific Literacy Project, and the large tenders it won for various ACE programmes.

Faculty of Education Research, Technology and Innovation Unit
Prof Paul Webb: 041-504 4015

Publications

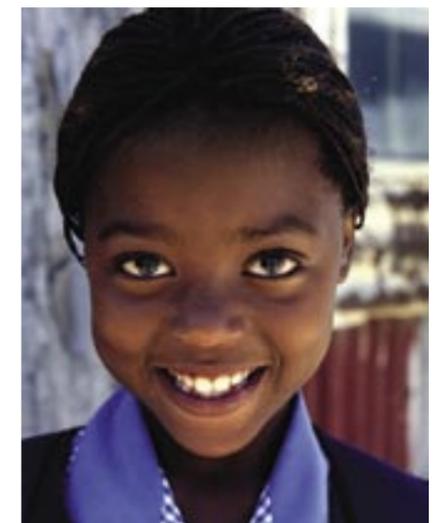
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Faculty of Engineering, the Built Environment & Information Technology

World-class research is being conducted in the Faculty of Engineering, the Built Environment & Information Technology, ranging from Friction Stir Welding (FSW), manufacturing technology and automotive manufacturing, to telecommunications, multimedia, information security, housing, construction processes and health and safety. The faculty is regarded by its peers, industry and professional bodies as one of the leading faculties of its kind in the country.

The faculty's drive towards research excellence gained tremendous momentum during 2006, with staff and students involved in applied, developmental and industry-related research. Moreover, although research within the faculty covers a broad range of fields, a research structure was created aimed at establishing a critical mass of research expertise in these areas. The structure entails two research institutes and two research units. These entities made significant progress in 2006 as indicated by the large number of publications, presentations and activities listed in this report.

Some innovation and commercial highlights include the official opening of the robot platform at Yenza Manufacturing by the Minister of Science, Engineering and Technology Mosibudi Mangena; the development of a handheld torque converter for the automotive sector; a project on the failure of exhaust silencers for a local small enterprise; the development of a low-cost, semi-automated cashew nut sheller; a project on stress tests for rear windscreen glass; a bicycle rickshaw project; and a project for a clutch manufacturer.

A new mechatronics laboratory was launched to complement the university's BEng Mechatronics degree, enabling students to be taught using the latest technology as used in industry and facilitating knowledge and technology transfer. Siemens Automation & Drives Business Unit contributed to the laboratory equipment, including 10 fully integrated automation workstations, and the Innovation Fund, AIDC and LN Manufacturing also provided funding.

International Chair in Automotive Engineering

In an effort to increase the pool of local engineering expertise that will contribute to the economic growth of the Eastern Cape, the faculty launched a partnership with Volkswagen South Africa and the German Academic Exchange Service (DAAD), worth R7-million over three years, to establish an International Chair in Automotive Engineering. It is anticipated that the initiative will significantly contribute to improved and relevant engineering education and high-level research and development at NMMU, and enhancement of technology transfer opportunities from higher education mainly into the small and medium enterprise (SME) automotive component supplier sector.

The International Chair will also create significant opportunities for postgraduate study and will fund four postdoctoral positions sourced from international partner universities as well as funding visiting professors. Respected academic Professor Hinrich Holdack-Janssen from the University of Braunschweig/Wolfenbüttel took up the chair early in 2007.

The main objectives of the Chair are to:

- Assist in the establishment of new research and development trends, opportunities and initiatives within the field of materials and manufacturing technology;
- Facilitate knowledge transfer into teaching and learning concepts and to integrate it in undergraduate and postgraduate engineering programmes; and
- Further international opportunities and co-operation between NMMU, German universities and the automotive industry.

Making industry more competitive

Due to the fast-changing, technologically-focused environment and the increasing demand for commercialisation of research, the faculty was involved in a number of contract research and other research projects for



*Prof Henk de Jager, Dean:
Faculty of Engineering, the Built
Environment & IT*



*Darelle van Greunen, Emerging
Faculty Researcher of the Year*



*Prof Rossouw von Solms, Chairperson: Faculty RTI Committee and
Faculty Researcher of the Year*

Prof Kobus van Wyk (Building) served on the Panel of Referees and Consultants of the refereed Journal for the Physical and Development Sciences Acta Structilia. He was also appointed to the International Advisory Committee of the International Conference on Engineering Research and Development: Impact on Industry, held in Nigeria, September 2006.



industry. Various partnerships were established with industry to carry out joint research projects in collaboration with Eskom, Pebble Bed Monitor Research, SAP Research, and the CSIR. Furthermore, THRIP projects were approved and extensive funding support was received from the NRF. VWSA also donated a laser welding cell; the Siemens Mechatronics Laboratory was officially opened in May 2006; a joint project with General Motors SA in the field of intelligent maintenance was launched and an agreement was signed with the GMSA Foundation to enhance the existing co-operation in housing and education.

Co-operation with industry and other institutions is viewed by the faculty as an important building block towards our research successes. The faculty has close relationships with international universities and research institutes such as the universities of Michigan, Plymouth, Florida, Reutlingen, Sheffield, and Goethe, and the universities of Applied Sciences of Braunschweig-Wolfenbüttel, Ingolstadt, and Esslingen, the European Synchrotron Radiation Facility (ESRF) and the Institute Laue-Langevin (ILL).

Research Entities

SCHOOL OF INFORMATION & COMMUNICATION TECHNOLOGY

Institute for ICT Advancement (IICTA)
Prof Rossouw von Solms: 041-504 3604

Cisco Academy Training Centre (CATC)
Mr Renaldo Rheeder: 041-504 3568

Centre for Information Security Studies (CISS)
Prof Rossouw von Solms: 041-504 3604

Spatial Technologies Unit
Dr Dalenca Pottas: 041-504 3668

Dragon Technology
Mr Jacques Wessels: 041-504 3587

SCHOOL OF ENGINEERING

Institute for Advanced Manufacturing Research (IAMER)
Dr Annelize Els-Botes: 041-504 3091

Automotive Component Technology Station (ACTS)
Prof Danie Hattingh: 041-504 3608

Manufacturing Technology Research Centre (MTRC)
Dr Annelize Els-Botes: 041-504 3091

Advanced Mechatronic Technology Centre (AMTC)
Mr Karl du Preez: 041-504 3644

SCHOOL OF THE BUILT ENVIRONMENT

Unit for the Study of Construction Processes (USCP)
Prof John Smallwood : 041-504 2551

Unit for Building Research and Support (UBRS)
Mr Kobus Bekker: 041-504 3075

Institute for ICT Advancement (IICTA)

The IICTA hosts the Centre for Information Security Studies (CISS). The niche area "Business information risk and security" under the leadership of Prof Rossouw von Solms (an NRF B-rated researcher) was approved by the Institutional Research Development Programme (IRDP) of the NRF in 2006. Information Security has been a focal point at NMMU for more than a decade.

The success of the research activities in the CISS is well known and 2006 was no exception - 21 students obtained postgraduate degrees and 10 journal articles, six international and 15 national conference papers stemmed from its researchers. The success of the CISS is directly dependent on the applied nature of the research undertaken, in many cases with industry involvement.

Unit for the Study of Construction Processes (USCP)

This unit serves as an avenue for rendering community service, conducting research, publishing, and disseminating information.

The USCP's research areas include construction health and safety, and facilities/maintenance management. This is further complemented by a range of postgraduate research studies including MSc and PhD degrees in the Built Environment, Construction Economics, Construction Management and a coursework MSc (Built Environment) which includes the unique specialisation field of Construction Health and Safety Management, under the leadership of Prof John Smallwood.

The USCP is recognised for its role in co-organising national and international conferences, including the First Built Environment Conference in Johannesburg in June 2006.

Through this unit, five peer-reviewed journal papers and 24 peer-reviewed conference papers were published in 2006. The conference papers were presented at a range of international congresses, conferences, and symposia, the subject areas being: the built environment; construction in developing countries; construction economics; construction management; cost engineering; ergonomics, and health and safety. The MSc (Built Environment) programme produced two graduates in 2006.

NMMU along with three other higher education institutions founded the Association of Schools of Construction of Southern Africa (ASOCSA) at the First Built Environment conference. ASOCSA aims to be the professional association for the development and advancement of construction education in Southern Africa, where the sharing of ideas and knowledge inspires, guides and promotes excellence in curricula, lecturing, research, and service. The USCP and related departments are likely to derive substantial indirect benefits from the establishment and growth of ASOCSA.

Unit for Building Research and Support (UBRS)

This unit is doing groundbreaking action research by creating opportunities for small and emerging contractors with a strong focus on black economic empowerment, capacity building and job creation, resulting in quality projects. This is backed up by fundamental research in housing.

The success of the UBRS is evident from the awards bestowed upon some of the projects in which it fulfilled an instrumental role during 2006. These included the South African Housing Foundation Award for Housing Project of the Year in the category of units below R80 000 per unit – in recognition of an innovative approach to demonstrating effective higher residential densities. The Impumelelo Innovations Trust 2006/7 Platinum Award was also granted for innovative work in the field of poverty reduction and community development and acknowledges the contribution made to public life in South Africa in the subsidised housing market.

Both these awards related to the 337 low-income subsidised housing units built at Sakhashonke Village in Walmer under the on-site mentorship and training of the UBRS. The project was visited by various dignitaries including Eastern Cape Premier Nosimo Balindlela, officials and consultants from throughout South Africa including 22 councillors and officials from the Ekurhuleni Metro housing departments as well as many international visitors.

The houses, complete with pathways, public areas and landscaping by the small contractors were hailed as "a model towards which other housing projects should strive to achieve" and "an affordable quality project".



Prof John Smallwood,
leader of the Unit for the
Study of Construction
Processes

Institute for Advanced Manufacturing and Engineering Research (IAMER)

This institute, in the School of Engineering, focuses on the development and improvement of discrete part manufacturing processes for the automotive industry, with the emphasis on innovative development of manufacturing technologies through mechatronics system design, material characterisation, on-line industrial monitoring and increased system intelligence.

This approach has already yielded positive benefits. The integrated approach to manufacturing via process monitoring and control, supported strongly by material performances and characterisation of the final product to ensure a component/process of high quality in all aspects has been applauded internationally.

IAMER houses the Automotive Component Technology Station (ACTS), the Manufacturing Technology Research Centre (MTRC) and the Advanced Mechatronic Technology Centre (AMTC).

NMMU is regarded internationally as one of the key role players in the field of friction stir welding and outstanding progress has been made in determining the sensitivity in mechanical and metallurgical properties of a friction stir weld joint due to joint gap variation.

This will enable industrial users to determine optimum gap tolerances and improved quality control. Furthermore, the niche area "manufacturing technology" under the leadership of Prof Danie Hattingh was also approved by the IRDP of the NRF during 2006.

Automotive Components Technology Station (ACTS)

ACTS forged ahead with research papers, international links and hosting high profile visitors such as the Minister of Science and Technology. Deputy Minister Derek Hanekom also visited ACTS to see first-hand the station's projects assisting industry and small and medium enterprises. ACTS technology manager Prof Danie Hattingh demonstrated a prototype cashew nut sheller, designed to improve productivity in the high-volume cashew nut processing industry. The project is solely funded by the Tshumisano Trust Technology Station Programme, a Department of Science and Technology funded organisation.

1ST ALL AFRICA TECHNOLOGY DIFFUSION

The 1st All Africa Technology Diffusion Conference in 2006 focused on how research and innovation in government-funded academic institutions could provide solutions for SMMEs and societies to be more competitive, thereby meeting pressing economic and societal needs. ACTS presented a paper titled "Technology Transfer by means of Technology Platforms".

INTERNATIONAL LINKS

ACTS staff continued to entrench their international ties through activities including:

- A visit to ACTS by Prof Neil James (Pro-Vice Chancellor and Dean: Faculty of Technology, University of Plymouth, England) and Dr Axel Steuwer (Facility for Materials Engineering (FaME38), European Synchrotron Radiation Facility - ILL) in July, during which the residual stress state in friction stir welds in AA5083-H321 alloy as a function of varying process parameters using synchrotron X-ray diffraction measurements was discussed and reworked into a scientific paper. This information is essential in order to advance our ability to predict optimised process conditions for making FSW joints.
- Researchers at the University of Plymouth performed microstructural analysis for optimising the FSW process on samples produced on

machines at NMMU.

- A visit to The Welding Institute (TWI) to investigate close co-operation in the fields of metal joining, with a specific emphasis on light metals. Special attention was given to ACTS possibly looking at linear friction welding of titanium.
- Prof Hattingh and Hannelie Lombard presented a paper on "Synchrotron Diffraction Residual Strain Scanning in Friction Stir Welding as a function of process condition" at the 6th International Symposium on Friction Stir Welding (FSW) in Canada in October.

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A delegation from the Department of Science and Technology visited NMMU on 7 April 2006 to sign two grant agreements, for the Automotive Components Technology Station and the Downstream Chemical Technology Station. Acting Deputy Vice-Chancellor: Research, Technology & Planning Prof Irene Moutlana and Minister of Science and Technology Mosibudi Mangena signed the agreement.



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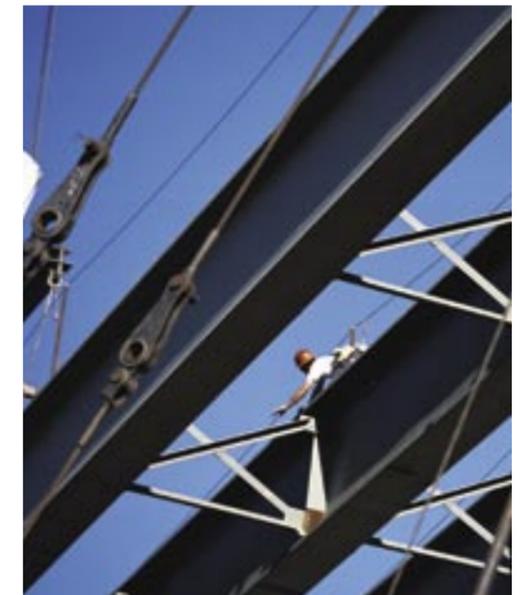
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Faculty of Health Sciences

The diverse range of training programmes for professional health disciplines offered by the Faculty of Health Sciences largely shape the research undertakings of the faculty. Academics conduct research and supervise postgraduate students in various sub-fields of nursing science, pharmacy, human movement science, biokinetics, psychology, environmental health, social work, youth work, and biomedical technology.

Individual researchers have also gained international recognition in the fields of career psychology, child development, effective drug utilisation, and the development of synthetic dipeptides having potential oncological application.

With such an array of research activities, the faculty strives towards the realisation of its mission of preventing and treating illness, and enhancing health and wellness for the betterment of the community. In promoting these endeavours, it also prides itself on national and international public and private sector collaborative partnerships, which have added value for all its stakeholders.

Highlights

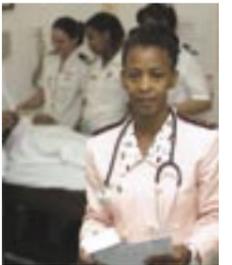
- Prof Rosa du Randt, of the Department of Human Movement Science and Sport Management, was appointed to the Sport Research Commission of the Department of Sport and Recreation South Africa (SRSA).
- Dr Henri Maarschalk, of the Department of Environmental Health, presented a paper titled "A conceptual framework for the development of a South African Environmental Health information system for decision-making" at the 9th World Congress on Environmental Health in Dublin, Ireland. The primary aim of the presentation was to demonstrate how environmental health indicators could be used in strategic planning and to monitor progress towards sustainable development.
- Prof Pieter Milne (Pharmacy) was re-appointed to the Medicines Control Council Pharmaceutical/Bioavailability expert committee. Prof Milne was awarded the FARMOVS prize in Pharmacology and Drug Development by the South African Academy of Sciences and Arts, South Africa's highest award for Pharmacology and Drug Development research.
- Dr Nanette Smith, of the Department of Biomedical Technology and Radiography, did a presentation on "Antibacterial Activities of Four South African Plants Traditionally Used to Treat Infections Associated with Burn Wounds", co-authored with Esther Baxter of the same department, at the 9th International Congress on Ethnopharmacology, in Guangxi, China, in August 2006.
- Prof Ilse Truter (Pharmacy) was elected to the steering committee of the Drug Utilisation Research Special Interest Group of the International Society for Pharmacoepidemiology (ISPE) and as the convener of a cross-national comparative study group. Prof Truter is a member of the Research and Development Task Team of the South African Pharmacy Council, which is conducting a major research project on the services provided by pharmacists in South Africa in which all pharmacy schools in South Africa are participating.
- Prof Ilse Truter published a chapter titled "Antidepressant prescribing to adolescents and young adults" (TE Kairuz & I Truter) in *Focus on Serotonin Reuptake Inhibitor Research*. She published nine review articles in the *South African Pharmaceutical Journal* during 2006 and also presented papers at the following conferences: *20th Annual Conference 2006 of the South African Association of Hospital and Institutional Pharmacists (SAAHIP)*, Wilderness, March 2006; *the 7th Eastern Cape Health Research Conference*, incorporating the NMMU Faculty of Health Sciences Annual Student Research Conference, NMMU, August 2006; *the 22nd International Conference on Pharmacoepidemiology and Therapeutic Risk Management*, Lisbon, Portugal, August 2006; and *the 4th International Conference on*



Prof Raj Naidoo, Dean: Faculty of Health Sciences



Prof Rosa du Randt: Chairperson; Faculty RTI Committee



Dr Sindiwe James, Emerging Faculty Researcher of the Year



Prof Mark Watson, Faculty Researcher of the Year

Pharmaceutical and Pharmacological Sciences (ICPPS), Gauteng, September 2006. She also attended *The Pharmaceutical Society of South Africa (PSSA) 61st Conference & AGM* (Theme: Pharmacy Indaba), Johannesburg, May 2006, as vice-chairman of the Cape Midlands Branch of the PSSA. Prof Truter also successfully completed the 6th Annual Research Methods Training Course presented by Effective Care Research Unit, Department of Obstetrics and Gynaecology, East London Hospital Complex, Eastern Cape Department of Health, in collaboration with the University of Fort Hare and the South African Cochrane Centre, Port Elizabeth, in August 2006.

- Elsevier Publishers appointed Prof Dalena van Rooyen, of the Department of Nursing Science, as the South African editor of the textbook *Foundations of Nursing Practice* (Chris Brooker & Anne Waugh) and to lead a team of specialist contributors in adapting an existing UK textbook *Fundamentals of Nursing Science* (Brooker & Waugh) for the African context. Together with Prof George Ellison (Kingston University, United Kingdom), Prof Van Rooyen also received a grant from the British Council for Higher Education SA for a research project focused on evidence-informed decision-making in the absence of definitive evidence in relation to HIV care in South Africa. This is an interdisciplinary, inter-institutional research project at NMMU and other SA universities.
- Prof Mark Watson (Psychology) was elected to the editorial board of the British Journal of Guidance and Counselling. Prof Watson also published eight book chapters and co-edited a second edition of *Career Psychology* in the South African context. He was an invited international keynote speaker at the *Australian Association of Career Counsellors International Conference* in Sydney, Australia, and delivered a paper at the *26th International Congress of Applied Psychology*, Athens. He was also a national keynote speaker at the *Society for Student Counselling in Southern Africa* conference at Mpekweni in the Eastern Cape.

Provincial Research Conference

The Health Sciences Faculty hosted the *7th Eastern Cape Health Research Conference* in August 2006. This conference, sponsored by the Eastern Cape Department of Health, was attended by about 200 health department officials, other health professionals and academic colleagues.

Research entities

Cyclic Peptide Research Unit

Prof Pieter Milne: 041 – 504 2760

Drug Utilisation Research Unit

Prof Ilse Truter: 041 – 504 2131

Drug Utilisation Research Unit (DURU)

“You cannot manage if you cannot measure ...” With this adage in mind, the first formal Drug Utilisation Research Unit (DURU) in South Africa was established in February 1994.

The unit started off as a commercial unit conducting projects for the medical aid and pharmaceutical industry, but gradually turned into a research unit. In just more than 13 years, DURU has produced over 30 refereed research articles, over 180 local and international conference presentations, and successfully supervised 11 masters’ studies, two doctorates and 20 honours level treatises, with a further five postgraduate studies underway. Last year DURU was registered as an official NMMU Research Entity with Prof Ilse Truter as director.

Drug utilisation research is defined by the World Health Organisation as the marketing, distribution, prescription, and use of medicine in a society with special emphasis on the resulting medical, social and economic consequences. It is a multi-disciplinary research area, and is ideally suited for a person with expertise in both business management and pharmacy. Prof Truter is one such person with a DCom in Business Management, and doctorate in Pharmacoepidemiology.

Although studies on a variety of topics have been undertaken by DURU, most of the current projects focus on central nervous system disorders such as anxiety and depression, attention-deficit hyperactivity disorder and pain management, and the management aspects related to medicine prescribing and use in general. Although research is academically focused, studies are practically orientated and the results are fed back to industry and the community.



Prof Ilse Truter,
Head: DURU



Publications

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ELKONIN, D.S. & SANDISON, A. 2006. Mind the gap: Have the registered counsellors fallen through? *South African Journal of Psychology* 36(3), pp 598 - 612.

FOUCHE, J.P., GOUWS, C., CLOETE, P. & NAIDOO, S. 2006. Biopsychosocial coping and adjustment of adult female irritable bowel syndrome patients. *South African Journal of Psychology* 36 (4), pp 780 - 794.

PRETORIUS, B.M.L., TERBLANCHE, S.S & TSHIWULA, J.L. 2006. A model for ‘restor (e) ying’ with youth to prevent relationship violence. *The Social Work Practitioner – Researcher* 18 (3), pp 366 -388.

BORNMAN, S., TRUTER, I. & VENTER, D.J.L. 2006. Public perception of community pharmacists in South Africa: A preliminary study. *Health SA Gesondheid* 11 (3), pp 27- 40.

KATENDE-KYENDA, N.L., LUBBE, M.S., SERFONTEIN, J.H.P. & TRUTER, I. 2006. Inappropriateness of antimicrobial prescription in private primary health care settings in South Africa. *South African Medical Journal* 96 (8), pp 704 - 705.

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WATSON, M.B. 2006. Career decision making and career indecision in: G.B. STEAD & M.B. WATSON (Eds). *Career psychology in the South African context.* Van Schaik: Pretoria.

WATSON, M.B. 2006. The career development and systems theory: enhancing our understanding of career in: G.B. STEAD & M.B. WATSON (Eds). *Career psychology in the South African context.* Van Schaik: Pretoria.

WATSON, M.B. 2006. The career development theory of Donald Super in: G.B. STEAD & M.B. WATSON (Eds). *Career psychology in the South African context.* Van Schaik: Pretoria.

WATSON, M.B. 2006. Career counselling theory, culture and constructivism in: M. MCMAHON & W. PATTON (Eds). *Career counselling: Constructivist approaches.* Routledge: London

WATSON, M.B. 2006. Indigenisation of career psychology in South Africa in: G.B. STEAD & M.B. WATSON (Eds). *Career psychology in the South African context.* Van Schaik: Pretoria.

The Faculty of Law, although one of the smallest faculties at NMMU in terms of staff numbers, experienced a tremendously fruitful and successful year of participating in and producing research of exceptional quality. The faculty produced 23 articles in accredited journals and was involved in the publication of several books, and revisions of chapters for books.

Publication and revision of books

- Of particular significance are the sustained contributions in the fields of property law and practice and mineral and petroleum law of Prof Pieter Badenhorst (in Badenhorst, Pienaar and Mostert) Silberberg and Schoeman's *The Law of Property 5th edition* (Butterworths LexisNexis), the *Butterworth's Compendium of the Bill of Rights*, as well as *Revision Service 2* (of Badenhorst and Mostert *Mineral and Petroleum Law of South Africa: Commentary and Statutes*) and Prof Henk Delpport (with *Revision Service 13 of Delpport South African Property Practice and the Law* (Juta)).
- Notable new contributions are those of Prof Patrick Vrancken on tourism law (in the *Max Planck Encyclopedia of Public International Law* and in George (ed) *Managing Tourism in South Africa* (Oxford University Press)) and Dr André Mukheibir on the law of delict (in the *Annual Survey of South African Law* (2005)).
- Dr Avinash Govindjee co-authored two textbooks: *Fresh Perspectives: Commercial Law 1* and *X-Kit: Undergraduate Commercial Law*.

Papers delivered at international, national & regional conferences

Prof Narnia Bohler-Muller delivered a paper on human rights at the *Critical Legal Studies Conference*, NALSAR University, Hyderabad, India. Several staff members participated in national, regional and local conferences.

Publication of accredited law journal

Since 1979 the faculty has published the accredited law journal *Obiter*, under the editorship of Prof Adriaan van der Walt since 1993. *Obiter* accommodates the publication of peer-reviewed research articles of national and international authors. During 2006 three non-academic authors, 28 academics from eight different universities, 11 NMMU staff members, three ex-NMMU law students and a current NMMU law student published/co-published in *Obiter*.

Postgraduate qualifications obtained

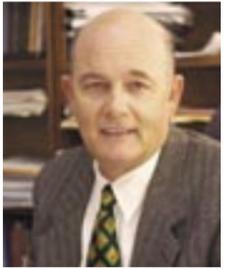
Two staff members obtained their doctorates - Prof Narnia Bohler-Muller obtained her LLD at the University of Pretoria and Dr John von Bonde completed his LLD at NMMU (degree awarded in April 2007).

Postgraduate students

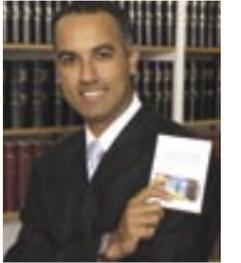
The faculty delivered four postgraduate diplomates, 11 LLM coursework graduates (Labour Law and Criminal Justice), two LLM research graduates and one doctoral student.

Hosting of conference

For the second year in succession, in collaboration with the Faculty of Law of the University of the Western Cape, the faculty hosted the *Third Annual Law Conference of the Universities of the Western and Eastern Cape*. The conference



Prof Christo van Loggerenberg,
Dean: Faculty of Law



Dr Avinash Govindjee, Emerging
Faculty Researcher of the Year



Prof Elmarie Knoetze, Chairperson: Faculty RTI Committee and
Faculty Researcher of the Year

serves as forum for the presentation of papers and sharing of research expertise of both young and established researchers of the University of the Western Cape, NMMU, Rhodes University, the University of Fort Hare, and the Walter Sisulu University of Science and Technology. Through this annual conference research collaboration between universities is established and collegial links fostered.

Research and the profession

During 2006 the faculty continued to maintain its strong research links with the legal profession. Prof Henk Delpport presented a number of seminars to property practitioners, mostly for the attorneys' profession, on the impact of the National Credit Act on property transactions. Moreover, he is the author of a rubric, titled "Recent Articles and Research" in the attorneys' journal *De Rebus* (6 issues), and the general editor of the *Commercial Law Bulletin* (6 issues).

Participation in legislative drafting

Eugene van der Berg made submissions on behalf of the National Arms and Ammunition Collectors Confederation of South Africa to the Portfolio Committee for Safety and Security on the Firearms Control Amendment Bill. He also participated in the Minister of Safety and Security Imbizo on the Implementation of the Firearms Control Act.

Research entities

Institute for Sustainable Government and Development (ISGAD)

Prof Hennie van As: 041-504 1200

Labour and Social Security Law Unit (LSSLU)

Prof Adriaan van der Walt: 041-504 2199

Institute for Sustainable Government and Development (ISGAD)

In 2006 ISGAD positioned itself as a major role player in the Eastern and Western Cape to enhance service delivery within the local sphere of government, to promote a safe and healthy environment and to regulate society. To this end it embarked upon the development of policies and the drafting and promulgation of by-laws for more than 20 municipalities. Some of these legislative instruments have been, or are in the process of being, used as national benchmarks. Matters that were researched include aspects such as informal trading, cemeteries and crematoria, water services, electricity, outdoor signage, safety and security, disaster management, community fire safety, municipal health, and public amenities. ISGAD is a self-funding entity that contributes towards the generation of additional income at NMMU.

Labour and Social Security Law Unit (LSSLU)

The special achievements of the Labour and Social Security Law Unit under Prof Adriaan van der Walt were the re-launch of the Practical Labour Law programme and the labour law capacity developed by the programme. Three students who underwent the programme qualified and are proceeding with an LLM in Labour Law. Moreover, the awarding of the LLM degree to Mr David Holness for research on poverty alleviation is a further highlight since the unit focuses on poverty relief and the role of the constitution in this regard.

Writing for legal transformation

“I write what I like” - Steven Bantu Biko

Researching, teaching and practising law in South Africa today is exciting due to the transitory nature of law and justice in a post-conflict community such as ours. It is this excitement that injects me with the energy and passion to write. In my chosen area of study, namely gender justice and equality, there have been numerous changes over the last 13 years since the birth of our constitutional democracy and these legal, political and social changes have come a long way in eliminating the oppression and suffering of human beings. But, the high instance of violent crime against women and the distressingly increasing prevalence of rape and sexual assault indicate that all is not as it should be in an egalitarian society. However, rather than adopting a sense of hopelessness about the future, this ignites even more my passion to write.

In my research I adopt a multi-disciplinary approach that broadly falls into the “category” of critical legal theory. This approach encompasses a critical analysis of where we come from and where we are headed in terms of legal and societal transformation and constitutes a careful reading of the jurisprudence of the Constitutional Court in particular. Drawing inspiration from the radical potential of the rights to dignity and equality in our Bill of Rights, I argue that rights such as these do not only require formal legal changes to be brought about, but also hold the promise for building, in a substantive manner, a just and caring community based on respect for diversity and “otherness”.

The focus of my work over the past year has been on the relationship between law, ethics and politics, and the impact of the African philosophy of ubuntu

Prof Hennie van As,
Director, ISGAD



The transitory nature of law and justice in a post-conflict community such as South Africa injects Prof Narnia Bohler-Muller, who received her Doctorate in Law in the year under review, with the energy and passion to write. Her research is multi-disciplinary and if it must be categorised, she would index it under “critical legal theory”. Here she writes about what she researches, why, and its relevance in South Africa today.



on our legal system. With respect to the latter, my research focused on the juridification of the value of ubuntu by our highest courts and the ways in which this has led to a more compassionate approach to individuals seeking justice. The importance of these legal developments in the light of discourses around what President Mbeki has termed the African Renaissance cannot be underestimated.

In my work I aim to bring across different perspectives – perhaps what can be termed “minor narratives” – and to use these perspectives to encourage critical thought and real change. I also aim to use whatever knowledge I have as a public intellectual by writing for newspapers on current and controversial issues, thereby keeping in touch with what is happening “out there”.

Issues of gender justice touch on how we can, as women and men, learn to live together differently outside patriarchal systems, and how the law can accommodate this “living differently”. What I write does not necessarily set universal precedents, but if a few minds are opened, I will continue to write what I like and to be grateful for the privilege of doing so.

Publications

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BOHLER-MULLER, N. 2006. The law of the father, emotions and equilibrium. *South African Public Law* 21 (1), pp 1 - 16.

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KENNEDY-GOOD, S. & COETZEE, L. 2006. The business judgment rule (Part 1) *Obiter* 27(1), pp 62 - 74.

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OLIVIER, M. 2006. Anyone but you, M’Lord: The test for recusal of a judicial officer. *Obiter* 27 (3), pp 606 - 618.

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VAN DER BERG, E. & CARNELLEY, M. 2006. A case of misfiring? *Obiter* 27 (3), pp 645 - 662.

VAN DER WALT, J.A. & KITURI, P. 2006. The equality court’s view on affirmative action and unfair discrimination – Du Preez v The Minister of Justice and constitutional development. *Obiter* 27 (3), pp 674 - 681.

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VRANCKEN, P.H.G. 2006. New Mpumalanga tourism legislation. *Obiter* 27 (2), pp 351 - 357.

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GOVINDJEE, A. 2006. Negotiable Instruments in: W.A. JOUBERT (Founding Ed), J.A. FARIS (Planning Ed), L.T.C. HARMS. *The law of South Africa*. Butterworths: Durban.

Faculty of Science

2006 proved to be a busy year for the Faculty of Science. Some R28m in external research funding came to the faculty from various sources including government research grants like the National Research Foundation (NRF), Technology and Human Resources for Industry Programme (THRIP), Water Research Commission (WRC) and the Medical Research Council (MRC), funding from industry for specific contract research projects, and support for postgraduate students in the form of bursaries and running funds.

About 50% of the international postgraduate students at NMMU are in the Science Faculty, and many are from other African countries, such as Namibia, Botswana, Zimbabwe, Kenya, and Uganda.

These students continue to excel and contribute to the research stature of the faculty. The faculty also benefits from various funding programmes such as the African Laser Centre, which seeks to provide resources for partner groups to engage in research together.

The faculty currently has six research entities, in which much of the faculty's research activities are concentrated. InnoVenton, a large research institute housed in the Department of Chemistry, receives considerable funding from the Tshumisano Trust, THRIP and industry partners, and has been extremely successful. Headed by Prof Ben Zeelie, InnoVenton has linked with local and national industry to solve chemistry-related problems, optimise processes and provide valuable analysis services, and train diplomates and postgraduate students for much-needed employment in industry.

Research entities

Institute for Chemical Technology, Downstream Chemical Technology Station, and InnoVenton
Prof Ben Zeelie: 041- 504 3281

Telkom Centre of Excellence
Prof Janet Wesson: 041- 504 2087

Centre for African Conservation Ecology (ACE)
Prof Graham Kerley: 041- 504 2316

Centre for Energy Research
Dr Ernest van Dyk: 041- 504 2259

Research Unit for Platinum Group Chemistry
Prof Jan du Preez: 041- 504 2286

Integrated Environmental and Coastal Management Unit
Dr Derek du Preez: 041 – 504 2721

The **Telkom-sponsored Centre of Excellence**, directed by Prof Janet Wesson, focuses on two areas of research: distributed multimedia applications, and optical fibre characterisation. For the past number of years the centre has received considerable funding from Telkom and other related industries in the telecommunications industry, as well as from government, for research aimed at addressing important telecommunications issues in southern Africa.

Prof Jan Neethling, of the Department of Physics, was awarded a R8.4m contract as part of the **Pebble Bed Modular Reactor (PBMR)** project, to characterise the silicon carbide (SiC) and pyrolytic carbon coatings protecting the nuclear fuel particles to be used in the next generation of high-temperature, gas-cooled nuclear reactors for South Africa.

Prof Neethling must also recruit and train a highly-skilled research group to assist with the PBMR nuclear fuel characterisation and development programme.

The specialised study involves high resolution transmission electron microscopy (TEM), the field in which Prof Neethling is the undisputed leader in South Africa. This exciting project is likely to continue into the future, as the country urgently explores ways of increasing its energy capacity to provide for the growing economy.



*Prof Andrew Leitch, Dean:
Faculty of Science and
Chairperson, Faculty RTI
Committee*



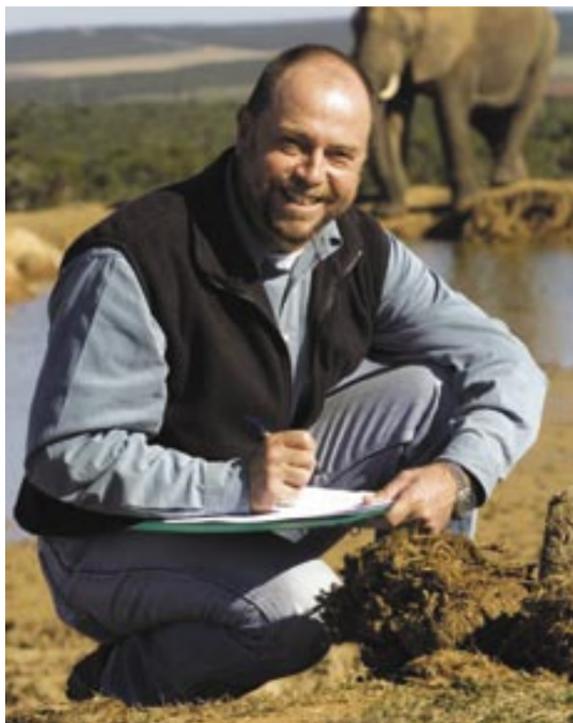
*Dr Charmain Cilliers, Emerging
Faculty Researcher of the Year*



Prof Richard Cowling, Faculty and NMMU Researcher of the Year

Also on the subject of energy, the Centre for Energy Research (CER) was established late in 2006 as a multi-disciplinary research centre, aimed at addressing various research issues related to energy, especially renewable energy. Directed by Dr Ernest van Dyk, the centre aims to bring together researchers from various backgrounds including science, engineering and economics.

They currently have several exciting projects in which photovoltaic (solar) energy and solar thermal hot water systems are being researched for use in the Eastern Cape.



Prof Graham Kerley,
director of The Centre
for African Conservation
Ecology (ACE)

The Centre for African Conservation Ecology (ACE) with Prof Graham Kerley as director, continued to be involved in a variety of terrestrial research projects in the Eastern Cape. Formerly known as TERU, the Centre for African Conservation Ecology (ACE) was renamed during the registration process in 2005. One of the current projects (conducted by Dr André Boshoff for Eskom) is a study on the best routing of future high tension power-lines in the Eastern Cape, with special emphasis on the protection of the threatened Cape vulture.

The Science Faculty is extremely proud of **Yatish Jagannath**, of the Department of Chemistry, who was awarded the Rupert Gesinstigting prize for the best postgraduate student at NMMU. Jagannath is continuing his PhD studies in Inorganic Chemistry, promoted by Prof Jan du Preez. Prof Tommy Gerber, one of the top researchers in the institution, had a scientific paper identified as one of the ten most downloaded publications from the international *Journal of Coordination Chemistry* during 2006.

Another of the Science Faculty's top researchers is world-renowned botanist **Prof Richard Cowling**. With an NRF A-rating, Cowling continues to make an international impact as an authority on the Eastern Cape's subtropical thicket biome. His research, along with that of his colleagues Profs Eileen Campbell and Janine Adams, continues to attract the attention of peers and students from across the country and further afield. (See feature on Prof Cowling on page 5).

The Eastern Cape is also home to a wide variety of plant species known to have medicinal properties. One research focus area of the **Department of Biochemistry and Microbiology** is the study of some of these indigenous plants for the treatment of diabetes and cancer. This exciting project has received international support.

Equally important in the department is the cyanobacteria research of Dr Tim Downing. In support of his research, he received a R1m grant from the Water Research Commission.

The anti-cancer work of the **Research Unit for Platinum Group Chemistry** is of international significance. Directed by Emeritus Professor Jan du Preez, the unit attracts considerable funding from industry to support ongoing research in the use of platinum for anti-cancer treatment. The unit includes highly-motivated postgraduate students working on various chemistry-related

aspects of this important area.

The faculty is also proud of the research activities of **Dr Hennie Boshoff** and his team in the Mathematics Department. Through their school learner programmes run every Saturday throughout the year as part of the Govan Mbeki Sasol Maths Development Programme (GMSMDP), they have pioneered new learning methods in the important area of maths education. The faculty will benefit from their efforts as future students to NMMU are increasingly likely to have passed through the learnership programme.

Highlights and achievements

- Prof Eileen Campbell (Botany) was elected President of the Phycological Society of Southern Africa.
- Prof Japie Engelbrecht (Physics) was re-elected to the executive of the Condensed Matter Physics and Materials Science Specialist Group of the South African Institute of Physics (SAIP), while Dr Ernest van Dyk and Freddie Vorster were voted onto the Applied and Industrial Physics Specialist Group committee. Physics PhD student Chantelle Radue served as a student representative on the Applied and Industrial Physics Specialist Group committee.
- Prof Engelbrecht was an invited speaker at the First Training College on Optics and Lasers at the University of Namibia in Windhoek. He also delivered an educational public talk titled "Voodoo Science" as part of the National Science Week hosted at the university.
- Dr Carminita Frost (Biochemistry & Microbiology) was appointed as a member of the NRF Assessment Panel for Biochemistry.
- Prof Ryno Naudé (Biochemistry & Microbiology) was selected as the principal South African researcher in a research project titled "Biochemical studies on ostrich meat as a healthy, natural food resource", part of the South Africa-Japan Research Partnership Programme which is jointly sponsored by the National Research Foundation (NRF) and the Japanese Society for the Promotion of Science (JSPS). Drs Vaughan Oosthuizen and Benesh Somai (Biochemistry & Microbiology) are also members of the South African research team.
- Prof Jan Neethling was re-elected to the executive committee of the Microscopy Society of Southern Africa (MSSA), and the Physics Department hosted the MSSA 2006 conference.



Science and Technology Deputy Minister Derek Hanekom (seated) visited the NMMU branch of the Department of Science and Technology (DST) Centre of Excellence (CoE) in Strong Materials. Prof Jan Neethling, demonstrating the transmission electron microscope in the Physics department, leads the NMMU branch of this Centre of Excellence. Prof Neethling, Dr Pearl Berndt, and their students participate in four of the six focus areas of the CoE - ceramic materials, diamonds, strong metallic alloys and hard metals. The NMMU unit is the leading South African institution for the characterisation of ultra-hard materials using transmission electron microscopy (TEM) and computer modelling of TEM images. The DST is funding this CoE until 2014.

Physics PhD students Gretta Hashe, left, and Tina Joubert, right, received the Fiona Graham prize for their research papers at the annual conference of the Microscopy Society of Southern Africa (MSSA). Ms Joubert was also awarded the prize for the best student presentation in the Physical Sciences for her paper titled "Effect of HfC/TiC ratio on the structure and properties of hafnium titanium carbide".



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George Campus

The George Campus of NMMU is in the Southern Cape, about 300km from Port Elizabeth. The School of Natural Resource Management provides unique natural renewable resource management expertise and the School of Business and Social Sciences serves as a hub of business support and human resource development in the area.

The nature, scope and diversity of research activities at the George Campus are such that it is able to offer a comprehensive service to partners in both business and natural resource utilisation industries.

Research activities during 2006 at the George Campus focused on:

PREDATOR CONTROL

This research focused on predator conflict in farming areas in Namibia and indicated that although levels of conflict are high, farmers belonging to conservancies were more tolerant of predators and more likely to use management techniques to reduce predator conflict, than farmers who did not belong to conservancies. Furthermore, fencing is commonly used to exclude predators from farms but species such as warthog typically dig holes under these fences, allowing access to predators. The research found that swing gates installed in fences were used by hole digging species and reduced the number of holes made by these species under fences, while predators appeared not to use the swing gates, suggesting that this may be a viable non-lethal predator exclusion technique. This research was conducted in collaboration with the Cheetah Conservation Trust in Namibia.

BUFFALO

The feeding and habitat use of buffalo during the wet and dry season in an arid environment considered marginal to buffalo was investigated. Buffalo were shown to change their feeding and habitat use during the seasonal cycle, in response to changes in the acceptability of principal grass species. The study was conducted in collaboration with the Northern Cape Department of Tourism, Environment and Conservation.

AFRICAN OYSTERCATCHER

This research focused on an important mainland population of oystercatchers and showed the important influence of habitat patchiness on the breeding success of oystercatchers and the direct and indirect impacts of human disturbance on oystercatcher population dynamics. The study was conducted in collaboration with Cape Nature.



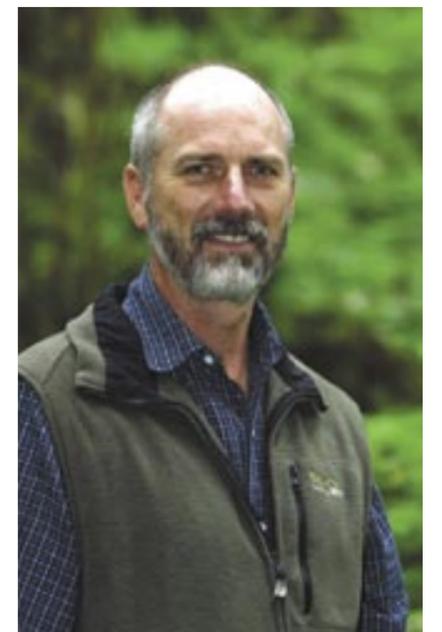
Prof Ernst van Bijl, George Campus Principal



Dr Glen Taylor, Chairperson: Faculty RTI Committee



Maryna Lehmann, Emerging Faculty Researcher of the Year



Dr Laurence Watson, Faculty Researcher of the Year

ZEBRA

The remnant population of Cape mountain zebra in the Gamka Mountain Nature Reserve, a population which is important for the conservation of this species, was researched.

Findings indicated that the reserve is not large enough to sustain a viable population of Cape mountain zebra and that under the present management policy, the viability of this small population was uncertain. A number of management options to increase the viability of this population were also proposed.

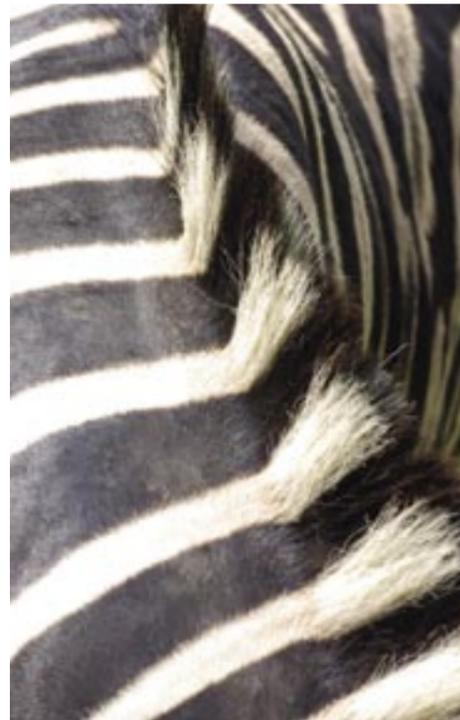
QUARTZ FIELD VEGETATION

The study focused on factors influencing species richness, cover and composition of vegetation on Namaqualand quartz fields. The study concluded that gravel road usage through quartz fields, livestock usage of these fields and road side quarries can be detrimental to the biodiversity of plant species in these fields.

DAIRY

Proper nutritional management is vital for remaining competitive in the dairy industry. This research indicated that barley could partially (50%) replace maize without affecting milk production, milk composition or cause metabolic disorders and that it could be included in concentrates, provided that sufficient pasture of good quality is available.

This research led to collaboration, generation and transfer of knowledge, skills and technology with other institutes, researchers, and research groups nationally (Prof Cruywagen of the University of Stellenbosch; Drs R Meeske, P Botha, and I Trautmann of the DoA Western Cape; Prof M Scholtz, Agricultural Research Council; and Dr L Erasmus, University of Pretoria) and internationally (Dr D Christensen, University of Saskatchewan; Dr E Kolver, Dexcel, New Zealand; Dr Paul Weimer, University of Wisconsin; and Dr Liam Neeson, Harper Adams University, UK).



OSTRICHES

This research focused on the optimal slaughter age of ostriches, an aspect directly affecting the economic viability of ostrich farming and the whole ostrich supply chain. The aspect of slaughter age, and specifically the economic consequences of changing conventional industry practices, have not been researched in depth before. The research results are significant, taking into account the current state of the global ostrich industry and that current practices do not favour the producer.

The research studied the effect of different management practices on the feed intake and growth rate of juvenile ostriches. Flavourants in the feed with a salty taste had preference over other flavourants with regards to feed intake. Colour of feed did not stimulate intake of feed in this study. Processing of feed lowered production and dry matter intake. Furthermore, no advantage in production was observed when ostrich juveniles were subjected to additional lighting.

THATCHING REED

This research focuses on the sustainability of the commercial harvesting of indigenous thatching reed (*Thamnochortus insignis*) in the Southern Cape. The study concluded that cultivated reed harvested according to sustainable agricultural practices produce more yield and better quality reed that meet industry norms than those harvested from natural resources. This research further led to the establishment of a reed forum which will set guidelines for the entire value chain.

FORESTRY

The focus of this research is to study the effect of HIV and AIDS on forestry contracting businesses. The research was done through HIV-testing of contract workers over a three-year period and by conducting demographic research to describe the effect on contracting businesses. Preliminary results indicate that the forestry industry could face a labour shortage in certain areas and that mechanisation strategies need to be considered.

Saasveld student excels in research studies against all odds

Clovis Bhiya, a master's student in Agricultural Management from the School for Natural Resource Management, recently completed a research study on economic aspects of ostrich production. Mr Bhiya started his studies as a student in the university's Foundation Programme, an academic enrichment programme that was offered to students who did not qualify for direct entry to the mainstream academic programme. From humble beginnings, Mr Bhiya completed his NDip Agricultural Management in four years, obtained his BTech degree, and is to be awarded his master's degree *cum laude*. Mr Johan Jordaan, a senior lecturer at the Saasveld Campus, was Mr Bhiya's study leader and specialist animal scientist Prof Tertius Brand, his supervisor. Mr Bhiya's research focused on the optimal slaughter age of ostriches, an aspect directly affecting the economic viability of ostrich farming and the whole ostrich supply chain. The aspect of slaughter age, and specifically the economic consequences of changing conventional industry practices, has not been researched in depth previously. The research results are significant, taking into account the current state of the global ostrich industry.



Top master's student Clovis Bhiya has completed research that examines the optimal slaughter age of ostriches.

Conference contributions

Schumann M., Schumann B., Dickman A., Watson L.H. and Marker L. Swing gates: an alternative for reducing fence maintenance and human/cheetah conflict in Namibia. Annual conference, *Southern African Wildlife Management Association*, Bela Bela. (2006)

Venter J.A. and Watson L.H. The feeding ecology of buffalo (*Syncerus caffer*) in the Doornkloof Nature Reserve, Northern Cape Province. Annual conference, *Southern African Wildlife Management Association*, Bela Bela. (2006)

Steenkamp, J. The Impact of HIV / AIDS on the Forestry Contracting Sub-Sector and the Implications for Broad Based Black Economic Empowerment in South Africa. *International Union of Forest Research Organisations Conference*, Charleston, South Carolina. (2006)

Muller, R. A fresh look at the development and prevention of drying stresses. *South African Lumber Dryers Educational Association (SALDEA)*. Johannesburg (2006)

Muller, R. Prevention of crook (spring) by means of side restraints. *South African Lumber Dryers Educational Association (SALDEA)*. Johannesburg (2006)

Publications

ARTICLES IN DoE ACCREDITED JOURNALS

LEHMANN, M. & MEESKE, R. 2006. Substituting maize grain with barley grain in concentrates fed to Jersey cows grazing kikuyu-ryegrass pasture. *South African Journal of Animal Science* 36 (3), pp 175 – 180.

LOUW, J.H. & SCHOLES, M.C. 2006. Site index functions using site descriptors for *Pinus patula* plantations in South Africa. *Forest Ecology and Management* 1 (225), pp 94 – 103.

LOUW, W.J.A. 2006. General history of the South African forest industry: 2003 – 2006. *South African Forestry Journal* (208), pp 79 – 88.

LOUW, W.J.A, KOK, M.C. & SANDERSON, C. 2006. Contractor selection: A quantitative, consensus-friendly, transparent and objective method. *South African Forestry Journal* (206), pp 35 – 40.

SCHUMANN, M., SCHUMANN, B., DICKMAN, A., WATSON, L.H. & MARKER, L. 2006. Assessing the use of swing gates in game fences as a potential non-lethal predator exclusion technique. *South African Journal of Wildlife Research* 36 (2), pp 173 – 181.

HIV & AIDS Unit

The HIV and AIDS Unit strives to mitigate the health and socio-economic impact of HIV and AIDS on students, staff and the community. Additionally the unit is involved in national research projects and has international collaborations.

Stigma intervention among health care professionals and other health care personnel at a public sector anti-retroviral site in the Eastern Cape.

This study started in 2006 in collaboration with the Virginia Commonwealth University. Training was conducted by the NMMU HIV/AIDS Unit and the Community Development Unit using the Engender Health Curriculum.

Eastern Cape Youth Commission HIV/AIDS Prevalence Project

An HIV/AIDS prevalence and KAPB (Knowledge, Attitudes, Perceptions and Behaviour) study among youth in four district municipalities was conducted in collaboration with Walter Sisulu University and the University of Fort Hare.

Virginia Commonwealth University (VCU) Collaborative Study

This pilot study carried out in collaboration with the VCU and the Centre for AIDS Development, Research and Evaluation (CADRE) in Grahamstown has been ongoing since 2004. The study deals with the ARV rollout and the perceptions of people towards HIV-infected persons through the utilisation of the theory of the diffusion of innovation.

The unit also conducted a skills audit and gender-based survey for the Chris Hani District Municipality and a skills audit for Ukhahlamba District Municipality.



Support Services

Publications

ARTICLES IN DoE ACCREDITED JOURNALS

FOXCROFT, C.D. & ASTON, S. 2006. Critically examining language bias in the South African adaptation of the WAIS – III. *South African Journal of Industrial Psychology* 32 (4), pp 1 – 6.

GERBER, R.E. 2005. The need for a shift in the South African educational research epistemological landscape. *South African Journal of Higher Education* 19, pp 1395 – 1404.

KILIAN, A. & STRETCH, R.A. 2006. Analysis of patient load data from the 2003 Cricket World Cup in South Africa. *The South African Journal of Sports Medicine* 18 (2), pp 52 – 54.

KILIAN, A. & STRETCH, R.A. 2006. Analysis of patient load data for teams competing in the 2003 Cricket World Cup in South Africa. *The South African Journal of Sports Medicine* 18 (4), pp 129 – 134.

LUIZ, D.M., FOXCROFT, C.D. & POVEY, J-L. 2006. The Griffiths scales of mental development: A factorial validity study. *South African Journal of Psychology* 36 (1), pp 192 – 214.

NEALE- SHUTTE, M. & FOURIE, J. 2006. Challenges to internationalisation in African higher education. *South African Journal of Higher Education* 20 (1), pp 118 – 142.

STRETCH, R.A. 2006. Protective sports equipment for reducing injuries in cricket. *International Sports Medicine Journal* 7 (4), pp 231 – 237.

CHAPTERS IN BOOKS SUBMITTED TO THE DOE FOR SUBSIDY

ROUHANI, S. 2006. Internationalisation at the University of Fort Hare (2001 – 2004) in: R. KISHUN (Ed). *The internationalisation of higher education in South Africa. IEASA: Durban.*

CONFERENCE PAPERS SUBMITTED TO THE DOE FOR SUBSIDY

FOXCROFT, C.D. Evaluating the school-leaving examination against measurement principles and methods. *Marking Matric: Colloquium Proceedings*, Pretoria, South Africa, 2 - 3 November 2004.

ROUHANI, S. Why do international students study in South Africa? *34th Annual Conference of the Australian and New Zealand Comparative and International Education Society: Canberra, Australia, 30 November - 3 December 2006.*



Dr Richard Stretch, Researcher of the Year, support services