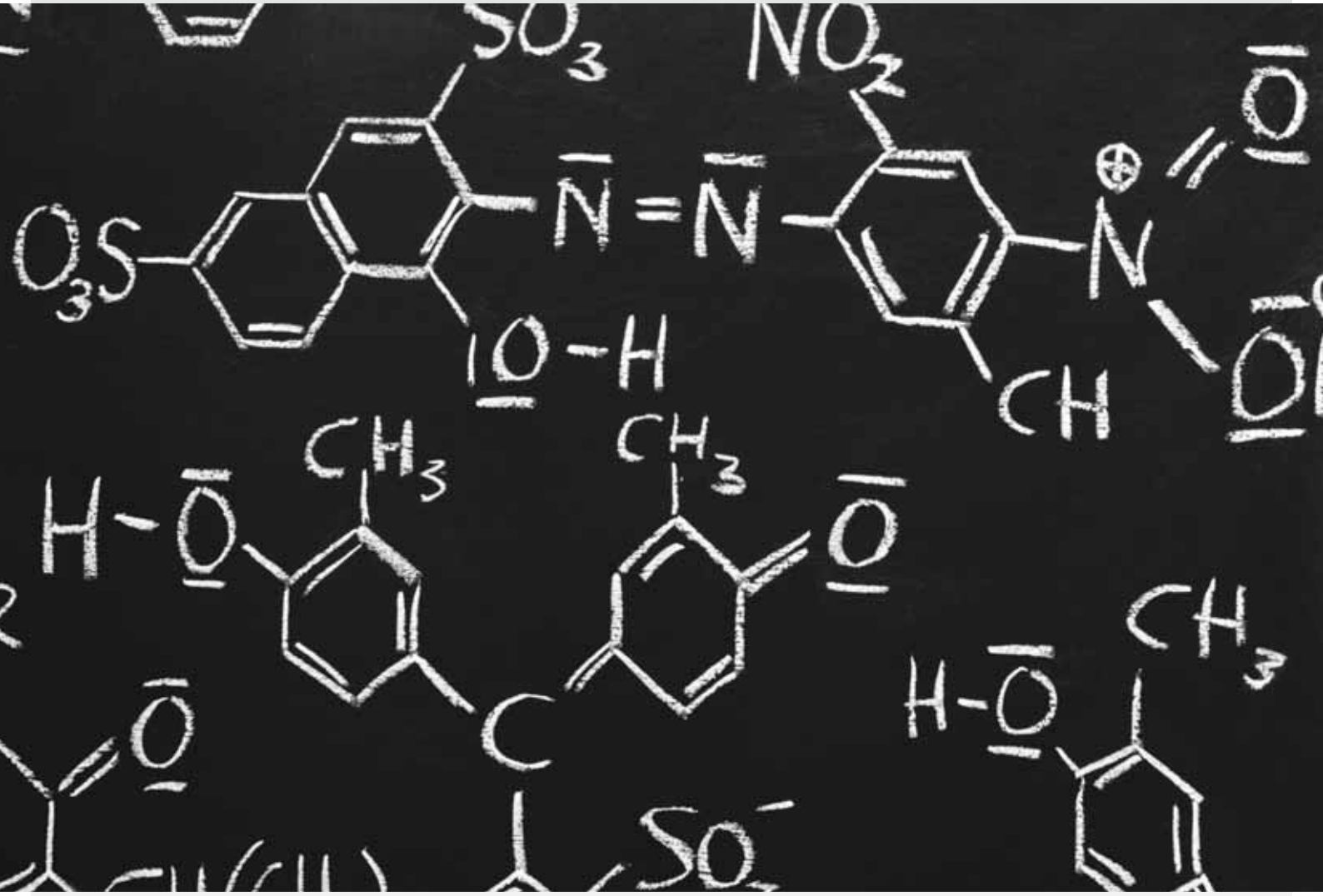
# Education and science

## We monitor and evaluate the access and quality in education and science



**Education is the formula for success. Through our research we promote relevance and equity in education, to enable the success of our nation.**

# EDUCATION

**This area of research explores issues in and across the education system, with a specific focus on monitoring and evaluation of educational progress at the primary, secondary and tertiary levels. It also investigates access, quality, relevance and equity in education.**

## Our initiatives have resulted in

- Findings that getting early literacy achievement right is imperative;
- Findings that national data do not reveal the actual shortages of teachers in key learning areas;
- Findings that pedagogical content knowledge is important in improving student achievement;
- Findings that drop-out rates at universities are linked to lack of finance and education quality in schools, particularly in historically black disadvantaged institutions; and
- Ongoing studies on education quality.

### Languages and literacy

Literacy achievement and learner performance in schools are of particular importance in education. Two projects dealt with this issue and both point to the fact that much has to be done to make sure that learners learn to read and write – and understand and speak – their own and other languages important to them, well from a very early age. The first project, supported by Irish Aid, focused on the foundation phase (grades R to 4). The second project, funded by the Shuttleworth Foundation, assessed the senior phase (grade 8). Preliminary findings point to the imperative of getting early literacy achievement right for the sake of learners' future performance in school and in the economy.

### Supply and demand of teachers

A consortium of four organisations including the HSRC conducted a large project organised under the auspices of the Teacher Education Programme, a multi-year Royal Netherlands Embassy-funded project on teacher education. Among the most significant findings and conclusions of this study were:

- National data do not reveal the actual shortages of teachers in mathematics, science and other subjects at the foundation phase.
- White students are keener to study teaching than their black African counterparts, which is worrying since there is a dire shortage of teachers in rural areas and white graduates are unlikely to teach in those areas.
- Female African students are on a decline.
- The process of merging and incorporating teacher education colleges into higher education requires a period of policy consolidation and integration to build a well-functioning, teacher education coherent system. Any new policy aimed at fundamentally re-orienting the system in another direction, rather than building incrementally and systematically on the changes that have been effected over the past decade, could have dire consequences for the institutions and the academics in them.

The work conducted in this project is of critical importance to the national debate on re-opening of teacher education colleges.

## Teacher quality and learner achievement are closely linked

A pilot study of teacher quality and learner outcomes in 40 grade 6 mathematics classes in Gauteng explored why South Africa does so poorly in international tests relative to its neighbours. Results were significant and supported the claim that pedagogical content knowledge is important in improving student achievement. This occurs through improved teaching by teachers who know their subject and how to teach it. The study also provided evidence of what teachers are good at, and what needs remediation – an important finding for the improvement of teacher education in South Africa. Analysis of videotapes of 40 classrooms showed that the intended level of cognitive demand is not always the same as the level at which it is implemented.

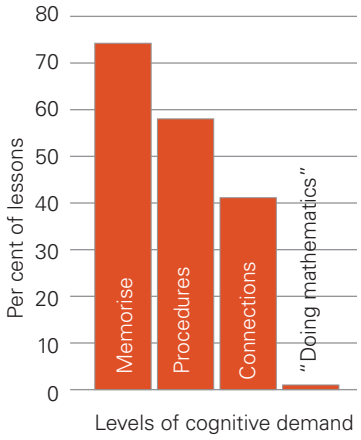



***Figure 2. Gauteng province: Per cent of lessons by cognitive demand***

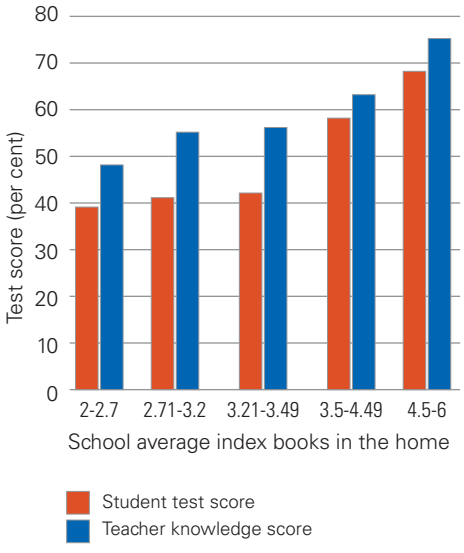



***Figure 3. Gauteng province: Grade 6 student mathematics test score and teacher overall knowledge score as a function of school average index of student's reported number of books in the home, 2007***

Note: Index of number of books in the home is as follows: no books=1, about 10 books=2, about 20 books=3, about 50 books=4, about 100 books=5, more than 100 books=6.

Another pattern observed was the lack of whole-class discussion on the activities or worksheets. The 'discussion' is often just a chorus of agreement to given answers – or the completion of comments-prompted answers, that really give no indication of whether or not learners actually were able to give the answer themselves.

This project was supported by the Spencer Foundation and forms part of a larger regional comparative study being conducted with Stanford University, the universities of the Witwatersrand, Cape Town and KwaZulu-Natal.

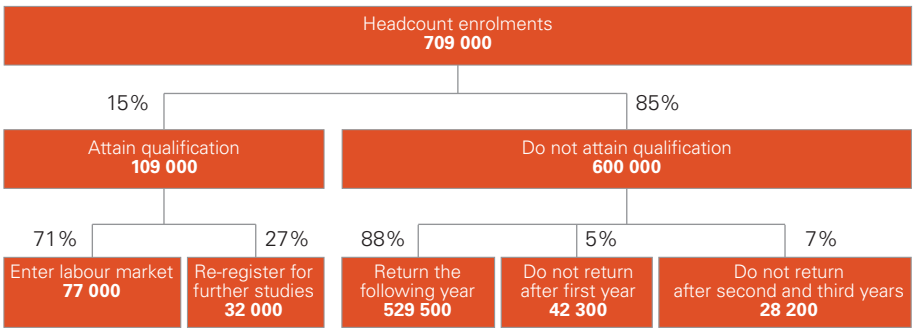
## Why university students drop out

This project, supported by the Ford Foundation, conducted research on seven universities – Witwatersrand, Stellenbosch, Western Cape, Fort Hare, Limpopo, Tshwane University of Technology, and Cape Peninsula University of Technology. The study traced a group of students who dropped out of university between 2000 and 2002 and investigated factors that influenced the students to discontinue their studies.

Key factors were a lack of finance and the disparate quality of education at school level. It found that the average low socio-economic status (SES) of students across the seven institutions was 70%, but more pronounced in historically black disadvantaged institutions, for example the universities of Fort Hare and of the North, where 82% of the sample were categorised as 'low SES'. The parents/guardians of the low SES students either had 'no formal education' or had 'some secondary education', and their monthly income was listed as 'no income' or below R1 600 pm.

As for the disparity in education quality, black Africans and coloureds, sections of society that bore the brunt of exclusion by apartheid education policies and legislation, continue to lag behind in education success rates.

***Figure 4. The chosen few***



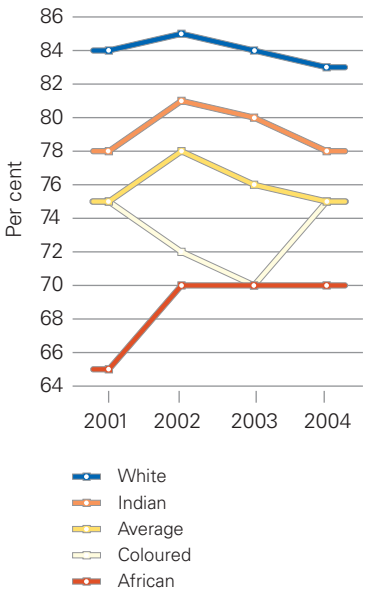



***Figure 5. Higher education undergraduate success***

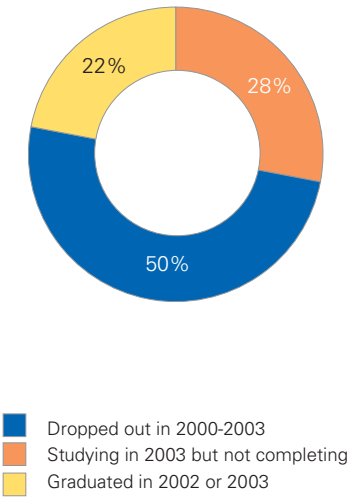



***Figure 6. SA drop-out rate***

## Education quality

Three studies on education quality form part of a large project on literacy and numeracy conducted in collaboration with the national and provincial departments of Education and funded by the Royal Netherlands Embassy. The research was conducted by a consortium comprising the HSRC, the Education Policy Consortium (i.e. the Centre for Education Policy Development and Education Policy Units from the universities of Witwatersrand, Western Cape and Fort Hare), JET Education Services and the Project for the Study of Alternative Education in South Africa (PRAESA). The HSRC component consists of three studies: the National assessment of learner achievement; Classroom assessment resources for learning improvement; and the National Indicator Framework. These studies are all ongoing.

The Reading, Writing and Rhythmatic consortium (3Rs) at a dialogue forum between the HSRC and the Department of Education

## WORLD OF WORK – SKILLS AND EMPLOYMENT

**Research in this area encompasses studies into the labour market, employment creation, and skills and human resources development. It seeks to address the key national imperatives to improve equitable access to skills acquisition, employment strategies and sustaining economic growth.**

## Our initiatives have resulted in

- Groundbreaking impact assessments of key post-apartheid labour market legislation;
- Providing an overview of the contextual factors driving human resources development in South Africa; and
- Providing concrete, innovative and forward-looking ideas on halving unemployment and poverty by 2014.

### Assessment of labour market legislation

A two-year research project for the Department of Labour provides groundbreaking impact assessments of key post-apartheid labour market legislation, measuring the equity and efficiency in the South African labour market. The Sector Skills Study provides insightful analysis on the complexities of attaining alignment between the skills development strategies and micro-economic priorities in 14 key sub-sectors in the economy. A National Skills Survey 2007 provides insight into employers' training programmes, and the Sector Education Training Authorities' propensity to train. The Scarce and Critical Skills Study contributes towards the development of a model for the identification and verification of vacancies and scarce skills in the critical occupations including engineering, artesan trades and others. A multi-sector tracer study on the impact of learnerships evaluated the external effectiveness of learnerships under the National Skills Development Strategy II, in terms of the impact on the labour market outcomes of beneficiaries. The employment equity sub-studies provided insights as to the rationale for the apparent lack of advancement of designated and historically disadvantaged groups in the labour market.

### Review of human resources development

The next in the series of the *Human Resources Development Review 2008: Education, Employment and Skills in South Africa* – 25 chapters authored by some of the leading researchers in the field – provides an extensive overview of the contextual factors driving human resources development in South Africa. A key theme throughout the volume is the importance of a multi-faceted skills development strategy operating at three levels. This publication is an important resource for researchers, practitioners and policy-makers in the field.

## Employment scenarios

Through roundtable dialogue, scenario building and thematic research, top decision-makers were drawn together in the employment scenarios initiative to provide concrete, innovative and forward-looking ideas on halving unemployment and poverty on a sustainable basis by 2014. These teams developed path and policy complements required to achieve different employment scenarios alongside their political, financial and bureaucratic implications. These were then put to policy-makers, stakeholders and experts for dialogue and debate. This initiative deepens the thinking around employment dynamics, and validates existing policies or identifies possible policy gaps by testing the potential employment impact of current policy thrusts. It also supports decision-making in terms of employment promotion and poverty reduction as part of government's growth strategy, and deepens dialogue on employment policy amongst central decision-makers and in civil society. A number of research projects support the employment scenarios initiative.

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## SCIENCE AND INNOVATION

**This area of research is concerned with the role of innovation in development, and how policy in support of innovation can advance the developmental ambitions of South Africa and other developing countries. The HSRC works within the perspective of the national innovation systems (NIS).**

### Our initiatives have resulted in

- Completing the first official South African Innovation Survey;
- Expanding R&D surveys to include measuring and monitoring progress toward the knowledge economy, and dealing with indicators of social well-being;
- Contributing to the developmental role of universities in the South project;
- Rolling-out a survey of firm experiences with university collaborations; and
- Identifying factors contributing to or inhibiting women with a SET background, and identifying gaps in gender representivity in the workplace.

## First official innovation survey in South Africa

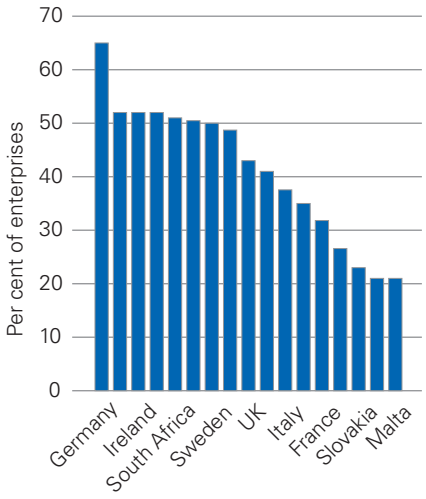
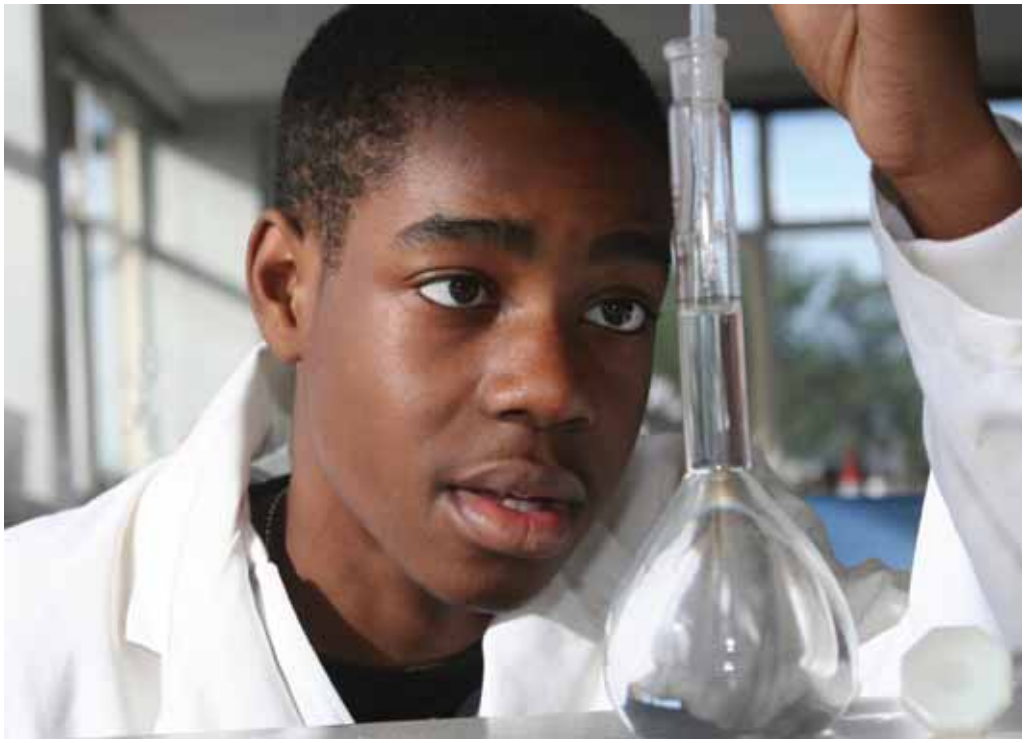



***Figure 7. Percentage of business enterprises with innovation activity, 2002-2004***

During 2007/08 the HSRC completed the first official South African Innovation Survey on behalf of DST. Innovation surveys are undertaken in all European Commission countries and numerous other countries including Brazil, Malaysia and Argentina. By using the European Union (EU)-recommended core questionnaire and methodology, countries can produce internationally comparable survey results that are useful for benchmarking and policy development. In South Africa's case the survey results showed that the country is more innovative than previously thought with 52% of enterprises recording innovation activities between 2002 and 2004. Denmark, Ireland and Austria all had the same rate of 52% and Germany demonstrated the highest rate of innovation with 65% of enterprises reporting innovation activities.





## Research and development (R&D) surveys

There is a growing body of research based on the series of four R&D surveys conducted by the HSRC, which have contributed to shaping: the DST Ten-year Plan, Innovation toward the Knowledge Economy; the framework for establishing the Technology Innovation Agency; the Organisation for Economic Cooperation and Development (OECD) Review of South Africa's Innovation Policy; and a National Advisory Council on Innovation (NACI) study on the benefits of publicly-funded R&D. It is expected that this work will expand yet further to include a project that will measure and monitor progress toward the knowledge economy, as well as another dealing with indicators of social well-being.

## Innovative in manufacturing and knowledge

South Africa is the only developing-country partner in a consortium of European institutions financed by the EU's FP6 Programme, in a study called 'Understanding the Relationship between Knowledge and Competitiveness in the Enlarging European Union (U-Know)'. The South African study was aligned with the research undertaken in Europe. HSRC researchers wrote papers on the determinants of innovative activities in the South African manufacturing sector and on knowledge dissemination and university-industry linkages in the South African national innovation system, partly in conjunction with our partners at the University of Cape Town, the CSIR, and the Western Cape Treasury. This work was presented at a meeting of the consortium first in Ljubljana in September 2007 and then in Oslo in early 2008. This was followed by a seminar at the HSRC.

## Developmental role of universities

In the developmental role of universities in the South, a project under the auspices of the Canadian International Development Research Centre's (IDRC) Research on Knowledge Systems (RoKS) Programme, HSRC researchers wrote individual country papers on the respective national innovation systems together with our partners from Uganda and Nigeria. The HSRC also rolled-out a survey of firm experiences with university collaborations in November 2007. The purpose and the methodology of the project were presented to board members of the IDRC in Cape Town.

## Women in science, engineering and technology (SET)

The study identified factors contributing to or inhibiting women with a SET background, and identified gaps in gender representivity in the workplace. The sample consisted of 27 companies across the JSE, private, small, medium and micro-enterprises (SMMEs) and state-owned sectors. Qualitative and quantitative data was gathered through in-depth interviews, a gender representation survey questionnaire, and a questionnaire for SET women in the company. Findings point out that women continue to be under-represented in the SET sector, and specifically in the industrial context. This under-representation is attributed to several factors including insufficient rewards for efforts at work; absence of mentorship within the organisation; lack of career opportunities in the organisation; lack of access to resources; inflexible working hours; and being recruited, retained and advanced because legislation dictates implementation of affirmative action and employment equity policies (compliance rather than true transformation). Implications for companies include developing and implementing specific strategies and programmes to retain and advance women (training, mentoring and support). For government, they include developing a national strategy for increasing women's participation in industrial SET at all levels of the organisation.

## CAPACITY DEVELOPMENT

**All work of the HSRC is directly or indirectly aligned with issues related to human resources development. It is part of our mandate as a humanities and social science council to train young, dedicated researchers who are most likely to build careers in this profession. Capacity development at the HSRC is both at research unit and institutional levels. At research unit level, capacity development is designed according to the strategic fit between the research unit and the trainee, while at institutional level, the intervention is generic and designed according to the needs of various research trainees.**

### Our initiatives have resulted in

- Setting up a dedicated capacity development unit;
- Boosting the HSRC trainee programme; and
- Training researchers on gender analytical tools in conducting research.

## Institutional capacity development

A dedicated capacity development unit, officially renamed Es'kia Mphahlele Researcher Development, got underway in 2007/08. This unit is strongly geared towards the National Human Resources Strategy and the Accelerated and Shared Growth Initiative for South Africa (AsgiSA). The programme was given a significant boost by a positive response of DST to a medium-term expenditure framework (MTEF) proposal submitted on capacity development.

The researcher development unit has two main activities:

- Planning and co-ordinating workshops and lecture series for HSRC researchers and research trainees; and
- Networking with national and international research institutions at institutional and programme level to create an enabling environment for the researchers and support the growing of new researchers.

The unit also funded conference attendance, locally and internationally, for the research trainees, as well as attendance of seminars.

## Training at research unit level

In order to make research training more meaningful, a mentoring agreement is signed at research unit level and the parties enter into protocol agreements. The protocols range from dedicated times for research, the nature of the internship, the course the internship will take and targets to meet during the internship period.

The number of research trainees placed within research units was 90. These research trainees are registered Master's and PhD students, and post-doctoral fellows. Some programmes also absorbed DST interns.

Training varied, but generally the following skills were offered to research trainees: project and data management, literature reviews, analytical writing, writing, co-authoring and presenting of papers, training in large-scale social sciences surveys, expertise on monitoring and evaluation, behavioural and social intervention research, data collection, proposal writing, networking skills, statistical software training, and finding research resources through the HSRC's virtual library.

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## Gender mainstreaming

Mainstreaming training in gender is a key function of the Gender and Development unit at the HSRC. In 2007-2008, 247 staff members (both research and support staff) underwent training in gender sensitivity, an achievement of 80,5% against the overall institutional target of 60%. The training in 2007-2008 for researchers focused mainly on gender analytical tools in conducting research.

Gender training at the HSRC.