

## Report for Committee on Chemistry Education

### South Africa 2011/2012

With continued low learners' performance in Mathematics and Physical Science in the Grade 12 examinations, policy makers have used 2010/2011 to conceptualize a new curriculum. As far as chemistry education at upper secondary level is concerned, the new approach to include practical work as a compulsory part of the curriculum is encouraging.

South Africa participated in IYC extensively, with a wide range of events, lectures and demonstrations. The Global Water Experiment featured prominently in initiatives launched by the South African Department for Science and Technology, the South African Agency for Science and Technology Advancement and also included significant corporate investment by SASOL.

2012 marks the 100<sup>th</sup> Anniversary for the South African Chemical Institute to commemorate its founding on 26 January 1912 and it will be celebrated in a variety of ways.



#### 1. National Educational Policy

In South Africa 2010/2011 saw the development of a new policy, namely the National Curriculum and Assessment Policy Statement (CAPS). It encompasses changes from Grade 1 to Grade 12, with implementation over the period 2012 – 2014. The focus for 2012 implementation for Grades 1- 3 is to improve numeracy and literacy, i.e. teaching these basic skills so that learners can cope with the intermediate phase better. Implementation for Grades 4 – 6 will follow in 2013 and for Grades 7 – 9 in 2014. At the same time, the new curriculum is being implemented in Grade 10 in 2012, with roll-out to Grade 11 in 2013 and Grade 12 in 2014.

On primary and junior secondary level, i.e. Grades 4 – 9, there is some concern that the combination of Natural Sciences and Technology into one subject will lead to the eroding of science content.

On senior high level, i.e. Grades 10 – 12, the new curriculum has been streamlined to try and decrease the amount of content. In Grade 10, this has unfortunately led to trivializing the section on application of chemistry, e.g. the nitrogen cycle, which has always been used as a basis for teaching of principles on fertilizers later on, has been omitted. In Grade 11, common sense has prevailed and principles of mining and enriching of minerals has been retained. In Grade 12, the old curriculum covered a number of relevant South African chemical industries, but the new curriculum is confined to fertilizers only.

In an effort to encourage teachers to incorporate practical work in teaching, the new curriculum lists Prescribed Practical Activities consisting of one chemistry experiment, one physics experiment and one project on either a chemistry or physics topic for formal assessment. In addition, Recommended Practical Activities for informal assessment comprise three activities on chemistry and physics respectively. A great deal of teacher training is being devoted to this aspect of the curriculum.

Needless to say, the universities will have to wait three years before any noticeable effects of the new curriculum could become apparent. In spite of attempts to get universities to lower entrance criteria, this hasn't happened and is unlikely to happen in the near future. Tertiary level education in the sciences has become perhaps more accessible to greater numbers of students financially, but academically many learners from previously disadvantaged schools are still being excluded.

## 2. Events in Chemical Education

Chemistry education is not taught as a separate discipline in South Africa, since our school curriculum is based on a combined subject Physical Sciences, in which physics and chemistry carry equal weighting. A review compiled in 2011 revealed that at most universities, specialization in chemical education is only possible at Masters Level and higher. The number of specialists in chemical education in South Africa is limited by this state of affairs and only a very small community of specialists would contribute papers on chemical education at conferences of the Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE). The 2012 conference was hosted by the University of Malawi in Lilongwe, Malawi and the 2013 conference will be held in Cape Town, South Africa.

## 3. Activities of the national adhering organizations of IUPAC, usually the chemical society.

The South African Chemical Institute organizes a wide variety of conferences throughout the year. At the biennial SACI Conventions, a day is usually set aside for Chemical Education. The next SACI Convention will be held at the beginning of 2013.

Notable international conferences for 2012 include the 4<sup>th</sup> International Conference on Nanoscience and Nanotechnology, held in Bloemfontein from 1 – 4 April 2012 and the Mineral Wealth in South Africa Symposium, held at Mintek in Johannesburg.

More details and news from the provincial sections are published in the monthly newsletter which can be accessed on <http://www.saci.co.za>

## 4. Publications about chemical education in your country, including websites/ books magazines

There are few publications on chemical education in South Africa and authors prefer to submit materials to the African Journal of Chemical Education (AJCE) instead.

## 5. Activities relating chemical industry and education

SASOL ( a major producer of petroleum, plastics, waxes, etc) host an annual SASOL Techno-X during which learners at school visit the exhibition and participate in hands-on activities. The 2012 event will be held in Sasolburg from 13 – 17 August.

In the November 2011 issue of the SACI newsletter, it is reported how Pretoria Portland Cement and the Nelson Mandela Metropolitan University in Pretoria hosted a School Outreach Project.

There are various such outreach projects in South Africa at present, but no single publication giving details. Most of the details are found in the Annual Reports of the companies in question and chemical educators might only learn about the initiatives by chance.

#### 6. International Activities that were visited

South Africa is well represented in a number of IUPAC Divisions and funding permitting, the country makes every effort to maintain attendance at international meetings.

Events on Chemical Education attended by the National Representative:  
Young Ambassadors for Chemistry, Kasulu, Tanzania, 23 - 27 April 2012.

#### 7. Other events or activities

None

8. Brief resume or CV of the national representative.

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<b>Qualification</b>	<p>BSc (Industrial Chemistry), University of Potchefstroom, South Africa</p> <p>MSc (Chem. Eng), University of Wales, UK</p> <p>DSc (Industrial Chemistry), University of Potchefstroom, South Africa</p> <p>MSc (Science Education), University of South Africa, Pretoria</p>
<b>Experience</b>	<ul style="list-style-type: none"> <li>• 1977 – 1985: Senior Scientist, Council for Mineral Technology, Randburg. Research field: Surface Chemistry, Polymers in mineral flotation.</li> <li>• 1992 – 2003: Teacher, Senior High School Physical Science, at various schools in Johannesburg.</li> <li>• Joined RADMASTE in January 2004 as a full-time consultant, appointed as a permanent WITS Staff member April 2005. Member of RADMASTE EXCO since January 2012.</li> <li>• <b><u>Summary of projects participated in since 2004:</u></b> <ol style="list-style-type: none"> <li>1. Impala Post Matric Project (Chemistry), Rustenburg, North West Province.</li> <li>2. NEDCOR Teachers' Programme, Alexandra, Johannesburg.</li> <li>3. Mpumalanga PCK Project, Nelspruit, Mpumalanga.</li> <li>4. D5 FET Project, Ekurhuleni.</li> <li>5. Advanced Certificate in Education (ACE): Planet Earth and Beyond, Learning and Teaching of Science, Structure and Properties of Matter.</li> <li>6. D10 Matric Intervention and Improvement Programme.</li> </ol> </li> <li>• <b><u>Work relating to National Curriculum Statement (NCS: Physical Sciences) in particular</u></b> <ol style="list-style-type: none"> <li>1. Appointed by Wits University as a writer of training materials and as a facilitator for a 40-hour in-service orientation course for Grade 10 educators. The course was presented on behalf of the Gauteng Department of Education from 19 -23 September 2005 in the FET band, with the focus on Physical Sciences.</li> <li>2. Development of learning materials, courses and equipment to cover new content in the NCS Physical Sciences, specifically molecular modeling kits.</li> </ol> </li> </ul>

	<ol style="list-style-type: none"> <li>3. Preparation and presentation of a series of workshops for the training of teachers in the new content of the NCS, taking place in Gauteng-D4, Taung, etc.</li> <li>4. Limpopo Continuous Professional Development Programme for Curriculum Advisors: Facilitator for chemistry (2008), Wits Short Course in Chemistry (2009) and Supporting the Learning and Teaching of Physical Sciences (2009).</li> <li>5. Limpopo Continuous Professional Development Programme for Educators: Facilitator for chemistry (2008 - 2010), Wits Short Course in Chemistry (2009, 2010) and Learning and Teaching of Physical Sciences (2009 – 2010).</li> </ol> <ul style="list-style-type: none"> <li>• <b><u>Work relating to Curriculum and Assessment Policy Statement (CAPS: Physical Sciences) in particular</u></b> <ol style="list-style-type: none"> <li>1. Member of the RADMASTE team authoring and trialling practical activities as prescribed by the 2012 curriculum for Grades 10 – 12.</li> <li>2. Facilitator for educator training with a CAPS focus (2012): Orange Farm for Imperial-Ukhamba; Sasolburg for the Boitjhorisong Resource Centre; teachers of selected schools for Cigré; teachers of winter schools for the Kganya Education Foundation Trust; teachers in North West Province and Limpopo for Anglo Platinum.</li> </ol> </li> </ul>
<b>Professional Award</b>	<ul style="list-style-type: none"> <li>• 2010 South African Chemical Institute Medal for Chemical Education.</li> </ul>
<b>Professional Membership</b>	<ul style="list-style-type: none"> <li>• Member: South African Chemical Institute</li> <li>• Affiliate member: IUPAC</li> <li>• National Representative on IUPAC Committee for Chemical Education (2007 to present). Involved in YAC programme, 2007 – present.</li> <li>• Elected as Titular Member of CCE in 2011.</li> </ul>