

Item 11.4: Report of the Committee on Teaching of Chemistry

CTC IN THE 1999 – 2001 BIENNIUM

Report to IUPAC Council

7 – 8 July, 2001, Brisbane, Australia

Executive Summary

This biennium has been a period of accommodation. Firstly to the new project system, secondly to recognition of CTC as an Operational Committee with a place on the Bureau, thirdly to the awareness of a probable larger role for education in the future IUPAC. This third point reflects the recommendations of the Education Strategy Development Committee which are currently still being considered. Communication with other IUPAC bodies is improving, and cooperation with UNESCO continues to strengthen, particularly in projects involving developing countries and countries in transition.

CTC Activities within the Framework of the IUPAC Strategic Plan

Goal 1: IUPAC will serve as a Scientific, International, Non – Governmental Body in Objectively Addressing Global Issues involving the Chemical Sciences.

It is generally understood that the gap between rich and poor countries, and/or between developed and developing countries, is widening rather than diminishing. The chemical sciences are a small but important part of this global reality, so that the gap between the chemical sciences (research, teaching, industry) in these two categories of countries is also widening. IUPAC is not a funding agency but can function as a conduit of ideas and experience that may make a difference to the chemical sciences in less – fortunate environments. In the educational domain CTC has developed active programmes in cooperation with UNESCO (Basic Sciences Division), which illustrate the possibilities.

The global issue involved here is what might be loosely described as scientific literacy. Two specific points of relevance are

- (1) the absence of practical chemistry experiences from the majority of school classrooms and even some first year university courses,
- (2) the absence of good quality, reliable teaching resources for most chemistry teachers at school and for many university chemistry lecturers.

These two realities undermine national programmes of education and, thereby, socio-economic development, in the majority of countries. As described below, in cooperation with UNESCO, CTC is actively addressing these realities. It is hoped that the International Chemistry Council will also lend its weight to this programme, with particular reference to its interest in chemistry in Africa.

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Goal 6: IUPAC will Utilize its Global Perspective to Contribute towards the Enhancement of Education in Chemistry and to Advance the Public Understanding of Chemistry and the Scientific Method.

Projects have been the principal means by which CTC has contributed to this Goal. Some of these, established years ago, continue vigorously, as briefly described below.

The International Newsletter on Chemical Education (27/85) is now electronic thanks to the efforts of Professors Takeuchi and Ito. We are at an early stage with this, and will need to assess its impact and ways of enhancing this. If we work steadily at this in the next biennium we should have a valuable mechanism for global enhancement of chemistry education.

The Source Books for Teaching of Chemistry project (44/91) is reactivated following a long period of indecisiveness. Following extensive investigations by Professors Bucat and Lagowski, it is now proposed to publish the two volumes of Selected Papers in Chemical Education Research electronically, making them available free. These will be one of the underpinning resources for the proposed new project "A Glossary of Chemical Concepts: a Pedagogical Content Knowledge Resource for Teachers".

The Education in Chemistry and Human Health project (47/96) continues in active collaboration with Commission VII.C.2. being lead by Professor Duffus, the Division Representative. Draft versions of Introduction to Toxicology – informally referred to as Toxicology for Teachers – have been quite widely circulated and a workshop conducted at the 16th International Conference on Chemical Education. The feedback is being digested, and meanwhile UNESCO has expressed interest in global dissemination.

The Small-Scale Chemistry project (43/91) continues with particular vigour, in collaboration with UNESCO. During this biennium, UNESCO – IUPAC/CTC workshops have been conducted to introduce and to advocate the benefits of small-scale, low-cost practical chemistry in Armenia, Belarus, Benin, Burkina Faso, Burundi, Cameroon, Chad, Estonia, Gabon, Gambia, Georgia, Guineé, Guyana, Iran, Jamaica, Lesotho, Lithuania, Mali, Mexico, Niger, Senegal, Trinidad and Yemen. In a number of countries they have been inspired to initiate pilot projects to assess the local applicability of the concept using individual student kits. Some countries have gone beyond this stage and embarked on wider, national implementation in the school system. A leading example is Cameroon, where a Centre of Excellence has been established recently in Yaoundé to underpin this implementation and to support its diffusion in the CEMAC region.

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It is very clear from the responses of individual school teachers and inspectors as well as from university lecturers, that the small-scale, low cost chemistry approach is like an answer to a prayer in developing countries. To facilitate local development workbooks with example experiments have been, or are in process of being, translated into French, Portuguese, Russian, Arabic, Persian and Estonian. Strong cooperation with UNESCO (Basic Sciences Division) in this programme has made it possible and hopefully will continue to do so.

The COCI project (17/98) – Assessment of DIDAC as an Aid for the Toxicology of Chemistry Around the World – is one in which CTC cooperates and again involves UNESCO. It has been possible to introduce the DIDAC materials to educators in most of the countries mentioned above, within the framework of the arrangements made for the small-scale chemistry workshops. Whilst the reaction of most educators is very positive, it is not possible to say what the wider impact may be. The costs are fairly high and in some countries, the electricity and overhead projector requirements may not be readily met. Classroom posters created from the original transparencies are an interesting possibility for such situations.

New Projects

As the new system gets under way, additional, new projects are beginning to emerge. Two have been approved and are proceeding. The first focussed on the holding of a Conference on Chemical Education for Sustainable Development in Moscow (October 11 – 13, 2000), with follow-up gathering and generation of educational resources. We see this initiative linking up with the Green Chemistry Education initiative of Division III and hope to play a part in their forthcoming workshop in Venice. The second continues a line of development established some years ago in Division II in Collecting, Testing and Dissemination of Experiments in Solid State and Materials Chemistry. Both these projects are being led by CTC members (Professors Tarasova and Kizilyali, respectively).

A number of other project proposals have been reviewed, some in conjunction with other Divisions, and have been rejected or returned for re-working.

The International Conference on Chemical Education (ICCE)

The ICCE remains a regular, important responsibility of CTC. The 16th ICCE was held in Budapest in August, 2000 and attracted more than 500 delegates, including 200 school chemistry teachers from the region. The event was well organised by the Hungarian Chemical Society with the theme Chemistry for a Healthier Planet. With this theme for inspiration we were able to secure a plenary lecture from Professor Miyamoto (Past President, Division VI), a workshop on Toxicology for Teachers led by Professor Duffus (Chairman, Comm. VIII.C.2) and symposium lecturers by Dr Parry Norling (Chairman, CHEMRAWN). CTC was well represented by 6 of its 8 Titular Members, 2 of its 7 Divisional Members and 7 of its then 16 National Representatives contributing lectures, workshop and/or poster papers.

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At an informal meeting of CTC, held during the conference, the invitation of the Chinese Chemical Society to host the 17th ICCE in August, 2002 in Beijing was approved.

The scheduling of ICCE in relation to BCCE (USA) and ECCE (Europe) remains problematic, and requires our urgent attention.

Other international and regional events are being explored with a view to inclusion of an appropriate educational component. We are grateful in this regard to the organisers of the World Chemistry Congress for agreeing to a CTC satellite symposium on Chemistry Education.

Retrospect and Prospect

During the biennium, CTC has been continually aware of change. At the beginning, it was already clear from Dr Hayes' Vice-Presidential Critical Assessment that significant change was to be anticipated. The Educational Strategy Development Committee, chaired by Professor Peter Atkins, was constituted and worked hard and constructively to recommend actions and policies to bring about the change. The recommendations are appropriate, far-reaching and ambitious and CTC endorses them. The conclusions of the Executive Committee are eagerly awaited. One concern will be however, that the resources committed are commensurate with the plans. Given the concerns most of us have about the need to sustain the vitality of education in chemistry and to advance the public understanding of chemistry, there is every reason to make the necessary resources available.

J D Bradley
CHAIRMAN: CTC

7 May 2001