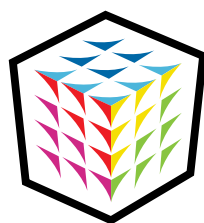


Ahead of the game

Biomedical science education into the 21st century



CUBENET

Collaborative Universities
Biomedical Education Network

Monday 12th December 2011

Shine Dome, Australian Academy of Science, Canberra

Program

Organising Committee

Professor Philip Poronnik, RMIT University (Chair)

Associate Professor Catherine Abbott, Flinders University

Professor Ian Dawes FAA, University of New South Wales

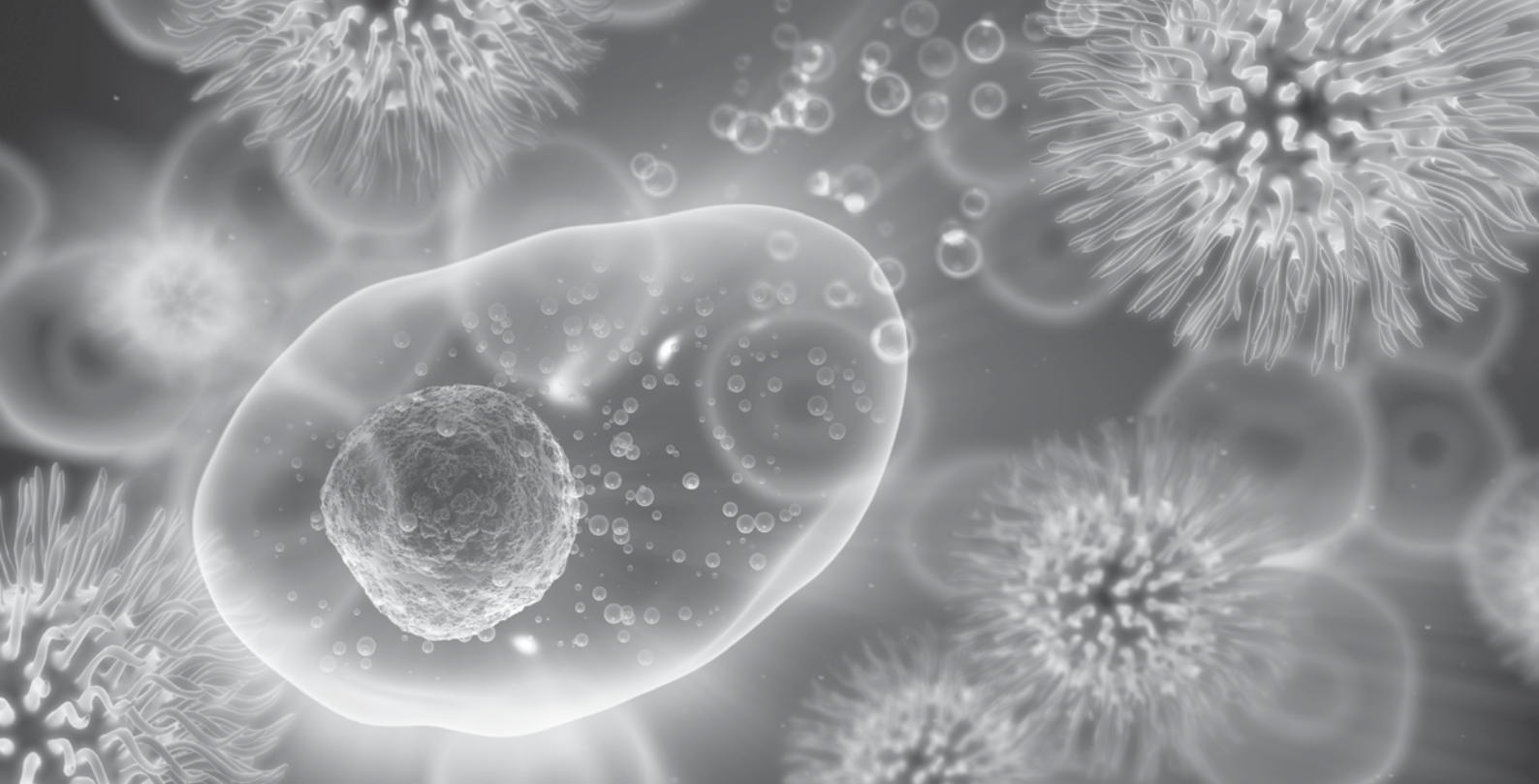
Associate Professor Yvonne Hodgson, Monash University

Associate Professor Susan Howitt, Australian National University

Dr Louise Lutze-Mann, University of New South Wales

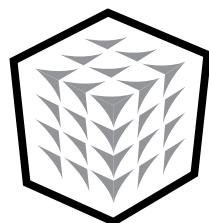
Dr Janet Macaulay, Monash University

Associate Professor Peter Thorn, University of Queensland



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Program

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Program

Sunday 11 December 2011

1830 – 2130 Welcome BBQ at the Shine Dome

Monday 12 December 2011

Ian Wark Lecture Theatre, Shine Dome

0800	Registration
0900	Welcome and Introductions: Professor Philip Poronnik
0905	Opening address: Professor Ian Chubb
0920	Professor John Rice (Australian Council of the Deans of Science) and Siobhan Lenihan (Office of Learning and Teaching, DEEWR) <i>The emerging landscape</i>

Keynote presentations

0930	Associate Professor Nancy Pelaez (Purdue University) <i>A Vision for changes in biomedical sciences education</i>
1020	Associate Professor Trevor Anderson (Purdue University) <i>Managing change and faculty capacity building</i>
1050	Morning tea, Jaeger Room

Outcomes and skills in biomedical science

1110	Professor David Vaux <i>An end-user perspective</i>
1130	Associate Professor Anthony Bedford <i>Stats for the real world</i>
1150	Professor Tony Macknight <i>Enhancing biomedical teaching through innovative laboratories</i>
1210	Professor Susan Howitt <i>As it is practised... embedding research</i>

1240	Professor Peter Tregloan <i>Seeing science</i>
1300	Lunch, Jaeger Room
1400	General Discussion Session 1 – Moderated by Dr Norman Swan

Assessment / delivery in biomedical science

1500	Professor Phillip Long <i>Emerging technologies augmenting the STEM learning pathways</i>
1520	Professor Geoffrey Crisp <i>Assessment of the future</i>
1540	Professor Hamish Coates <i>Outcomes and real metrics</i>
1600	Afternoon tea, Jaeger Room
1615	General Discussion Session 2 – Moderated by Dr Norman Swan
1715	Wrap up: Professor Philip Poronnik and Dr Norman Swan
1730	Drinks: Jaeger Room

Tuesday 12 December 2011

0930-1000	Tea and coffee
1000-1300	Debriefing session Conclusion of Forum

Welcome

Dear Forum participant,

On behalf of the Australian Academy of Science and the National Committee on Biomedical Sciences we would like to welcome you to the second National Forum on Education in the Biomedical Sciences at the Shine Dome in Canberra. This occasion also marks the “official” launch of CUBEnet – the Collaborative Universities Biomedical Education Network, a network that will be dedicated to assisting all involved in the biomedical sciences as our curriculum transitions into the next decade. We hope that the Forum is a valuable experience and that during the social events you will meet old friends, new colleagues and network with a spectrum of like-minded academics from across the nation and New Zealand – all of whom are dedicated to excellence in the learning and teaching of biomedical science.

You are the leadership group in biomedical education across the country. We look forward to a sustained and productive collaboration as we journey through the new tertiary landscape.

The Organising Committee.

Professor Ian Chubb

Chief Scientist for Australia

Opening Address



Professor Ian Chubb was appointed to the position of Chief Scientist on 19 April 2011 and commenced the role on 23 May 2011.

Prior to his appointment as Chief Scientist Professor Ian Chubb was Vice-Chancellor of the Australian National University from January 2001 to February 2011 and before that he was Vice-Chancellor of Flinders University of South Australia for six years.

Professor Chubb studied at Oxford University where, during the period 1971-1977, he was a Wellcome Foundation Scholar, a Junior Research Fellow of St John's College, and a Royal Society Research Fellow. He spent 1969-1971 as a JF & C Heymans Research Fellow at the University of Ghent, Belgium.

Professor Chubb's research focused on the neurosciences and was supported by the National Health and Medical Research Council, the Australian Research Grants Scheme and by various Foundations. He has co-authored some 70 full papers and co-edited one book all related to his research.

In 1999 Professor Chubb was made an Officer of the Order of Australia (AO) for "service to the development of higher education policy and its implementation at state, national and international levels, as an administrator in the tertiary education sector, and to research particularly in the field of neuroscience". In 2006 he was made a Companion (AC) in the order for "service to higher education, including research and development policy in the pursuit of advancing the national interest socially, economically, culturally and environmentally, and to the facilitation of a knowledge-based global economy". In 2000, Professor Chubb was awarded a Doctor of Science (Honoris Causa) from Flinders University. He was made the ACT's Australian of the Year in 2011 for his contribution to higher education.

Dr Norman Swan

Australian Broadcasting Corporation

Moderator



Producer and presenter of the Health Report, Dr Norman Swan, is a multi-award winning producer and broadcaster.

Dr Swan's career has been highlighted by his desire to keep the Australian public informed of health developments as they happen. This allows him to combine medical expertise with investigative reporting, clear analysis and the knowledge to report the latest research in health and medicine.

One of the first medically qualified journalists in Australia, Dr Swan is highly regarded by the medical and health professions.

Born in Scotland, he graduated in medicine from the University of Aberdeen and later obtained his postgraduate qualifications in

Paediatrics in the United Kingdom. Joining the ABC in 1982, Dr Swan has won numerous awards for his work on Radio National.

Dr Swan was named Australian Radio Producer of the Year in 1984 and was awarded a Gold Citation in the United National Media Peace Prizes for his radio work. He has won three Walkley National Awards for Australian journalism and in 1989 he was given Australia's top prize for Science Journalism, the Michael Daly Award.

A famous example of Dr Swan's work is his much publicised and controversial investigative program on scientific fraud and the well-known gynaecologist Dr William McBride. The program exposed fraudulent research, sending shock waves throughout the medical world and led to Dr William McBride being de-registered. It earned Dr Swan the 1988 Australian Writers' Guild Award for best documentary and a Gold Walkley.

In addition to the Health Report, Dr Swan appears every Monday morning on Sally Loane's ABC 702 program in Sydney. He also presents the popular Health Minutes on ABC Newsradio each week. Norman edits his own newsletter, The Choice Health Reader, which is published in association with the Australian Consumers Association.

On television, Dr Swan has hosted ABC Television's science program, Quantum, and been a guest reporter on the ABC Television current affairs program, Four Corners. He created, wrote and narrated a four part series on disease and civilisation, "Invisible Enemies", made for Channel 4(UK) and SBS Television. This has been shown in twenty seven countries. He also co-wrote and narrated "The Opposite Sex", a four part series for ABC Television.

Norman Swan is known outside Australia. He was the Australian correspondent for the Journal of the American Medical Association and has consulted for the World Health Organisation in Geneva.

Professor Philip Poronnik

*Discipline Head of Pharmaceutical Sciences
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Chair Organising Committee



Philip Poronnik is the Discipline Head of Pharmaceutical Sciences and Deputy Head of School Learning and Teaching in the School of Medical Sciences at RMIT University. He is also Group Leader of Membrane Physiology in the Health Innovations Research Institute at RMIT. Prior to joining RMIT in 2009 Philip was a Professor of Physiology in the School of Biomedical Sciences at The University of Queensland where is an adjunct Professor at the Centre for Educational Innovation and Technology. He is also an Associate Fellow of the Australian Learning Council. He has wide ranging interests in membrane physiology that are funded by the NHMRC and ARC. Philip also has a passionate commitment to excellence in biomedical science education. He has over 100 publications in basic research and education. His awards include the University of Queensland Research Excellence Award (2005) and the Michael Roberts Award for Excellence in Physiology Teaching from the Australian Physiological Society. He is also the "Cells in Focus" Editor for the International Journal of Biochemistry and Cell Biology and Honorary Secretary of the Australian and New Zealand Association for the Advancement of Science.

Associate Professor Nancy Pelaez

Department of Biological Sciences, Purdue University
npelaez@purdue.edu



Nancy Pelaez is Associate Professor of Biological Sciences at Purdue University. Pelaez received a BS in Biology summa cum laude from Newcomb College of Tulane University, a k-12 California single subject teaching credential in both Life Science and Physical Science from Mills College, and a PhD in Physiology and Biophysics with a research focus on vascular muscle physiology from Indiana University School of Medicine with support from a Howard Hughes Medical Institute fellowship. A Leadership Award was given to Pelaez in 2010 after establishing Purdue's doctoral program for science education research in the Department of Biological Sciences. Pelaez and several doctoral students are working at Purdue with Visiting Scholars from Europe, Africa, Australia and South America to investigate difficulties students encounter when they reason about biological experiments.

A Vision for changes in biomedical sciences education

Given the radical changes in the nature of biomedical science research and what we now know about how students learn, there is a need to reform the way Biomedical Sciences are taught so that instruction keeps pace with the progress of science. A 2011 report from the American Association for the Advancement of Science (AAAS), *Vision and Change in Undergraduate Biology Education*, represents a blueprint for change in undergraduate biology education developed by US leaders in the biological sciences as part of a project funded by the US National Science Foundation. Major themes include an outline of overarching and unifying key concepts and competencies; classroom practices that focus on student-centered learning; and strategies for change. This talk will present a critical analysis of the process used to develop the Vision and Change report, highlighting some of the accomplishments and also pointing out several deficiencies, to emphasise what still needs to be done in order to institute real changes in Biomedical Sciences Education.

Associate Professor Trevor Anderson

Department of Chemistry, Purdue University
ander333@purdue.edu



Trevor Anderson is a biochemist and biochemistry education researcher in the Department of Chemistry at Purdue University. He is a member of the IUBMB Educational Committee and the editorial board of "Biochemistry & Molecular Biology Education (BAMBE)". In 2007 he was the recipient of the Monash University, Biomedical Sciences "Scholar in Residence in Education" award. His Visualization in Biochemistry Education (VIBE) research group focuses on four interrelated areas: 1) visual literacy and the development and assessment of visual skills, 2) science inquiry and reasoning about experiments, 3) concept inventories and reasoning with core concepts and representations, and 4)

curriculum and faculty development. Central to his faculty development activities has been his workshops on scholarship, his design of curriculum change models, his development of the CARD e-resource (<http://www.card.unp.ac.za>), and his authorship of the Bridging-the-Gap series in BAMBE aimed at encouraging the application of educational research to teaching practice.

Managing change and faculty capacity building

Curriculum reform is one of the hottest topics in scientific institutions of learning across the globe. This is because faculty are coming under increasing pressure to design courses that incorporate modern educational innovations, that will address the expectations of students, employers, funders and other stakeholders. Research has shown that reform isn't easy as it requires both competent management of the change process and the buy-in and building of faculty capacity. This is supported by reports that most reform efforts are falling far short of their goals, despite extensive resources being invested in the development and dissemination of curriculum materials. Thus, there is an urgent need to reconsider the nature of and the manner in which change strategies are employed. In this talk I will commence by discussing a model for a centre for applied science education research (CASER), followed by a model of curriculum change which I will use to frame selected examples of successful and failed initiatives and to discuss what strategies might have prevented such failures. I will end by illustrating how the model might be used to frame the use of visualizations to bring cutting-edge scientific research into the classroom and educational scholarship to teaching faculty.

Professor David Vaux

Speaker

*Division Head, Cell Signalling and Cell Death
Walter and Eliza Hall Institute of Medical Research
vaux@wehi.edu.au*



Professor David Vaux is Assistant Director of The Walter and Eliza Hall Institute in Melbourne. He is a molecular biologist, whose research field is programmed cell death / apoptosis. In addition to his research, he has interests in the rights and responsibilities of researchers, including issues of scientific integrity in research, publishing and peer review.

An end-user perspective

Students enter WEHI, Australia's oldest bio-medical research institute, either to do an Honours year or to commence a PhD. In addition to some knowledge of biology, and high enough marks to qualify for scholarship funding, there are a number of general skills that are highly desirable. Professor Vaux will talk about his 'wish list' for students starting at WEHI. It includes skills such as having an understanding of what science is; knowing the difference between standard deviations and standard errors of the mean, and what they are used for; knowing the difference between replicate data and independent data; knowing the difference between 'statistical significance' and 'importance'; knowing what P stands for, and what conclusions can be made when $P < 0.05$. He wishes students knew how to download and read electronic copies of papers, knew when data looks 'too good to be true' and retained a healthy scepticism no matter who the authors of a paper are, or which journal it appears in.

Associate Professor Anthony Bedford

Speaker

Deputy Head, Learning and Teaching

School of Mathematical and Geospatial Science, RMIT University

anthony.bedford@rmit.edu.au



Anthony has extensive experience in learning and teaching evaluation projects, having headed the CES Analysis Group since 2003. Similar projects Anthony has been involved in range from the course to University-level, involving multi-phase sampling methodologies and advanced data analysis. He has taught epidemiology and biostatistics for eleven years, winning numerous teaching awards, culminating in an ALTC Citation award for first year teaching. He is deputy Head, Learning and Teaching, and Chair of MathSport Australia.

Stats for the real world

Statistics remains one of the more difficult concepts for biomedical students to grasp. Whilst the analysis of data can be rather easily learned, the knowledge retained remains an ongoing challenge. In this presentation Professor Bedford will cover effective methods of delivery that enhance understanding of statistical concepts, and how tightening the curriculum around specific concepts enhances these skills. He will also cover a number of effective delivery styles and technologies that enhance the statistical learning experience.

Professor Tony Macknight

ADInstruments New Zealand
tony@adi.co.nz

Speaker



Emeritus Professor Tony Macknight (MD, PhD, FRSNZ) was Wolf Harris Professor of Physiology at the University of Otago from 1984 to 2002. His research areas were cell volume regulation and epithelial transport. He authored over 100 original research articles, reviews and book chapters. He chaired the Medical School Curriculum Committee and developed and implemented case-based teaching. He chaired the Organising and International Scientific Program Committees for the 34th International Congress of the International Union of Physiological Sciences (IUPS) in 2001, and was on the Council of the IUPS 2001 – 2009. He is presently a member of the IUPS Education Committee. In 1984, he initiated the development of the computer-based data acquisition system marketed internationally by ADInstruments as the PowerLab system. Since 2002 he has acted as a Consultant to ADInstruments and also serves on a number of the grant reviewing committees of the Health Research Council of NZ

Enhancing biomedical teaching through innovative laboratories

Laboratory work is at the heart of biomedical science and our challenge is to create laboratories that, despite resource constraints and increasing student numbers can motivate, excite and stimulate students. Students need to see the relevance of the laboratory experience to their diverse professional aspirations. The one activity that requires the physical presence of students on campus is laboratory work. But laboratory work cannot stand alone. It must be an integral part of the course. The ubiquity of the on-line environment provides new opportunities to develop modular teaching that integrates elements of the laboratory experience with other course activities. Software/hardware interfaces such as LabTutor are being developed to facilitate this type of course engagement. One of the key features is that, if designed and used appropriately, such technologies can maximise the efficiency of teaching while at the same time enhancing the students learning experience. This can be accomplished without requiring additional staff, teaching space or formal scheduled teaching hours. This talk will provide some practical examples of the power of this approach.

Associate Professor Susan Howitt

Speaker

*Deputy Head, Biology Teaching and Learning
Research School of Biology, Australian National University
susan.howitt@anu.edu.au*



Associate Professor Susan Howitt completed a PhD in bacterial genetics at the ANU, studying symbiotic nitrogen fixation. Her first postdoc involved a change of direction, with research into the structure and function of membrane proteins, including bacterial ATPases and mammalian GABAA receptors. This led to her current research interests, which cover a range of transporters including plant and bacterial nutrient uptake transporters as well as those from the malaria parasite. In 1997, Susan was appointed to a lecturing position at the ANU which involved teaching molecular genetics. Since then, she has become increasingly interested in education, completing a Master of Higher Education in 2009.

She has served as chair of the ASBMB Biochemical Education group from 2008 to 2010. A major part of her research effort is now in education, with my main interest being student views of research and the nature of science and how these impact on learning from undergraduate research projects.

As it is practised... embedding research

Undergraduate research experiences are often seen as a means to provide students with generic skills. While many studies have shown that research experiences give students a greater sense of what research is like and improve motivation, higher order learning gains such as hypothesis development and testing, or understanding the contestability of knowledge are more rarely reported by students. We have shown that this is true even for students undertaking multiple research projects in an elite undergraduate degree aimed at research preparation. The fact that students rarely report higher order or generic skills can partly be attributed to expectations of learning opportunities in research projects by both students and supervisors. Our surveys of students and supervisors in this degree show that both exhibit a wide range of expectations, only some of which address preparation for research or the development of generic research skills. Incomplete understanding of what is required to engage in scientific research may constrain student learning. Our results suggest a need for learning goals from research experiences to be made explicit to both students and supervisors. We are currently investigating the benefits of incorporating reflective practice into research projects as a means to help students identify improvements in generic skills.

Professor Peter Tregloan

Speaker

School of Chemistry
University of Melbourne
patreg@unimelb.edu.au



Peter Tregloan is a Professorial Fellow in the Centre for Educational Innovation and Technology at The University of Queensland and Principal Fellow and Associate Professor in Chemistry at The University of Melbourne. His chemical research concerns the solution chemistry of metal complexes, particularly under conditions of kilobar pressures. Over a long career in tertiary teaching, he has been active in the development of a wide range of innovative virtual and physical learning environments that have challenged and extended established approaches for teaching large chemistry classes.

Peter was Chemistry Education Association Chemistry Educator of the Year in 2000 and received a National ALTC Citation for Outstanding Contribution to Students' Learning from the Australian Learning and Teaching Council in 2008. He was the RACI Hartung Youth Lecturer in 2010 and has been part of the RACI International Year of Chemistry lecture tour program through 2011.

Seeing science

Scientists must be able to move seamlessly between three overlapping domains – the macroscopic world that we live in, the microscopic or molecular worlds that we can never inhabit, and the symbolic world that provides the language and tools that link and predict the behavior of the other two. As educators, our task is to work with students to build the knowledge and skills they need to become independent travelers through these domains.

Scientific communication is often critically dependent on 'reading' static and moving images or graphical representations of interrelated data. Our images are often generated using complex and sophisticated tools and techniques. The phenomena and procedures of science have been described as visual, analogic and thematic, and building from this, 'master images' of the content and 'visual processes' in the practice of science have been proposed.

Learners begin by reading and interpreting the images of others. How do we enable science students to become more sophisticated in representing visual-spatial concepts and observations? The development of fundamental drawing skills is proposed as a way to enhance the capacity of tertiary science students to interpret and understand the visual landscape that underpins much science today.

Professor Phillip Long

Centre for Educational Innovation and Technology
University of Queensland
longpd@uq.edu.au

Speaker



Phillip Long is Professor of Innovation and Educational Technology in the School of ITEE and the School of Psychology, founding director of the Center for Educational Innovation and Technology (CEIT) at the University of Queensland, dedicated to research on learning environments that have the potential to innovate teaching, learning and creativity. The Centre fosters a community of scholarship among technology innovators, and researchers within UQ, across Australasia and around the world. Professor Long's current research interests focus on emerging technologies, the cognitive interactions with them and the spaces - physical and virtual - wherein they occur.

Professor Long's professional activities include serving on the boards of the New Media Consortium, NMC Project Horizon, Pearson Australia Advisory Board, Association for Authentic, Experiential & Evidence-based Learning (AAEEBL), the Global Online Laboratory Consortium (GOLC) and acting as Chair or co-Chair of various conferences and meetings, including the 1st Learning Analytics & Knowledge conference

Emerging technologies augmenting the STEM learning pathways

Emerging technologies offer remarkable opportunities for engaging students in STEM learning. They can provide collaboration tools to connect learners in ad hoc support teams; track interactions with digital learning materials to make visible patterns of learning interactions; and “invert the classroom” moving core content dissemination online, outside of class time, & reserving “face time” for things for which f2f interaction and the richness of human bandwidth are really suited - in this case for the collaborative inquiry and problem solving that are at the heart of 21st century STEM education. This represents a further step from teaching centric, past learner centric, to **learning** centred design. Technology can ‘augment the human intellect’, but toward what end requires rethinking STEM learning practices. A peek at possibilities will be introduced.

Professor Geoffrey Crisp

Speaker

Dean, Teaching and Learning
RMIT University
geoffrey.crisp@rmit.edu.au



Geoff completed his BSc (Honours, First Class) at the University of Queensland in 1977 and his PhD in Chemistry at the Research School of Chemistry, Australian National University in 1981. After a Humboldt Fellowship completed at the Max Planck Institute in Mulheim an der Ruhr and postdoctoral positions at Colorado State University and the Australian National University, Geoff began his first academic appointment in 1985 in the Chemistry Department at the University of Melbourne. In 1988 he moved to the Chemistry Department at the University of Adelaide and continued discipline research and teaching until 2001. Geoff developed his passion for learning and teaching as well as continuing his work in chemistry during this time, being Associate Dean for Learning and Teaching

for the Faculty of Science from 1999-2001. He was actively involved in the development of online learning and was appointed the Director of the Online Learning and Teaching Unit in 2001 to oversee the implementation of the university online system (MyUni). Geoff made the permanent move to educational and staff development and online learning when he was appointed the Director of the Centre for Learning and Professional Development in 2002. He joined RMIT University in 2011 as the Dean, Learning and teaching. Geoff received the University of Adelaide's Stephen Cole the Elder Prize (Excellence in Teaching) in 1999; the Royal Australian Chemical Institute Stranks Medal for Chemical Education in 2003 and Australian Learning and Teaching Council Fellowships in 2006 and 2009. Geoff was member of the HERDSA Executive from 2006 to 2011 and President of HERDSA from 2009 to 2011.

Assessment of the future

This short presentation will explore the 21st century skills and capabilities that our students will need as they live and work in a world dominated by ubiquitous technology as well as increasing uncertainty and complexity. Our assessment practices will need to change; we cannot continue to give students static content-based assessment tasks that ignore the contextual consequences of working in a complex environment with many stakeholders. We will need to expand our repertoire of assessment tasks to include a more sophisticated use of virtual spaces that allow students to construct their responses with access to whatever resources are required to make a meaningful response to a meaningful task. Students should be required to identify their decision making processes when proposing a solution to a real life problem and to identify all the stakeholders impacted by this response. Students will need to be provided with more authentic, meaningful tasks that will engage them in using the full range of capabilities they have developed during their learning. We will examine some of the implications of this new educational environment and reflect on our current assessment practices in relation to the requirements of this brave new world.

Professor Hamish Coates

Speaker

Research Director

Australian Council for Educational Research

coatesh@acer.edu.au



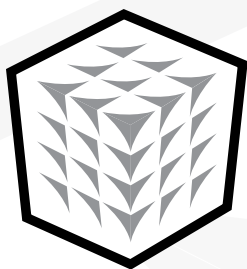
Hamish Coates conducts research and development in the field of higher education. He is Foundation Director of Higher Education Research at the Australian Council for Educational Research (ACER), and a Program Director with the LH Martin Institute for Higher Education Leadership and Management, based at the University of Melbourne.

Hamish collaborates widely, and has worked with learners, senior researchers and administrators in many countries. He is leading a consortium of international agencies to run OECD's Assessment of Higher Education Learning Outcomes Feasibility Study (AHELO). Over more than a decade he has led influential assignments that have shaped research, policy and practice.

Hamish's research and publications focus on the measurement and evaluation of tertiary education inputs, processes, contexts and outcomes. Active interests include large-scale evaluation, tertiary education policy and reform, institutional strategy, outcomes assessment, learner engagement, academic work and leadership, quality assurance, tertiary admissions and assessment methodology.

Outcomes and real metrics

Along with developed systems around the world, Australian higher education is moving into an era that places far greater emphasis on measuring student learning outcomes and on using results for monitoring and continuous improvement. This calls for assessment resources that yield valid and reliable data, and that are efficient to implement, analyse and report. As a national agency with a mission to improve learning, ACER supports higher education institutions and teachers take collegial leadership in building robust, efficient and relevant assessments of higher learning outcomes. The presentation sketches assessment research underway in the fields of Engineering, Medicine, Economics and Generic Skills. It describes opportunities for collaborative development in biomedical science that shape innovation, monitoring and quality improvement.



CUBENET

**Collaborative Universities
Biomedical Education Network**

Collaborative Universities Biomedical Education Network (CUBENET)

As we move into the new century and a changing and challenging tertiary landscape, the National Committee for Biomedical Sciences of the Australian Academy of Sciences has identified an urgent need for greater coordination and communication across teaching and learning in this area. The evidence for this need is reflected by the support provided by the partner universities and other disciplinary networks. The most effective means to facilitate coordination and communication is through the formation of a collaborative leadership network platform, CUBENET. This network seeks to (i) provide the critical mass needed to identify, address and solve the central challenges that face us in delivering a forward looking and sustainable curriculum and (ii) maximize the efficiency of development, dissemination and adoption of innovative curriculum. *In a complex tertiary environment, such a network is critical to **aggregate, filter and connect** ideas and information with the appropriate teams of people to achieve effective, transferable and sustainable solutions.* The National Forum will mark the first official activity in the formation of CUBENET.

The **overall aim** is to generate a critical mass of active tertiary biomedical academics at the national level to create a sustainable framework for a program-wide approach to the biomedical curriculum that can harvest expertise and resources across the university sector at the local, national and international levels.

There is indeed a surprising depth of knowledge and wealth of resources that have been developed in recent years. These resources can be readily reviewed and adapted to local contexts such that curriculum renewal/reinvigoration need not be the overwhelmingly daunting task that it often seems. Collaboration and unity of purpose is key to the success of such endeavours in an environment that faces increasing resource constraints.

Why a collaborative network?

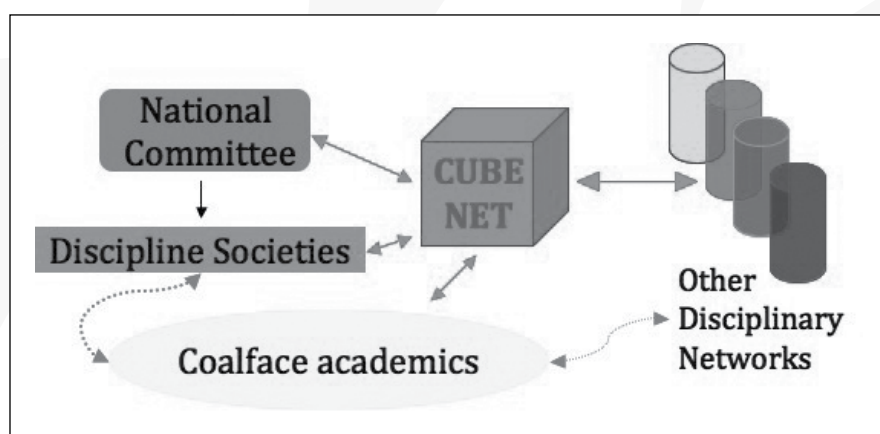
Biomedical sciences underpin our understanding of health and disease. Together with biology and biotechnology, these disciplines cover the life sciences, with each providing a unique focus. Importantly these three “disciplines” share much in common in the initial years of tertiary education and draw heavily on the enabling sciences (maths, physics and chemistry). Innovations in one area of the life sciences will be useful and transferable to others both within the sciences and beyond.

New directions for the life sciences curricula into the 21st century are well articulated in a recent report “Vision and Change in Undergraduate Biology Education: a Call to Action” from the American Association for the Advancement of Science¹. Four action items were identified as the agenda for change: (1) integrate core concepts and competencies throughout the curriculum (2) focus on student-centered learning (3) promote a commitment to change (4) engage the biology community in the implementation of change. This is echoed in the report from the Australian Council of Deans of Science that specifically identified the need for new approaches for teaching generic skills and the delivery of laboratory classes, something that requires leadership at the national level². Similarly, a report on learning and teaching of biotechnology in Australia identified two themes contributing to success (i) recognition that biotechnology is interdisciplinary and (ii) the need for strong leadership in design, development and administration of programs, given the rapidly changing technological environment facing the field³. In the context of the biomedical sciences, these reports clearly articulate and reinforce the need to convene a discipline-based yet outwardly looking collaborative network for learning and teaching in the biomedical sciences and related areas.

To develop this unity of purpose and outcomes in learning and teaching for the biomedical sciences is a key priority of the National Committee for Biomedical Sciences of the Australian Academy of Sciences. Despite the numerous excellent initiatives from societies, institutions and other groups, teaching and learning in biomedical sciences remains somewhat fragmented and lacking in integration and cooperation at the program level. Currently much biomedical science teaching is constrained within disciplinary silos. This situation is partly historical, partly administration/funding driven and partly due to the compartmentalization of the curriculum (often reinforced by “service teaching” requirements). A program-wide approach to the development and delivery of an integrated and flexible biomedical curriculum is

critical to ensure the success of our students. To achieve this requires **first** - that there is some unity of purpose within the “discipline” itself and **second** - that enablers are put in place to allow productive exchange with other groups who can enrich the “discipline”. *CUBENET seeks to establish a collaborative network driven by those academics who are directly involved in the learning and teaching of biomedical sciences and to provide a framework that facilitates productive interactions between the biomedical sciences and other national and international networks involved in science education.*

To achieve this aim, it will be essential to facilitate links across disciplinary and departmental silos. It is widely accepted that change is driven by those individuals with the capacity to scale the silo-walls (the “boundary-crossers”) and establish new links. These links must extend to encompass others outside the traditional walls of the biomedical fortress (e.g. biologies/chemistry/physics/math). The structure of the collaborative network proposed here is the key to its success. It is driven from the “top” in that the National Committee sits across the biomedical societies and outside conventional intra- and inter-institutional boundaries. The network is also driven just as powerfully from the “coalface”, the powerhouse of the network, those academics responsible for learning and teaching and who are also members of the relevant societies. This creates an agenda that is truly “needs-based” and ensures maximum efficiency in development, exposure and dissemination of the new learning and teaching strategies that will be central to improving the curriculum. CUBENET is the unified “voice” of biomedical sciences and by virtue of its constituents, associations and outputs, will be in a position to contribute to policy formulation at the institutional and government level. This is critical in ensuring appropriate resources are leveraged to grow the quality of tertiary education in the biomedical sciences.



Aggregate, filter, connect

CUBENET is the “glue” that links all parties in a previously fragmented environment. This will reinforce existing links and amplify productive and collaborative exchanges in learning and teaching built around an efficient and sustainable paradigm

CUBENET Lead Team

Professor Ian Dawes (FAA) Chair of the National Committee for Biomedical Sciences, Scientia Professor, School of Biotechnology and Biomolecular Sciences UNSW, past-President, ASBMB (2008).

Professor Philip Poronnik Co-opted Member of the National Committee for Biomedical Sciences, Deputy Head of School Learning and Teaching, School of Medical Sciences RMIT University, ALTC Associate Fellow, Research Professor, Centre for Educational Technology and Innovation UQ.

A/Prof Susan Howitt Deputy Head, Biology Teaching and Learning, ANU; Former chair of the ASBMB Education Group

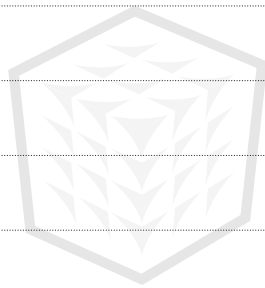
Dr Louise Lutze-Mann Senior Lecturer Academic Coordinator of Learning and Teaching Faculty of Science The University of NSW. Participated in ALTC funded projects on Thresholds in Biological Sciences. ALTC Citation for Outstanding Contributions to Student Learning for the sustained development and implementation of research-focused teaching resources for undergraduate science students.

Dr Janet Macaulay Senior Lecturer (Education focused) Director of Undergraduate Education, Dept Biochemistry and Molecular Biology, School of Biomedical Sciences, Monash University Current chair of ASBMB Education Group. Organiser of National Biomed Forum 2007.

Associate Professor Yvonne Hodgson Senior Lecturer (Education focused) Manager of Academic Programs & Quality, Convenor of Bachelor of Biomedical Science, Dept of Physiology, Monash University. Organiser of National Biomed Forum 2007.

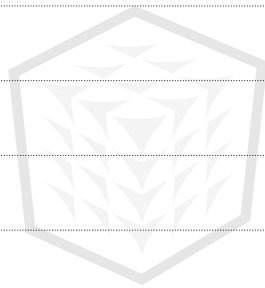
References : (1) AAAS (2010). Vision and Change: A Call to Action www.visionandchange.org/VC_report.pdf (2) Tertiary science education in the 21st century www.altc.edu.au/project-reconceptualising-tertiary-science-uc-2006 (3) Extending Teaching and Learning initiatives in cross-disciplinary Biotechnology www.altc.edu.au/resource-extending-teaching-biotechnology-uq-2008

Notes

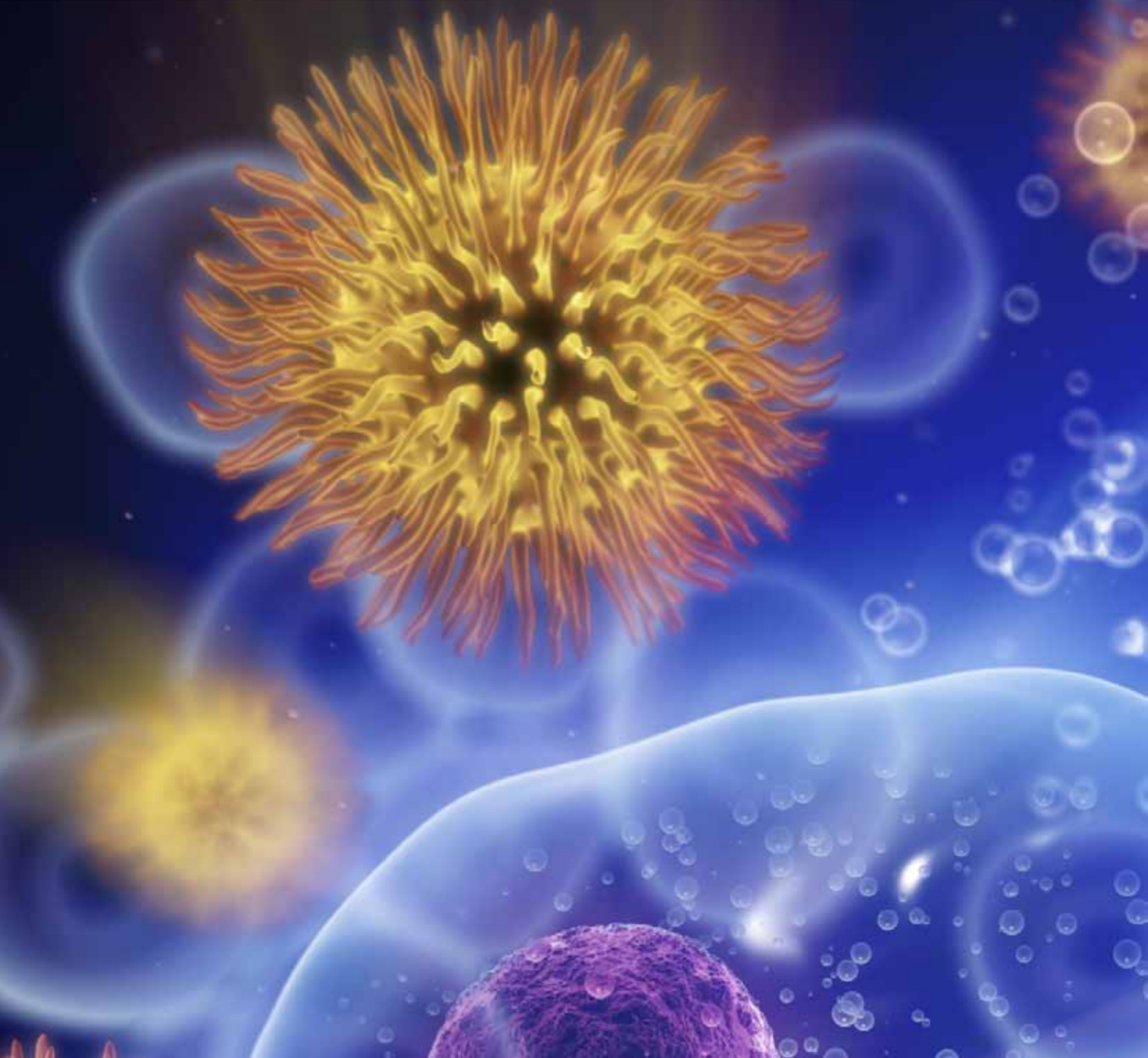


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