

REPORT
of the
COMMITTEE ON CHEMISTRY EDUCATION
2004–2005

I HIGHLIGHTS

The principal activities of CCE centre on its two major subcommittees, PUC and CED:

1. Report of the subcommittee on Public Understanding of Chemistry (PUC)

Chairman: Peter Mahaffy

(a) Public Understanding of Science: Identifying IUPAC's Niche. Members of the Project team have prepared a report after meeting for three days in May, 2005 in Edmonton to review IUPAC's role, survey the literature, and prepare this report. The purpose of the Beijing workshop will be to consider recommendations to the Bureau on roles for IUPAC in promoting public understanding of science. The final stage of this project will take place at and following the 19th ICCE in Seoul in August 2006, where a special symposium on the Public Understanding of Chemistry will take place.

(b) Young Ambassadors for Chemistry (YAC). The YAC initiative was launched in Taipei, followed by implementation in the second proposed site, Buenos Aires. The objective of YAC is to enhance the public understanding of chemistry through teacher and school audiences in target locations of regions in transition. YAC is a partnership between IUPAC and Science Across the World (SAW), building on a previously successful collaboration to organize a global poster competition. Additional partners for YAC include Glaxo-Smith-Kline, the British Council, and for Taiwan the National Taiwan Normal University, The Chinese Chemical Society, and the National Science Council. The Taipei launch was covered in the March-April, 2005 issue of Chemistry International. Organization of activities for the third and fourth sites, in Russia and South Africa, are under way.

(c) PUC symposium The Flow of Ideas (2003 Ottawa IUPAC Congress): Follow up. Canadian Chemical News (ACCN), the national news magazine of the Chemical Institute of Canada (CIC), has followed up this symposium and solicited from symposia speakers; CIC is building on the momentum to create sustained activities at annual national conferences. The Chemical Heritage Foundation in Philadelphia has inquired about outcomes from this symposium, in conjunction with a proposal to study public attitudes toward,

and understanding of, chemistry.

(d) Standards for colours in electrostatic potential maps. A new IUPAC project to address the need for systematisation is being considered. Peter Mahaffy convened an informal meeting of possible participants at the 2005 Gordon Research Conference on Visualization in Science & Education, July 3-7, 2005, Oxford UK.

2. Report of the subcommittee on Chemistry Education for Development (CED)

Chairman: Ram Lamba

(a) e-Quiz Project: promoting Chemical Education in India. In Istanbul the CCE approved USD2k as seed money and encouraged the applications to come back with a revised proposal with various technical solutions to points that had been raised. The revised project aims to develop assessment tools, a test bank in several Indian languages, motivation of high school students to improve their chemistry knowledge and continue studies in this area, conceptual understanding, teacher training through the outcomes of their students in the e-quiz, web-based interaction among students and teachers, newer practices in certain regions of India through hands-on Chemistry (such as micro-scale and the use of low-cost equipment), and benchmarks and standards at high school level. The intention is to extend the program to SE Asia.

(b) Micro-scale Chemistry The Micro-scale UNESCO-IUPAC Global Program has been continued during this period.

Consultant: John Bradley

Two-day introductory workshops have been conducted with the aim of introducing the concept to senior educators. Since the last report in Ottawa, these workshops have taken place (chronologically) in:

Azerbaijan, Russian Federation (Bashkortostan, Tatarstan), Cote d'Ivoire, Comoros, Djibouti, Equatorial Guinea, Zimbabwe, Angola, Norway, Sweden, Finland, Turkey, Malawi, Zambia, Mauritania, Congo (DRC), Bangladesh, Maldives, Thailand and Pakistan

The large pilot project for 22 African countries has been completed and a final report submitted to UNESCO and GIFCA. As part of the preparations for the completion of the report, a number of evaluation workshops were also held. These took place in

Dakar (Senegal), Johannesburg (S Africa), and Windhoek

(Namibia).

The final report preparation took place in Johannesburg. The report, which is being evaluated by the donors, includes recommendations for expansion of the project to support wider implementation in some of the countries involved.

The translation of the micro-scale chemistry worksheets into languages other than English has always been part of the program of dissemination. This continues, whilst at the same time the existing English and French versions are now accessible free to all on the UNESCO website (www.unesco.org/science/bes). Most of this program has been funded by UNESCO, using extra-budgetary funds from a number of different sources. There remains a list of countries which have requested introductory workshops and we hope to organize visits in the months ahead.

(c) Flying Chemist Program (FCP) The FCP is a major new initiative of the CCE. The aim is to provide emerging countries means to improve the teaching and learning of chemistry at primary, secondary, and tertiary levels. The FCP will provide a country with the expertise needed to strengthen chemistry education and to assist them in its development. The program is preferably to be implemented for the development of economically disadvantaged countries. The host country will provide local costs (board and lodging), and CCE (in collaboration with the Project Committee) will provide the air fare. It is expected that visits will in due course be developed in collaboration with UNESCO, but their participation is not essential (except to broaden the activity). It is anticipated that visits will be considered only if invitations are received from a National Society, a Ministry of Education or Technology, or another comparable substantial organization.

Possible scenarios for the FCP are:

1. To assist in the development of curricula.
2. To help develop or recommend new tools of assessment.
3. To help recommend implementation of hand-on experiences at all levels of chemistry education.
4. To assist in the establishment of partnerships among universities, industries, and governments.
5. To help develop different approaches to the teaching of chemistry.
6. To develop successful international conferences to achieve expert advice on a particular aspect of chemistry education.
7. To help develop and implement teacher training and preparation programs.
8. To help identify and approach sources of funding.
9. To assist in other matters of chemistry education.

The Executive Committee of the FCP will consist of the Chairman and the chairmen of the two Subcommittees, with the chairman of CED as Convenor and Project Leader.

Under this program:

(i) India The first implementation of this program is to India, to implement improvements to chemistry education. This project is in collaboration with the DAV College Managing Society, New Delhi (DAV Managing Society manages an educational network comprising over 500 schools spread throughout India). The chairman of CCE and the chairman of the CED visited Delhi in July, 2005.

(ii) Peru The Association of Chemistry Educators of Peru has been sent the criteria for the FCP program.

(iii) Sri Lanka In response to the effects of the 2004 tsunami and in collaboration with the RSC, which has committed substantial funds in support, and its local branch in Sri Lanka, plans are moving forward other to proceed with a conference and workshops to develop and improve chemistry education in Sri Lanka. The chairmen of CCE and CED visited Sri Lanka for one day after their visit to India in July in order to see and discuss first-hand the needs of the country. The meetings are planned for 2006.

(iv) Iran A request is expected to come officially from Iran through the CCE chairman.

(d) Flying Scientist Program (FSP) The idea for this program is to extend FCP to all science-based subjects and to collaborate with other Unions and make use of ICSU and possibly UNESCO resources.

(e) Medicinal Chemistry It is proposed to hold a symposium in Korea 2006 in connection with ICCE-19.

(f) The 2nd International Conference "Chemistry Education and Sustainable Development (Moscow, October 2004). The report on this conference has been recently published in CI. The chairman of CCE attended and presented a paper.

3. Other significant activities A significant collaboration has been established between CCE and OPCW [the Organization for the Prohibition of Chemical Weapons] in response to the request to the CCE that it should examine the educational aspects of chemical weapons mentioned in the IUPAC Report [PAC]. A meeting, jointly funded by IUPAC and OPCW took place in Oxford, July 9—13 2005 with a view to taking this matter forward and preparing a report for consideration by

the States Signatories of the Convention later in the year. The meeting is scheduled to take place after the deadline for this report to Council and will be included in the oral report.

II ACHIEVEMENT OF GOALS OF THE STRATEGIC PLAN

(a) IUPAC will provide leadership as a worldwide scientific organization that objectively addresses global issues involving the chemical sciences.

The role of the CCE is to encourage good practice in chemical education worldwide and to promote the public appreciation of chemistry. It continues to play a central role in providing assistance to developing countries and countries in transition, particularly through its Collaboration with UNESCO and the propagation of its microscale kits (see the CED report), and is organizing symposia to propagate chemistry to the general public (see PUS report). The CCE is encouraging the development of curricula that have regional relevance. In particular, it has established a 'Flying Chemists Program' (FCP) where the expertise of the committee is offered to governments and other substantial organizations with the aim of developing their provision of chemical education.

(b) IUPAC will facilitate the advancement of research in the chemical sciences through the tools that it provides for international standardization and scientific discussion.

The CCE regards research in chemical education as an intellectually valid domain of original investigation, and intends to continue to encourage its acceptance, for instance, by examining the origins of misconceptions and the role of animations.

(c) IUPAC will assist chemistry-related industry in its contribution to sustainable development, wealth creation, and improvement in the quality of life.

The chairmen of CCE and COCI have become representatives on each others' committee and have been fully involved in matters of mutual concern. Although the chairman of COCI was unable to attend the off-year meeting of CCE (in Istanbul), the chairman of CCE was able to attend the off-year meeting of COCI in Oxford and is fully informed about that committee's activities. The CCE recognizes that the education of chemists is the prime source of talent and hence profit for the chemical industry.

(d) IUPAC will foster communication among individual chemists and scientific (with special emphasis on the needs of chemists in developing countries).

As has been pointed out previously, the CCE has a huge membership, with a large number of NRs from developing countries. As in the Ottawa meeting, we shall include

symposia at which NRs present summaries of what each of their countries need, and the CCE will continue to build a program of relevant projects. The FCP is a particularly relevant example of our involvement with developing countries.

(e) IUPAC will utilize its global perspective and network to contribute to the enhancement of chemistry education, the career development of young chemical scientists, and the public appreciation of chemistry.

This goal lies at the heart of the CCE, and all the activities of the CCE are directed towards its achievement.

(f) IUPAC will broaden its national membership base and will seek the maximum feasible diversity in membership of IUPAC bodies in terms of geography, gender, and age.

The chairman of the CCE seeks to involve a wide range of its members in its activities and planning. In the course of his travels he has encouraged a number of countries to consider membership.

III FURTHER SUBSTANTIVE INFORMATION

This part of the report consists of summaries relating to the structure of the CCE, its subcommittees, and its projects.

1. Composition and structure The membership of the CCE is shown in Table 1. We have developed the structure of the committee following our off-year meeting in Istanbul in the course of the ICCE in August 2004. See Table 2. We have aimed at a global distribution of members. In addition, we have established three working groups: See Table 3.

This biennium sees the retirement of its Chairman (PWA) and its Secretary (EMP). It is proposed that the Chairmanship for the next biennium be taken by Peter Mahaffy, who will in due course reallocate responsibilities. The President has been offered the names of Eva Akesson (Sweden) and Choon Do (Korea) as replacement Titular Members. The Chairman is *ex officio* a member of COCI, and reciprocally. The CCE has had close and valuable relations with COCI and has developed themes of mutual interest.

2. Project advisory subcommittee We have established a protocol for dealing speedily with applications:

1. Project proposal received by Secretariat.
2. Project Coordinator receives proposal from Secretariat (FM).
3. If FM is uncertain whether the Project is of interest to CCE, FM consults Project Coordinator.

4. FM distributes the proposal to all Project Group members and comments are to be returned to her; this first round of review by all members should take 1 week.
5. FM will collate all comments and send that to the Project Coordinator who will then formulate a decision.
6. If comments diverge, the Project Coordinator can ask for a second round of comments; to initiate such a round, all the comments initially collected will be circulated to all members of the Project Group for additional comments.
7. The Project Coordinator will report to FM (a) to support or not to support; (b) suggestions for external referees, (c) the level of CCE financial support.

Current projects are listed in Table 4.

3. ICCE program As its flagship activity, the CCE is responsible for the sequence of ICCEs. A highly successful ICCE-18 was held in Istanbul in 2004, with a large and gratifying number of attendees from the Middle East. The next ICCE (ICCE-19, in August 2006) will be held in Seoul. Because there is now a more vigorous interest in the program, the CCE has established the following criteria on which to base its selection:

1. The availability, style, quality, and location of lecture rooms.
2. The availability, style, quality, and location of dining rooms.
3. The availability, style, quality, and location of laboratories, technology resources, and access to the internet.
4. The number and level of expertise of the conference committee involved in the management of the conference.
5. Financial resources to host the conference
6. Accommodation availability and costs
7. International access to host city by air travel and availability of competitive airfares.
8. An assessment of the ability of the conference to attract teachers and other interested parties from the region and their ability to attend.
9. A (non-binding!) assessment of the weather conditions at the planned meeting time.
10. Opportunities for excursions and entertainment.

The CCE intends to make its selections helped by advice from its Conference coordinator., whose role also includes informing members of the CCE about other conferences with an educational content.

Peter Atkins
Chairman, CCE
June, 2005

Table 1 Committee membership

Titular Members	
Prof. Peter W. Atkins	1998-2005
Prof. M. Elisa M. Pestana	1996-2005
Prof. Warren Beasley	2004-2007
Prof. Masato Ito	2004-2007
Prof. Ram S. Lamba	2002-2005
Prof. Peter G. Mahaffy	2002-2005
Dr. Lida Schoen	2002-2005
Prof. Natalia P. Tarasova	2004-2007

Associate Members	From Division	
Prof. Christopher M. A. Brett	Physical and Biophysical Chemistry	2002-2005
Prof. Leonard Interrante	Inorganic Chemistry	2004-2005
Prof. Maria F. da Silva	Organic and Biomolecular Chemistry	2004-2005
Prof. Jung-II Jin	Polymer	1998-2005
Prof. Roger M. Smith	Analytical Chemistry	2004-2005
Prof. Nicola Senesi	Chemistry and the Environment	2002-2005
Dr. Mukund S. Chorghade	Chemistry and Human Health	2002-2005
Prof. Herbert D. Kaesz	Chemical Nomenclature and Structural Representation	2002-2005

National Representatives	Country	
Prof. Hector Santiago Odetti	Argentina	2004-2005
Dr. Mauro Mocerino	Australia	2004-2005
Dr. San Hoa Thang	Australia	2004-2005
Prof. Ludo Brandt	Belgium	2004-2005
Prof. Alvaro Chrispino	Brazil	2002-2005
Prof. Borislav V. Toshev	Bulgaria	2002-2005
Prof. Qiankun Zhuang	China/Beijing	2000-2005
Mei-Hung Chiu	China/Taipei	2002-2005
Dr. Helena Klímová	Czech Republic	2002-2005
Prof. Amen Farouk Mohamed Fahmy	Egypt	2000-2005
Dr. Ahmed S. Shoukry	Egypt	2004-2005
Prof. Matti E. Näsäkkälä	Finland	1994-2005
Prof. Françoise Rouquérol	France	2000-2005
Prof. Terence N. Mitchell	2004-2005	Germany
Prof. Miklos Riedel	Hungary	2004-2005
Prof. A. K. Bakhshi	India	2004-2005

Prof. Uday Maitra	India	2004-2005
Prof. Peter E. Childs	Ireland	2004-2005
Dr. Mordechai Livneh	Israel	2002-2005
Prof. Paolo E. Todesco	Italy	2004-2005
Prof. Choon H. Do	Korea	2000-2005
Dr. Maryam Al-Wateed	Kuwait	2002-2005
Prof. Józef J. Ziolkowski	Poland	2000-2005
Dr. Eva Akesson	Sweden	2002-2005
Prof. Hale Bayram	Turkey	2002-2005
Dr. Anthony D. Ashmore	United Kingdom	1992-2005
Prof. Morton Z. Hoffman	USA	2004-2005
Prof. John D. Bradley	South Africa*	

* *Ex-Officio*; Consultant for Microscale Project/Program

Subcommittee on Chemistry Education for Development (CED)

Prof. Ram S. Lamba (Chairman)

Dr. Eva Akesson

Dr. Anthony D. Ashmore

Prof. Warren Beasley

Prof. John D. Bradley

Dr. Mukund S. Chorghade

Prof. M. Elisa M. Pestana

Prof. Natalia P. Tarasova

Prof. Chung-Yuan Mou

Subcommittee on Public Understanding of Chemistry (PUC)

Prof. Peter G. Mahaffy (Chairman)

Dr. Anthony D. Ashmore

Dr. D. Balasubramanian

Prof. Robert B. Bucat

Prof. Choon H. Do

Prof. Masato Ito

Dr. Lida Schoen

Prof. Joseph Schwarcz

Table 2 Officers

Office	Holder	Country
Chairman	Peter Atkins	UK
Chairmen of the CED Subcommittee and PUS Subcommittee	Ram Lamba Peter Mahaffy	Puerto Rico Canada
Secretary	Elisa Maia	Portugal
Project Coordinator	Choon Do	Korea
Divisional Coordinator	Eva Akesson	Sweden
Conference Coordinator	Warren Beasley	Australia
Treasurer	vacant	-

Table 3 Subcommittees and working parties

Task	Members	Countries
Project management	Choon Do Eva Akesson Tony Ashmore Hale Beyram	Korea Sweden UK Turkey
Educaitonal aspects of chemical weapons	Natalia Tarasova Jun-Il Jin Elisa Maia	Russia Korea Portugal
Networking and developing DIDAC	Warren Beasley	Australia

Table 4 Projects in progress

Number	Title
2001-003-5-050 -	Organisation of Clearing House for the translation, publication, and dissemination of the IUPAC-sources materials and ideas in chemical education in Russia and CIS
2001-016-1-050	IUPAC chemical nomenclature for chemistry teachers at secondary schools
2001-046-1-050	Introduction of small scale chemistry experiments - teacher training
2002-010-1-050	Toward a core organic chemistry curriculum for Latin American universities*
2002-021-2-050	A feasibility study of the scope and limitation of machine translations as a means of disseminating useful reading material for chemical education to be used on the internet
2003-055-1-050	Young Ambassadors for Chemistry (YAC)
2004-047-1-050	Public understanding of science: identifying IUPAC's niche
2005-004-1-050	Flying chemists program - 2005 visit to India
2000-020-2-200 *	Collecting, testing and dissemination of experiments in solid state and materials chemistry
2003-022-1-020*	Chemistry's contributions to humanity - A feasibility study
2004-037-1-400*	Design of polymer education material for French speaking countries
2004-045-1-700*	Training of school children on pesticides and health
2004-048-1-020*	A joint OPCW - IUPAC project on education and outreach regarding chemical weapons

* Interdivisional project

