

A close-up photograph of a microscope lens, showing the intricate details of the glass and metal components. The lens is positioned on the right side of the frame, with a blue ring visible on its barrel. The background is a soft, out-of-focus blue. A large, semi-transparent red circle is overlaid on the left side of the image, containing the title text.

Education and Science

We monitor, evaluate and encourage
access to, and quality in, education

Education

Education is key to development and is central to how and whether economies grow, citizenship is exercised and social cultures are valued. South Africa continues facing fundamental challenges relating to access, equity, quality, and relevance across critical areas of the education system. Our research explores issues in and across the education system, with a specific focus on the monitoring and evaluation of educational progress at the primary, secondary and tertiary levels.

Our initiatives have resulted in, among others:

- Gaining insight into the literacy difficulties experienced at primary schools in the Limpopo province;
- Identifying ways how the teacher education system in South Africa can be improved on an ongoing basis;
- Highlighting the role of technical and vocational training institutions in the country;
- Showing how a selected sample of female university students succeeded in male-dominated fields of study;
- Developing a national framework for the assessment of learner achievement;
- Developing a classroom assessment resource system for teachers to improve their learning and teaching practices; and
- Helping the KwaZulu-Natal Department of Education plan infrastructure in the most cost and time efficient way.

Literacy in primary schools in Limpopo

The HSRC research project offered valuable insights into the literacy difficulties experienced in junior primary classrooms in the Limpopo province. It was a complex project due to the linguistic and community diversity in the province, as well as the high incidence of rural and multi-grade classrooms.



Our key findings were:

- Learners did not reach the desired levels of literacy and language proficiency because their school work did not involve enough challenge, pace and volume;
- Children did not read and write enough during school hours or at home;
- Literacy instruction was neither specific nor good enough in both the pre-school period and the foundation phase, suggesting problems with the relevance and quality of teacher training;
- Learning materials and learning contents were not in synergy across grades and learning areas; and
- High levels of poverty and illiteracy at home and in the community eroded the support that is required from a home environment for successful literacy achievement at school (also reported on page 86).

Education, Science and Skills Development (ESSD) programme

Getting youth into science

The Department of Science and Technology commissioned the HSRC to track and evaluate the success of its national youth-into-science strategy. The strategy was launched in 2007 to enhance participation, performance and career selection of school-going youth in the fields of science, technology, engineering and mathematics.

We kick-started the study by conducting a national survey of Grade 11 and 12 learners who take mathematics and physical science. The survey has shown that not only do learners have high career aspirations but 90% of them want to continue their studies after Grade 12. The career preferences in order of popularity are medicine, engineering, nursing and social work; with a small but significant proportion (5%) indicating they want to become teachers.

The study is ongoing.

Education, Science and Skills Development programme

Teachers and gender equality in maths and science education

The HSRC assessed the impact of gender policies and interventions on the commitment and attitude of teachers towards achieving the Millennium Development Goal 3 (MDG3). The MDG3 aims at achieving gender equality and empowerment with specific reference to girls' access to participation in maths and science education.

Initial results suggested that teachers believed in equal access for both girls and boys to science and mathematics subjects and to careers in science, engineering and technology (SET); and that all learners, irrespective of gender, should be equally encouraged to pursue these subjects in school.

We found, however, that gender inequality is still rife in classrooms across the country and that girls continue to be underrepresented in these



subjects. There are overt and hidden curricular policies and practices causing women to be underrepresented in maths and science at tertiary level and in SET careers.

We believe classroom policies and practices should be investigated and interventions should include knowing what to do with the knowledge gained from research and the implementing of research recommendations.

Policy Analysis and Capacity Enhancement unit

Teachers, teaching and teacher education

Research relating to teachers and teacher education is critical if we are to improve the quality of education and learner performance in our country. To support quality education, the HSRC has, during the past few years, undertaken research on the capacity of the teacher education system.

We have worked with a consortium consisting of the Centre for Education Policy Development, the South African Institute for Distance Education and the University of Pretoria, supported by the Royal Netherlands Embassy.

The consortium aims to make a significant contribution to the resolution of key obstacles to the effective functioning of the teacher education system. Key achievements of the research so far include:

- Important contributions to the Department of Education's national policy framework for teacher education and development (2007).
- Differentiated analysis of trends in supply and demand data for teachers necessary to plan the teacher education system.
- Providing the research necessary for the Department of Education to develop a systematic national teacher upgrading plan, including piloting a process to obtain useful data on teacher qualifications.
- Providing in-depth, original information about the impact of restructuring teacher education, and especially the teacher education curriculum; suggesting a moratorium on institutional change; and deepening relationships between universities nationally as well as between universities and education departments.

A second phase of research, building on findings so far and taking up questions that have arisen during the first phase, will begin later this year. The central problem to be addressed by the proposed suite of new projects relates to the ongoing difficulties of addressing the poor quality of schools in South Africa.

Unlike research that looks to the capacity of learners or of schools for explanation, the proposed programme will examine the capacity of the teacher education system to support quality



teaching. The processes, practices and outcomes of teacher education will be investigated.

Education, Science and Skills Development programme

Technical and vocational education and training

Since 2002, the HSRC has undertaken research on the role of technical and vocational education and training (TVET) in formal and non-formal settings. The Danish International Development Agency (Danida) Support to Education and Skills Development Programme has provided support to develop further education and training (FET) colleges in South Africa.

The HSRC continues to monitor and evaluate seven of these colleges.

In addition, we have extended our model to undertake baseline studies at two new sites, Mnambithi College in KwaZulu-Natal and West Coast College in the Western Cape. These evaluations involve all college constituencies and have had a strong formative dimension over time.

Education, Science and Skills Development programme

Gender, success and institutional culture

Funded by the Carnegie South Africa scholarship programme, this project examined the success and experience of selected female Carnegie scholarship recipients. The study looked at factors such as academic and social integration of these female students at three different South African universities.

With few exceptions, the participants had all broken gender boundaries by entering fields of study common for male but not female students. How the young women in the study negotiated their success and their gender identities is considered important given that the society they live in does not support gender boundary-crossing.

The case studies revealed that the students' perceptions of success were facilitated by a number of factors: the financial support from the scholarship programme, the informal support of family and friends, the students' personal efforts, their religious convictions and their belief in themselves. They did not experience institutional culture as negative and sought a future that would combine personal and public fulfilment in equal measure.

Education, Science and Skills Development programme



The consolidation of public schools across KwaZulu-Natal

The KwaZulu-Natal (KZN) Department of Education estimated in 2006 that it had a backlog of about 11 400 classrooms across the province. The backlog included a lack of new infrastructure and additions required to existing infrastructure. This meant that schools with smaller enrolments, typically less than 140 primary and 200 secondary learners, could be deemed economically unviable as the costs to provide all required teaching resources and learning spaces to such schools would put an inordinate drain on available resources.

We collected data regarding the location of schools (education supply), learners aged 6-18 (education demand) and the road network connecting learners' place of habitation to the available education facilities. The data was used to conduct a regular catchment area analysis as well as a threshold distance analysis to calculate which schools should be consolidated across the province.

A total 11,7% of primary schools were found to be unviable while the figure for secondary schools was 10,5%. A list of these schools was provided to the department, enabling the department to make final decisions about consolidation. The HSRC research helped the department plan infrastructure for the future and to consider the demand and supply factors that impact such planning.

Knowledge Systems (KS) unit

Assessment system to improve teachers' learning and teaching

In an effort to determine the current understanding and use of classroom assessment by teachers across the different grade levels and school types, this ongoing project involves developing a classroom assessment resource system for teachers to improve their learning and teaching practices.

Our project will attempt to answer questions on how teachers use assessments to provide relevant and timely feedback to learners to improve their performance; what are the appropriate ways in which assessment information should be reported to parents; and how teachers can use the information to improve learner performance.

From this, a pilot study based on randomised experimental trials will follow. The trials will include a computerised and a paper/pencil version of a classroom assessment resource system to support teachers in improving their analysis of learner strengths and weaknesses.

The study also intends to test the quality of feedback and to develop a process of tracking and monitoring learner performance levels and will include the development and costing of an implementation strategy for scaling up effective classroom assessment practices and lessons to improve learner performance.

Centre for Quality Education Improvement (CEQI)

National assessment of learner achievement

Tools and systems to conduct an assessment survey of Grade 9 learners entailed developing and piloting a national indicator framework that could inform policies for education quality improvement at school level. Our project also identified factors affecting learner performance.

During 2008/09, the test assessment instruments for the Grade 9 systematic survey were collected from all provinces and the data coded, captured, cleaned and analysed. The HSRC then submitted a technical report, *The development and pilot application of Grade 9 English FAL, mathematics and natural science assessment items*, to the Department of Education and reached an agreement on survey methods to be used in the future.

Information from the data analysis was used to review and improve existing items. Curriculum experts were commissioned to review the table of specifications and to map existing test items against the assessment standards in the learning area of the National Curriculum Statements (NCS) document. Additional items were developed and collated into a booklet for mathematics and two booklets each for natural sciences and languages respectively. The newly developed items covered all assessment standards (80 English items, 60 maths and 100 natural sciences).

The new items were piloted at 11 schools in the Mpumalanga, North West and Gauteng provinces. Following the piloting of Grade 9 assessment items, we developed the final assessment instruments for English FAL, mathematics and natural sciences.

Centre for Quality Education Improvement

Review of assessment systems

This ongoing project aims at providing a detailed analysis of current assessment policies and practices and an audit of available systems and structures in schools, districts, and provinces nationwide.

It entails clarifying roles and rules and engaging in critical dialogue to develop a framework of education quality in South Africa. The study should ultimately help develop the capacity and skills of the personnel involved with education assessment in South Africa at various locations and levels.

So far, a framework for the development of assessment instruments to collect data on teacher classroom assessment practices in schools in South Africa has been fleshed out. A review of teacher classroom assessment practices has also been conducted at eight schools in the provinces of Gauteng, Mpumalanga and North West.

Furthermore, a forum on policy was held to share international and national experiences and to facilitate dialogue among practitioners, researchers and policy makers. Research findings of the project on *Improving assessment systems* was discussed, which is presently providing support to the national and provincial departments of education in strengthening the national assessment system in South Africa.

Centre for Quality Education Improvement

Assistance to the UN Relief and Works Agency in Palestine

The UN Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) commissioned the HSRC to provide technical assistance in the development of a monitoring learning achievement system for UNRWA schools across its five field offices.

During the first phase of the project, the HSRC assisted UNRWA education staff to develop relevant instruments, review pilot results and establish systems for the administration of the Monitoring Learning Achievement surveys.

The second phase will focus on the analysis and reporting of the results, and the establishment of effective strategies for the dissemination and utilisation of the results for improving learning in all UNRWA schools.

Centre for Quality Education Improvement

Science and Knowledge

The link between innovation and socioeconomic development is the subject of much of the research undertaken by the HSRC. The variety of studies conducted in this area reflects the global movement of economies to a more knowledge-intensive orientation. Among these are research and experimental development (R&D) and innovation activities, which need to be measured and monitored to understand their dynamics in terms of human resources, expenditure and focus areas in relation to economic growth.

Our initiatives have resulted in:

- Providing data on the relationship between knowledge and competitiveness;
- Producing national indicators that provide input for the formulation of national research, development and innovation policies;
- Designing an innovation strategy for the Limpopo province; and
- Discovering how waste reutilisation may lead to economic growth in the future.



The relationship between knowledge and competitiveness

The HSRC was commissioned by the European Union to research the relationship between knowledge and competitiveness in the enlarging European Union, abbreviated as U-Know. Our study has pioneered the concept of 'network alignment' both as a tool to understand 'knowledge' in its varieties in the EU and in 'catch-up' economies such as South Africa.

Through various interactions with policymakers, both in Europe and in South Africa, the value of the concept for policy practice was demonstrated by this project. However, it was also acknowledged that data access problems in

South Africa, especially with respect to innovation and research and development data, impedes sound evidence-based policymaking to advance the knowledge society.

Education, Science and Skills Development programme

Impact of networks and globalisation in interaction with EU strategies

We are working on another research project funded by the EU. The project, which involves 15 partners from 11 countries, including China, Brazil, and India, is one of the Management of Social Transformation (MOST) international projects in the EU Framework Programme 7 suite.

The consortium analyses the emerging geography of knowledge-intensive activities in the global economy. Researchers from South Africa were instrumental in drafting the project proposal, which received the single highest score in a very competitive evaluation. The HSRC is represented on the consortium's executive committee.

Education, Science and Skills Development programme

National R&D surveys

The HSRC undertakes regular national research and development (R&D) and innovation surveys on behalf of the Department of Science and Technology to produce national indicators that provide inputs for policy makers and a basis for international comparisons. We have so far completed four full R&D surveys. The methodology and data provided in the 2006/07 R&D survey report were approved by Statistics South Africa and were awarded the seal of approval by the statistician-general.

The key users of this work are various government departments and agencies, especially the Department of Science and Technology, the Department of Education, the National Treasury, the National Advisory Council on Innovation, and the Presidential Commission on the Information Society and Development. The work assists government in meeting its strategic imperatives such as those contained in the South African R&D strategy to help promote effectiveness and efficiency, attain greater competitiveness and create employment

opportunities. Of particular significance is the way in which the research is increasingly finding its way into the deliberations of relevant policy-makers.

Knowledge Systems unit

Innovation survey

The HSRC designs innovation surveys to measure the extent of innovation in the business sector of a country, as well as to estimate the expenditure on various innovation activities. The surveys help to inform higher education planning, business policy and trade practice, and to provide policymakers and planners with essential and comparative data.

The majority of NePAD countries that submitted R&D surveys - and/or innovation survey questionnaires - have based their questionnaires on the HSRC's CeSTII/South African questionnaires that were made available to them.

Our first official innovation survey, carried out on behalf of the Department of Science and Technology, has been published in a book titled *Main results of the South African Innovation Survey 2005*.

Knowledge Systems unit

The changing role of the developmental university in the south

This project involved a global consortium comprising five Asian (Korea, China, Malaysia, India, Thailand), three African (South Africa, Uganda, Nigeria), and four Latin American (Brazil, Costa Rica, Mexico, Argentina) partners, funded by the International Development Research Centre (IDRC) in Canada.

The consortium essentially looked at the determinants of links between universities and industries in the southern hemisphere. The African regional study highlighted variance in the



scale and forms of university-firm interactions in countries at distinct stages of development, and set out the implications for universities in each trajectory.

In a similar project the Southern African Regional Universities Association (SARAU) commissioned the HSRC to assist in laying the foundation for a research network on higher education in SADC countries.

Education, Science and Skills Development programme

University-business interactions and economic development in SADC

We analysed the interactions between universities and enterprises, and found that the relations between universities and firms in 13 SADC countries is limited.

Our study cautions against the uncritical adoption of models from the developed world, and tries to lay a basis for developing differentiated strategies that take each country's level of development and higher education system into account.

Education, Science and Skills Development programme

Microeconomic development strategy

The HSRC has been advising the Western Cape Department of Economic Development and Tourism on industrial policy for a number of years. During the past year, its activity focused on a five-year review of this policy experiment, which, at provincial level, is unique in South Africa.

Education, Science and Skills Development programme

Integrated innovation strategy for Limpopo

In this project, commissioned by Department of Science and Technology, the HSRC developed an integrated innovation strategy for the Limpopo province. This was the first commission to

design an innovation strategy for a South African province, in partnership with the department's manufacturing and local innovation unit and the office of the Limpopo premier.

Education, Science and Skills Development programme

Waste reutilisation

A multi-year project was developed in partnership with the director-generals of the Economic and Employment Cluster, the Department of Environmental Affairs and Tourism, and the Department of Science and Technology, to look at how the waste reutilisation sector may offer opportunities for dynamic economic growth and employment for the future.

The project works from the premise that material re-use will necessarily become the next technological wave as 'peak oil' is reached and non-renewable resources become scarcer. It is believed that countries that identify opportunities at the beginning of the curve will benefit from what is known as the 'cyclical' economy, where industrial technologies are developed to reprocess materials into new uses.

An industry survey, completed in 2008/09, determined the current status of technology in respect of waste reutilisation and developed an industry database. The survey offered an initial insight into technology futures in waste reutilisation with implications for South African technology and industrial policy.

Centre for Poverty, Employment and Growth

