

VICS /CEA Outreach Network Meeting

An invited group of organisations met on April 21 at the School of Chemistry, University of Melbourne.

The following report was compiled in order that organisations and teachers could examine the workshops and material available and perhaps encourage some redesigning of material being offered, as well as develop new material where needs appeared.

It is hoped that the network group can now appreciate the extent of available material. A continuing aim is to make this information available to as many teachers and schools as possible through websites and email lists. We hope that it will be possible to improve communication further and include other similar groups.

Penny Commons for CEA

Minutes and Report

Associate Professor Peter Tregloan opened the meeting, welcomed everyone to the evening and thanked them for accepting VICS' and CEA's invitation.

The aim of the meeting was to determine what is being done for teachers and students of chemistry in Victoria, in Years 11 and 12 in particular, by various organisations as providers of workshops, opportunities for professional development and learning and to document the information for everyone's use.

The attendees and organisations that they represented are listed below. Members from each organization described the aims of their organisation and what they offered students and teachers. A summary of the short presentation from each group follows.

Organisations that attended

Chemistry Education Association

CSIRO Education

Ecolinc Science and Technology Innovations Centre

Free Radical Biotechnology ARC Centre of Excellence

Gene Technology Access Centre

LaTrobe University, Bundoora

Monash University, Churchill

Royal Australian Chemical Institute - Chemical Education

Science Teachers' Association of Victoria

University of Melbourne

Victorian Curriculum and Assessment Authority

Victorian Institute for Chemical Sciences

Victorian Space Science Education Centre

Rob Sanders, Penny Commons

Chris Krishna-Pillay, Caitlin Lewis

Suzanne Clark

Felicity Jenz

Brian Stevenson

Francesca Calati, John McDonald, Sarah

Pulis

Alison Green

Judy Gordon

Soula Bennett

Peter Tregloan, Brendan Abrahams

Anne Semple

Mick Moylan

Michael Pakakis, Naomi Mathers

Organisations invited, but unable to attend

Department of Innovation, Industry and Regional Development

Green Chemistry Centre

Melbourne Water

Monash University, Clayton

RMIT University

CEA - Chemistry Education Association Inc

Mr Robert Sanders

President Chemistry Education Association Inc

Mrs Penny Commons

Project Officer

Aim

To promote the study and general knowledge of all branches of chemistry at the secondary level of education. CEA is a non-profit organization that uses text book royalties to dispense appropriate information to Year 11 and 12 teachers and students and to sponsor scholarships and useful ventures aimed at helping teachers and students to enhance their chemistry knowledge.

Means of communicating information

- the CEA website www.cea.asn.au
- email list to members

Presently providing

1. CEA website

The website is a most successful project that provides many resources, information and links for students and teachers.

2. Instrument workshops and Chemical Detective program

Several workshops were held in city and rural schools enabling students to carry out practical activities with the assistance of expert university personnel using relevant instruments. Further assistance is provided by a website designed to assist Chemistry teachers and students by providing infrared, ^1H and ^{13}C NMR spectra and mass spectra of a small selection of molecules that can be downloaded and used in "Chemical Detectives"-style exercises.

3. November Lecture Series

This annual series of lectures for Chemistry teachers provides an opportunity for teachers to update their knowledge by listening to lectures about exciting recent developments, important research and cutting-edge applications.

4. Cocktail Party and Scholarship for Pre-Service Chemistry Teachers

A scholarship is offered annually to a post graduate student who is studying to become a chemistry teacher. In order to assist young teachers to develop networks, a cocktail party for Pre-service Chemistry Teachers is held each year.

5. Other scholarships

These are offered annually to an undergraduate student studying Chemistry at a tertiary institution as well as to Chemistry teachers to assist them in attending a chemical education conference in Australia or overseas.

6. Chemistry Teachers' Conference

CEA assists STAV with the organisation of workshops, presenters and speakers for these annual conferences.

7. ChemCal

Four online modules are now available for students and teachers. The self-paced modules are on the topics of Stoichiometry, Atomic Structure, Bonding and Equilibrium. These modules help students learn topics in VCE Chemistry Units 1 to 4.

8. Chat Group

ChemTeach is designed for teachers to share ideas by using a discussion group and the site can be accessed directly through 'au.groups.yahoo.com/group/ChemTeach/' or through a link on the CEA web site.

CSIRO Education

Dr Caitlin Lewis

Education Officer and Student Research Scheme Coordinator

Aim

To develop and widen the Australian community's awareness of the contribution of CSIRO to scientific research, to encourage young people to become scientists and engineers and to help everyone to be interested in science.

Means of communicating information

- The CSIRO website www.csiro.au/education
- CSIRO education centres in all states (Victoria - www.csiro.au/melbcsirosec)
- Link from the CEA website: www.cea.asn.au

Presently providing

1. School programs

These programs are available for Prep to Year 12 and have Chemistry based programs at all levels. They provide hands-on and minds-on activities investigating current research and can either take place at the CSIRO Science Education Centre in each capital city, or programs can be brought out to the school. The website is www.csiro.au/education. As part of the school programs the following activities are provided:

- support of Double Helix Science Clubs in schools
- production of *The Helix* magazine
- support of the CREST program in schools

They are all web supported using www.csiro.au/helix

2. Student and teacher research schemes

This program pairs a VCE student with a research scientist who guides the student to complete a challenging research project. The Teacher Research Scheme provides teachers with first-hand engagement and greater understanding of the scientific process and its practical applications as they complete a research project. The website is www.csiro.au/srs

3. Cutting edge lecture series

Free, inspiring lectures are presented for teachers by engaging science experts in the latest science and innovation. Topics covered include nanotechnology, gene technology, art conservation, possible future energy sources and artificial intelligence. The website is www.csiro.au/csirosec

4. Science by email

Students, teachers and many others value this informative and innovative learning tool by accessing a free, weekly e-newsletter that provides information including home-experiments, environmental news, competitions and new scientific ideas. The website is www.csiro.au/sciencemail

5. Scope

This is an innovative science TV program for young people where different themes are explored each week. It is supported by an extensive web site www.csiro.au/scope

6. Industry link

This provides educational gene technology workshops. Website www.csiro.au/csiro/content/standard/ps2at.html

7. Publications

There are many educational and reference products available for schools. Website is www.publish.csiro.au

ECOLINC

A Science and Technology Innovations Centre based at Bacchus Marsh College

Mrs Suzanne Clark

Ecolinc Manager

Aim

A range of environmental programs suitable for all year levels, Prep – Year 12 across the curriculum, linking the programs to the VELS and VCE study designs is offered. In particular, Ecolinc aims to combine the wet lands and energy efficient features of the building that are available at Bacchus Marsh with topics in VCE Chemistry, Biology, Environmental Science and Physics.

Means of communicating information

- The Ecolinc website www.ecolinc.vic.edu.au
- Link from the CEA website www.cea.asn.au

Presently providing

1. Prep to Year 10 programs

Half or whole day activities cover a wide range of programs including wetlands, edible plants, discovering the Diprotodon, classification of living things and managing ecosystems. Themes explored include; life, water, earth, energy and air.

2. VCE Programs

Half or whole day activities for topics in Units 1 to 4 for Chemistry, Biology, Environmental Science and Physics engage students in an award winning facility with access to a range of technologies, indigenous storm water wetland and horticultural and micropropagation facilities. In particular the Chemistry programs include:

For Unit 2:

- an extended experimental investigation looking at the role of water in maintaining life
- an investigation looking at the role of the atmosphere that could be completed as a summary report or an extended experimental investigation.

For Unit 3:

- a half day or whole day activity that can be completed as an extended experimental investigation looking at chemical analysis using the following instruments: atomic absorption spectroscopy, infrared spectroscopy, UV-visible spectroscopy and thin layer chromatography.

Free Radical Biotechnology Australian Research Council (ARC) Centre of Excellence

Dr Felicity Jenz
Community Awareness Manager

Aim

The ARC centres aim to undergo research to develop a better understanding of free radical processes and hence develop products that protect all substances from free radical damage. Simultaneously, this research will enable us to harness free radicals and hence provide technological innovations. A secondary and essential aim is to introduce this life changing science to the public and especially to teachers.

Means of communicating information

From the Australian Government Research Grant for the Centre of Excellence, a proportion on the funding is directed towards outreach. The Centre includes five universities (over 100 researchers) across Australia, as well as industry partners working in three broad themes that range from material sciences to biology.

- The Community Awareness Manager is the means by which the general public is informed and involved. The email address is: enquiries@freeradical.org.au
- Website is www.freeradical.org.au

Presently providing

1. Profiles of Science Graduates

After discovering that two thirds of surveyed secondary students had very little idea of the range of careers that result from a chemistry degree, profiles of real life chemists have been produced. These profiles provide a window into the daily research/working lives of young chemists, as well an indication of why they chose their careers. These profiles are handed out at events involving science teachers (eg. STAVCON), career's teachers and students. They are available on the website (www.freeradical.org.au) via the *community, teacher and media pages*.

2. Teacher Notes

Notes on NMR Spectroscopy and Mass Spectroscopy have been produced to help Chemistry teachers prepare for the new topics in the VCE Study Design. They give an explanation of each technique as well worked examples showing how to interpret the data. They are available on the website (www.freeradical.org.au) via the *community, teacher and media pages*.

3. Public meetings and lectures

The Centre also engages in public lectures and events. During National Science Week in 2006, the Centre ran a very popular *Free Radical Wine tasting event* at BMB Edge Theatre in Federation Square. The Centre has also been participated in the CSIRO Cutting Edge Lecture series in 2008, and also gives various invited talks at schools.

4. Articles in popular science and also science teacher magazines

The Centre provides articles to be published in various teacher magazines, such as Labtalk (STAV) and also SEN (STANSW).

GTAC - Gene Technology Access Centre

The Gene Technology Access Centre (GTAC) is a specialist centre established by the Victorian Government to promote excellence and innovation in science education. GTAC is located at the University High School and is supported by the Walter Eliza Hall Institute of Medical Research, the Department of Microbiology and Immunology of the University of Melbourne, the Department of Education and Training and the University High School.

Mr Brian Stevenson
Director

Aim

To deliver world class specialist education programs in molecular and cell biology for Victorian students and teachers that promote excellence and innovation in learning, with particular reference to DNA and biotechnology. GTAC aims to bring personnel and expertise from the education and scientific research communities together.

Means of communicating information

- Website is www.gtac.edu.au

Presently providing

1. Laboratory Workshops

These workshops provide a unique opportunity for students to work in small groups with their own young research scientist as “mentor” and use research quality equipment. These sessions are structured so that teachers can use them as assessment tasks.

2. Seminars

These assist teachers to interpret the VCE Study Design in the area of

- DNA structure, function and applications including DNA profiling
- Protein structure and function with a focus on bioinformatics tasks for classroom use to elaborate on the nature of enzyme action.

3. Lecture series

These are aimed at Chemistry teachers and are presented by eminent research scientists on aspects of chemical biology.

La Trobe University, Bundoora

- A. Ms Sarah Pulis
Project Manager of the Science Teachers' Assistance Program
- B. Mr John McDonald
Project Manager of the Science Peer Mentoring in Schools Program
- C. Ms Francesca Calati
Transition Fellow and Outreach Officer in the School of Molecular Sciences

A. Ms Sarah Pulis

Program Co-ordinator of the Science Teachers' Assistance Program (STAP)

Aim

The Science Teachers' Assistance Program (STAP) aims to assist teachers by providing a range of activities for students and teachers within select areas of Science, Technology and Engineering

Means of communicating information

- Website <http://www.latrobe.edu.au/scitecheng/stap>

Presently providing

Student programs that range from practical educational workshops that complement the secondary school curriculum, mentoring, or informational presentations about careers and courses. At times professional development programs for teachers are offered.

B. Mr John McDonald

Project Manager of the Inscience Peer Mentoring in Schools Program

Aim

The aim is to foster links between schools and universities by placing university students as role models in schools to work alongside secondary teachers and Years 7-10 students in the areas of Chemistry, Biology, Mathematics and Physics.

Means of communicating information

- Website <http://www.latrobe.edu.au/scitecheng/mentoring/index.html>

Presently providing

University students are placed in schools for 10 - 12 weeks a year to work with classroom teachers. The students see them as scientists and peer role models who are able to engage with students in different ways to the teacher. This program is currently funded only to support government schools.

C. Ms Francesca Calati

Transition Fellow and Outreach Officer in the School of Molecular Sciences

Aim

To develop chemistry courses at La Trobe University, introducing nanochemistry and to oversee the transition from school to university for students.

Means of communicating information

- Website <http://www.latrobe.edu.au/molsci/>
- Link from CEA website www.cea.asn.au to the analysis programs that are being offered presently

Presently providing

1. Chemical analysis and chemistry practical workshops for Year 12 students
2. Professional development workshops for teachers on topics such as NMR.
3. Modular nanotechnology courses for use in Years 7 - 10

Monash University, Churchill Campus

Dr Alison Green
Lecturer Chemistry Environmental
School of Applied Sciences and Engineering, Gippsland

Aim

To provide workshops for secondary school students and to organize network groups for teachers in the Gippsland area.

Means of communicating information

- Website is <http://www.monash.edu.au/campuses/gippsland.html>

Presently providing

1. Instrumental workshops

Chemical analysis workshops for VCE Year 12 Chemistry students are provided. Students can complete the requirements for an assessment task using instruments such as AAS, GC and UV-visible spectrometers.

2. Teacher networking groups

The Churchill Campus is used as a centre for networking groups for teachers throughout the Gippsland region to meet.

RACI - Royal Australian Chemical Institute Chemical Education Group

RACI is a national professional organisation of Chemistry researchers and educators. Full membership is restricted to those who possess strong tertiary qualifications in Chemistry and is by nomination. Those who qualify under the strict entry process are then entitled to use the letters FRACI or MRACI after their name. Secondary teachers are eligible for a 50% discount on the relevant fee upon receipt of a letter from their principal.

Ms Judy Gordon
Chair of Chemical Education Group, Victoria

Aim

The principal aims of the group are to encourage students and teachers to develop a greater knowledge of and love of Chemistry, and to inspire students to further their studies in Chemistry. It often acts in a consultative capacity on matters such as curriculum development and school programs and has also hosts professional updates and national conferences.

Means of communicating information

- Website is www.raci.org.au
- The RACI Chemistry Resources website: <http://www.raci.org.au/chemistry/>
- RACI maintains a national office as well as state branch offices. The National Office and the Victorian Branch Office are both located at 21 Vale Street, North Melbourne.
- The RACI (Vic) Education Group may be contacted through:
 Judy Gordon, Chair: Phone: (03) 9251 7031, Email: judy.gordon@deakin.edu.au
 or Jenny Sharwood, Secretary: Phone/fax: 9816 3786, Email: jenny.sharwood@oup.com

Presently providing

1. Competitions

There are several competitions for secondary school students that are organized by different groups and divisions of RACI. These are:

- Crystal Growing Competition
- Titration Stakes

2. Resources

Recently RACI has been involved in developing resource materials in analytical chemistry for secondary students through the ASISTM project. Such resources include:

- Sets of Periodic Table cards that show the latest internationally accepted Periodic Table. Enquiries - racivic@raci.org.au
- First 20 Elements: <http://www.raci.org.au/national/chemistry/elements%201-20.pdf>
- First 20 Elements Teachers' Notes: <http://www.raci.org.au/national/chemistry/First%2020%20elements%20teachers%20notes.pdf>

3. Lectures and Workshops

- The Hartung Youth Lecture is designed to inspire and challenge Years 10 and 11 students and is an excellent way to enrich and extend students in science, particularly in Chemistry. In 2008 the Hartung Youth Lectures are entitled: *Breaking the Carbon Bond – Energy for All*. They will be held in Melbourne, Bendigo and Morwell. The lecturer is Dr Rachel Caruso, ARC Research Fellow at the University of Melbourne.
- A recent workshop for teachers on the chemistry of chocolate was interesting and stimulating, providing teachers with an interactive, instructive workshop as well as a networking opportunity.
- The next professional update is the program *Chemistry and Conservation at the NGV*.

STAV - Science Teachers' Association of Victoria

Ms Soula Bennett
Vice President

Aim

To provide useful and accessible services to members who include primary and secondary science teachers, tertiary science educators, laboratory technicians and any person with an interest in science and/or science education.

It also represents science teachers at a national level.

Means of communicating information

- The website www.stav.vic.edu.au
- Chat group
- Email list to members

Presently providing

1. Conferences and events

A number of teachers' conferences are held each year including:

- VCE Conference Series: Biology, Chemistry, Environmental Science, Physics, Psychology.
- Beginning Science Teachers' Conference
- Primary Science Teachers' Conference
- Science Co-ordinators' Conference (every 2nd year)
- STAVCON

2. Useful resources

The resources provided by STAV include:

- Trial exams and handbooks
- Labtalk and Contact
- Useful links

3. Student activities

STAV is involved in the co-ordination of various student activities within Victoria, including

- Science Talent Search
- Science Drama
- BHP Billiton Science Awards
- Greenfleet Energy-efficient car competition
- National Science Week

VCAA - Victorian Curriculum and Assessment Authority

Ms Anne Semple
Acting Science Manager

Aim

VCAA is responsible for the provision of high quality curriculum and assessment programs for all students in Victoria. It is a statutory authority that reports directly to the Victorian Minister for Education through the VCAA Board. The VCAA has been established to:

- develop curriculum for all Victorian schools
- assess student learning and monitor student achievement
- conduct research leading to innovative educational programs.

Means of communicating information

- The VCAA website www.vcaa.vic.edu.au
- Links from the CEA website www.cea.asn.au

Presently providing

1. Study Design for VCE Units 1 to 4

A new Study Design has been developed with the assistance of teachers and university lecturers to update and renew the contexts used to present the major ideas of chemistry.

2. Additional resources

These resources include books, websites and professional development. Implementation workshops were held to assist teachers with the introduction of the new Study Design in conjunction with CEA. In order to continue this support, the VCAA would like experts to write short papers on various aspects of chemistry that will enhance teachers understanding of these topics.

3. Assessment

An assessment handbook, examination papers and reports will continue to be provided. A sample examination was produced for the new course to aid teachers in their interpretation of the Study Design.

4. Support material

This includes the sample examination, frequently asked questions and answers, mapping of the key knowledge, papers on topics of interest to teachers such as nanotechnology, green chemistry, biofuels, and information from the implementation workshops and a CD covering new topics and providing useful websites.

VICS - Victorian Institute for Chemical Sciences

Mr Mick Moylan
Chemistry Outreach Fellow
Publicity Officer, RACI Chemical Education Group in Victoria

Aim

To engage students by providing a mixture of new research, important principles and chemistry of everyday life. The initial aim of VICS was to develop a partnership between the Schools of Chemistry in three universities (University of Melbourne, Monash University and RMIT University) and industry.

Means of communicating information

- Website: <http://www.vicsco.com.au/outreach.html>
- Bookings via CSIRO
- Links from the CEA website: www.cea.asn.au
- Chemistry Connections email list – to subscribe, send an email to mailserv@unimelb.edu.au with subscribe chemistry-connections in the email body.

Presently providing

1. In schools programs

These programs are aimed at Years 7 - 11 and provide hands-on and demonstration activities. In particular, for Year 11 chemistry students *The Periodic Table* has proved to be an extremely successful method of exploring the elements and their properties and trends, despite the difficulties associated with handling various elements.

Rural students have also had access to these programs with the help of sponsorship from CEA.

Other programs are:

- *Chemistry of Colours* – hands-on with dyes, paints, solar panels, nanotechnology
- *Energy Transformed* – talk about energy and society with demonstrations of energetic reactions
- *What's in That?* – mostly food chemistry; includes 3-dimensional multimedia *virtual* models.

2. On campus programs

An analytical instrument workshop enables students to perform exercises using instruments such as HPLC, GC, UV-Vis or AAS and complete an assessment task is run at Melbourne University, Monash University and RMIT. A tour of the universities' working laboratories and a discussion of careers and real-life uses of the instruments are included.

VSSEC - Victorian Space Science Education Centre

Mr Michael Pakakis and Ms Naomi Mathers
Project Managers

Aim

VSSEC promotes science education by providing engaging, 'hands-on' activities for students and teachers. It is a unique collaborative, research and education centre that is part of a global network of Space Science Centres and Institutions that offers a link between local and international business and industry.

Means of communicating information

- Website: www.vssec.vic.edu.au
- *Capcom* monthly issues emailed to interested people on the email list
- Links from the CEA website: www.cea.asn.au

Presently providing

1. VCE Programs

There are extensive programs throughout the year for students of all levels and for teachers of all scientific based subjects. VCE Programs in Analytical Chemistry, Biology, Astrophysics and Astronomy are offered. VCE students work in fully equipped research-standard laboratories and are involved in experimental activities, data collection and analysis.

2. Years 9 -10 Programs

Students in Years 9 - 10 are offered two scenario based programs: *Mission to Mars* and *Mission to the Space Laboratory*. The Planetary Surface Simulation room reproduces a small crater on mars, allowing students to collect real data and geologically accurate samples.

3. Professional Development for Teachers

Teacher professional development sessions include a Chemical Analysis workshop where teachers are given hands-on experience using analytical equipment associated with VCE Unit 3 Chemical analysis, in particular, AAS, UV-vis and GC techniques.

4. Public Lectures

These are held regularly and cover a range of interesting and varied topics presented by eminent researchers.

5. Language Program in Japanese or Italian

This program, which is designed for Years 8 and 9 students, provides materials for a 10 week course to be completed in the school. After completion of basic vocabulary and grammar training, they come to the space centre for a space mission entirely completed in Japanese or Italian.