



# International Newsletter on Physics Education



International Commission on Physics Education • International Union of Pure and Applied Physics

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## ICPE Chair's Corner

Welcome to the 62nd International Newsletter on Physics Education. This edition comes hot on the heels of the 29th General Assembly of IUPAP – the International Union of Pure and Applied Physics – the parent body of ICPE. Such General Assemblies are held once every three years. They are the occasions on which IUPAP makes its major decisions, including those that determine the officers and members of its Commissions until the next General Assembly. As a result of the 2011 General Assembly, ICPE has some new officers and several new members.

As the newly elected Chair of Commission 14 (ICPE) I want to use this particular Chair's Corner to tell you something about the new team of Commissioners, and some of the tasks we will be undertaking over the coming three years. First, however, I want to express my sincere thanks to my predecessor as Chair, Pratibha Jolly, her Secretary, Dean Zollman, and to all the other members and associate members who served ICPE so well during the period from 2008 to 2011. Thanks to their effort, and the efforts of those who supported them, ICPE is in robust good health with a strong track record of successful conferences, meetings and publications, some excellent ongoing programmes and several ideas for future developments. All of this is well documented in past issues of the International Newsletter which itself has gone from strength to strength under its continuing editor, Ian Johnston. Of course, pleasurable as it is to recognize and celebrate the achievements of the past, doing so makes me acutely aware of the high standard that the new Commission must live up to and, if possible, perhaps even exceed between now and the autumn of 2014.

Our first task is simply to get to know one another. The new Commission is a mix of experienced past-commissioners who already have some knowledge of how ICPE and IUPAP operate, and newcomers who may well be wondering what they have let themselves in for. Those with prior experience on ICPE will already have met at one or more of the international conferences that the Commission has organized or sponsored. For the newcomers, however, the first opportunity for a face to face meeting with their fellow commissioners will probably be at the World Conference on Physics Education that takes place in Istanbul, Turkey from 1 to 6 July, 2012. Until then we are making do with e-mail; using that medium to introduce ourselves, to describe our

backgrounds and institutions, and to say something about our aims and aspirations.

It's already clear that the new Commission is a remarkably rich mix. Naturally it is geographically diverse, with each of the 14 commissioners coming from a different country; from Russia to South Africa and from Argentina, Brazil and the U.S.A. to India, Japan and China. It's also diverse in terms of the levels and styles of education that it represents. Many of the commissioners work in universities, conducting research, teaching undergraduates and postgraduates and, frequently, helping to train teachers. Some, now or in the past, work or have worked in schools. Several have an interest in informal education, outreach and public engagement. Not a few have or have had some formal representative role through a national physical society or a recognized teaching body. It's obvious that the Commission will be able to call on a great deal of collective expertise and a far-reaching network of contacts. That's good because it will have to

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consider a wide range of issues and do all that it can to take account of all points of view. The 2011 IUPAP General Assembly spent some time discussing issues relating to diversity; ICPE is well placed to consider diversity in physics education and to make a full contribution to IUPAP's work in that area.

The mandate of ICPE requires that it should promote the exchange of information in the general field of physics education, and initiate the organization of conferences as the need arises. This is an area in which the Commission's plans are already well developed. The forthcoming 2012 World Conference in the city that traditionally marks the meeting place of Europe and Asia has already been mentioned but beyond that we have firm plans for a 2013 conference in the Czech Republic (thanks largely to the initiative of the Commission's new Secretary, Leos Dvorak) and emerging plans for a gathering in South America in 2014. The new Commission will have to build on these foundations, finalizing existing plans and determining the best sites and topics for future conferences. It will be particularly important to ensure that ICPE's International Conferences complement and support any planned regional conferences so that the broad enterprise of educational physics—in research, development and practice — can continue to advance on all fronts.

Another part of the ICPE mandate concerns the award of medals and testimonials. The Commission traditionally meets this through the annual award of the ICPE Medal and the new Commission will certainly continue that tradition, indeed, the winners for 2011 and 2012 have already been chosen. It is, incidentally, particularly appropriate that the winners of the 2011 award are from Japan since this is, by chance, also the home country of the Commission's new Vice-Chair Hideo Nitta. I very much look forward to working with Hideo as we, together with all the other commissioners, undertake the enjoyable but challenging task of determining which of all the hard-working and inspiring physics educators in the world should join the list of ICPE medal winners in 2013 and beyond.

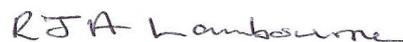
One ICPE activity that will certainly continue is the organization of PHYSWARE Workshops. PHYSWARE has become a recognized 'brand' in which the Commission takes particular delight. Based on the recognized need to strengthen capacity building amongst physics educators, particularly in the developing world, PHYSWARE will continue to address the teaching and learning of specific physics topics using low cost equipment and appropriate technology. Sadly, some of those most strongly involved in the development of PHYSWARE have completed their maximum terms on the Commission and have had to leave but amongst the new commissioners are several with a strong interest in this area, including one of PHYSWARE's original

pioneers, the US commissioner, Priscilla Laws. With the help of Priscilla and the enthusiastic support of several other commissioners I am sure that PHYSWARE will continue to flourish and that it will be at least as valued and appreciated in the future as it has been in the past.

In this Commission, as in the last, our Secretary will also be our webmaster. This will simplify communication but will complicate the Secretary's life, at least in the short term, since one of the first jobs will be to move the ICPE website from Kansas to Prague. Once this has been done we can get on with a number of other projects that make use of the web. For example, ICPE and IUPAP have already agreed to support the proposal for an International Year of Light in 2015. The web site will play a vital role in finding and publicising educational initiatives to support this proposal.

Another area where the web will be important concerns post-school physics education research. Recent years have seen a significant growth in research into university level physics education, particularly that conducted by physicists working in physics departments as opposed that carried out in education departments. This development is especially strong in the US but engagement elsewhere can be patchy and is often overly dependent on the efforts of a few individuals. One of my own aims for some time has been to conduct an ICPE survey that will show the status and standing of this kind of research work around the world. This is an obvious early goal for the Commission; it will enable us to draw on our international links, demonstrate the rapidly changing nature of educational physics and, perhaps, yield results that will help those nations not yet engaged to recognize the potential benefits and become active supporters of evidence based teaching development in their universities as well as in their schools and colleges.

As you can see there is a great deal to be done. The new commissioners, I am pleased to say, have already expressed their desire to work together, to learn from each other and to get on with the job. I am delighted to have the privilege of chairing such a diverse and talented group, and I greatly look forward to working with them over the next three years. It should be an exciting time for us all.



Robert Lambourne  
ICPE Chair

# ASELL: The Advancing Science by Enhancing Learning in the Laboratory Project.

*Simon M. Pyke<sup>1</sup>, Alexandra Yeung<sup>2</sup>, Scott H. Kable<sup>2</sup>, Manjula D. Sharma<sup>2</sup>,  
Simon C. Barrie<sup>2</sup>, Mark A. Buntine<sup>3</sup>, Karen Burke da Silva<sup>4</sup> & Kieran F. Lim<sup>5</sup>*  
*<sup>1</sup> University of Adelaide; <sup>2</sup> University of Sydney; <sup>3</sup> Curtin University of Technology;  
<sup>4</sup> Flinders University; and <sup>5</sup> Deakin University,*

*This paper is an abridged version of:*

*Pyke et al, Proceedings of the 16th UniServe Science Conference, University of Sydney, 2010, pp.7–12*

## Introduction

Most researchers agree that the laboratory experience is a significant factor that influences students' attitudes to their science courses. Consequently, good laboratory programs should play a major role in influencing student learning and performance. The laboratory program can be pivotal in defining a student's experience in the sciences, and, if done poorly, can be a major factor in causing disengagement from the subject area. The challenge remains to provide students with laboratory experiences that are relevant and engaging, and offer effective learning opportunities.

## The ASELL Project

The Advancing Science by Enhancing Learning in the Laboratory (ASELL) project has developed in several Australian universities over the last 10 years. It provides a multi-institutional, collaborative approach for improving the quality of undergraduate laboratories and providing effective professional development for academic staff.

It began in 2000 when a number of chemistry academics noticed increasingly high levels of student dissatisfaction with their undergraduate chemistry laboratory courses. It was also apparent that many of the academics who taught chemistry at the tertiary level were not familiar with educational research related to students' experiences in the laboratory. After successful development in chemistry, trials were held in physics and biology using the principles that had been developed. As a result of that, the project has expanded to include those disciplines.

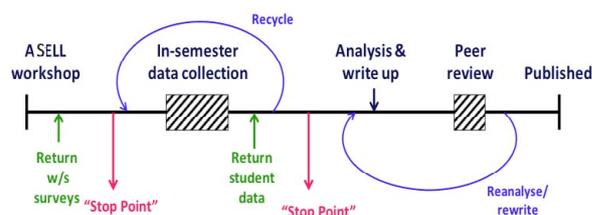


Figure 1. Schematic of the ASELL process

One of the tangible outcomes of the project is a database of educationally-validated undergraduate experiments on an open-access website ([www.asell.org](http://www.asell.org)). For an experiment to be accepted onto the ASELL database, it passed through a rigorous evaluation process (see Figure 1). Submitted experiments also included student notes, demonstrator notes, technical notes, hazard/risk assessment, and the ASELL Educational template. The Educational Template provides information on the context in which the experiment is run, the educational goals which it serves, how these goals are achieved, and an analysis of student feedback data providing evidence of students' perceptions of the experiment.

## The Workshops

The first stage of the ASELL process involves the third-party testing of submitted experiments at a workshop by both academics and students and the evaluation of the educational and scientific merit of the exercise. The first of these workshops (in chemistry) took place in 2001 and the first multi-disciplinary workshop was held in 2006. The aims of these workshops are twofold. Firstly the testing serves to demonstrate that the experiment is transferable to a new institution, by having it set-up and got running away from its home laboratory. The technical notes and student notes supplied need to provide sufficient information to anyone who is unfamiliar with the experiment. Secondly, testing provides valuable feedback to submitters on the strengths and weaknesses of the experiment. At the workshops, a community of practice is also fostered where discussions of practical educational theory take place.

After an experiment completes its workshop testing, it is returned to its home institution where modifications could be made before further student data is collected using the ASELL Student Learning Experience (ASLE) survey. The ASLE survey consists of Likert-scale and open-response items, and the student evaluation part of the Educational Template must include a summary of the Likert-scale data and a content analysis from the open-response items. The project team and the website provide

guidance as to how the analysis can be completed, including examples.

Following the analysis and provided the student data meets certain criteria, the submitter is in a position to finalize the Educational Template and write the manuscript for publication. Complete submissions are then sent for peer review by 3 referees – a student who has participated in a workshop, a staff member of a university, and a member of the project management team. Normal editorial processes are followed where the submitters can respond to referee’s comments. Acceptance of the submission leads to the inclusion of the experiment on the ASELL website. If the submission included a full manuscript, this would be submitted for publication in the educational journals appropriate to the relevant branch of science.

### The first ASELL workshop

The first large-scale multidisciplinary ASELL workshop was held at the University of Adelaide in April 2010. At this workshop 39 experiments were submitted for evaluation in parallel sessions across the three disciplines, biology, chemistry (including 2 biochemistry experiments) and physics. Testing of these experiments was completed over a four day period by a team of 42 academics and 41 students. In addition, a special 2-day workshop was run for Deans, Associate Deans and/or their representatives (13 delegates). This was the first time there has been such a good representation from the Deans at a workshop.

Table 1(a) provides a summary of the delegates who represented 15 different institutions. Table 1(b) shows the number and some of the types of experiments

tested at each workshop. Delegates were invited to the workshop as teams (1 academic and 1 student) and paid a team registration fee.

(a)	Biology	Chemistry	Physics	Total
Academics	12	16	14	42
Students	12	12	14	41
Deans	5	6	2	13
Directors	1	4	1	6
Total	<b>30</b>	<b>41</b>	<b>31</b>	<b>102</b>

(b)	Biology	Chemistry	Physics
Total	12	13	14
Types of labs	Dissection	Titration	Pendulum
	Botany	Synthesis	Radioactivity
	Enzymes	Analytical chemistry	Optics
	Genetics	Biochemistry	Oscilloscope

Table 1: (a) Summary of the delegates who attended the ASELL Science Workshop and (b) Number of experiments and some of the types of activities tested at the ASELL Workshop

The Deans of Science at each of the participating institutions agreed to provide financial support for a team from each of the three disciplines at their institution to attend the workshop. Thus, the workshop was self funded and did not rely on external funding to run, which was the case in the past.

The workshop was organized following the procedure shown in Figure 2



Figure 2: The process undertaken to set up the ASELL workshop held at the University of Adelaide

Delegates were sent an invitation to submit an experiment and attend the workshop. Academic staff delegates submitted an Expression of Interest for the experiment they wanted to evaluate. After consideration of the types of experiments submitted, academics were notified whether their experiment was accepted to be evaluated at the workshop. Following the acceptance notification, academics were required to submit all the necessary documentation for the experiment.

The technical notes, experiment notes and risk assessments were passed onto the technical staff and PhD students who were employed to set up the workshop. Using the notes provided the experiments for the chemistry and biology workshops were set up in the corresponding laboratories at the University of Adelaide (setup commenced about 2 weeks before the workshop). Academics that submitted physics experiments were asked to send or bring their own

equipment, except for common equipment provided on a list by the host institution. Equipment for biology and chemistry activities was provided by the host institution. Not all the experimental activities were easy to set up and some experiments required assistance from other disciplines. For example, two biochemistry experiments that were run at the chemistry workshop required equipment that was provided from biology. If there were any materials that could not be provided by the host institution, the submitters were asked to either send these beforehand or bring it with them (this was kept to a minimum). Fortunately, in most cases, enough laboratory space was available for the majority of experiments to be set up the day before they were due to be run. The PhD students who set up the experiments acted as technical

staff throughout the workshop.

The workshop itself had a very packed schedule. A flowchart of a typical day's events is shown in Figure 3. Each day involved early morning discussion sessions focussing on the educational aspects of laboratory work where delegates were guided through an educational analysis of their submitted experiment (this provided scaffolding for completion of the ASELL Educational Template). Morning and afternoon laboratory sessions (each 3 hours long) were separated by a communal discipline lunch break. The Deans started participating on the second day of experimental work and completed the same activities as the other delegates.

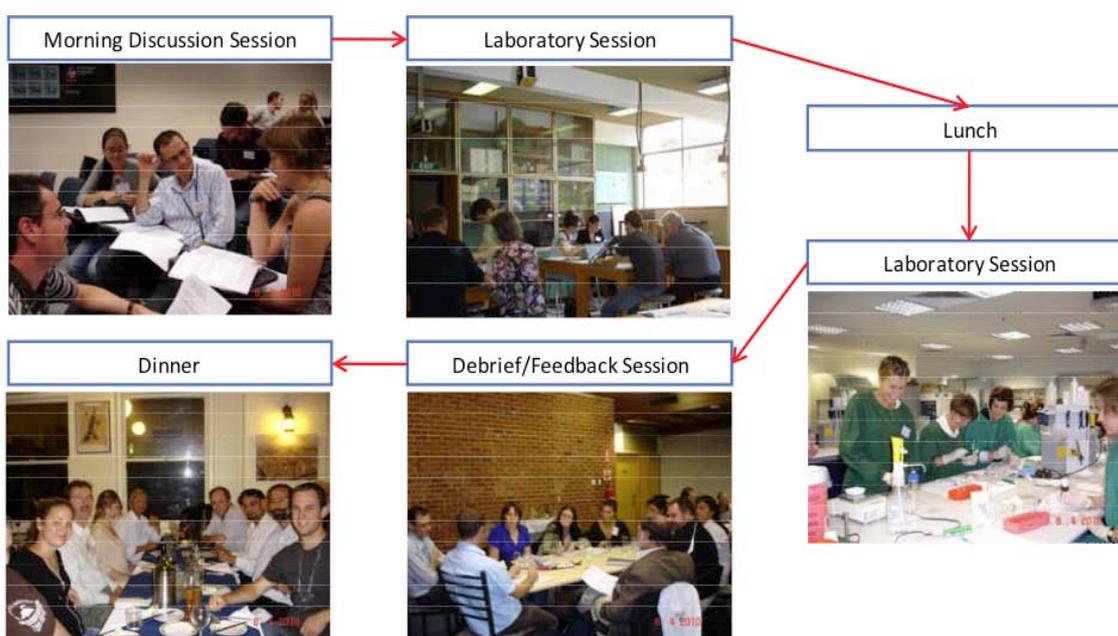


Figure 3: Flowchart of a typical day's events at the ASELL Science Workshop

### Impact on the Host Institution

Hosting the workshop raised the profile of not only 'what makes a good experiment' but also the similarities of these factors across what had previously been considered to be a lack of any common ground. In concert with other curriculum renewal activities currently in progress, the workshop has provided increased opportunity for development of a more holistic approach to curriculum design, particularly in the core Level 1 discipline areas, with a focus on improving the student experience within the laboratory programs.

### Conclusion

The ASELL Workshop held in April 2010 was the first workshop of its kind. In the past, discipline-specific workshops had been organized, in particular for chemistry. This workshop is the first example where experiments from all three disciplines were tested at the same time, while also allowing for cross discipline interaction during free/social time. The representation of Deans at the workshop was also much greater than at any previous workshop. The April 2010 workshop marks the start of more cross discipline interaction, conversations with the Deans and discussions about laboratory activities in future.

For further information go to: <http://www.asell.org/>

## Farewell to retiring commissioners.

*As laid down by the IUPAP by-laws, the term of office for all general members of the ICPE is for a term of three years, with the possibility of re-election once. At the IUPAP General Assembly held in London, UK, October 31– November 4, six new members were elected. These will be welcomed in the next issue. In the meantime we offer our heartfelt thanks for all their good work and best wishes for their future to the seven members who are retiring.*

### Pratibha Jolly

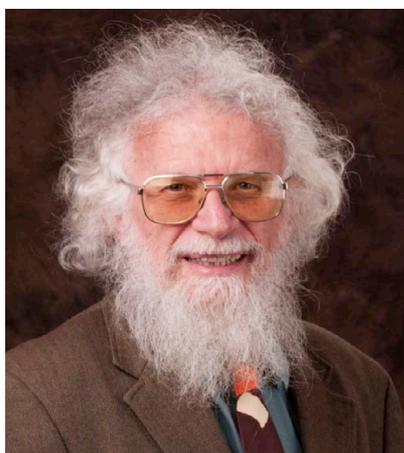


Dr. Jolly gained her Ph.D for theoretical work in Chemical Physics from the University of Delhi in 1981 and taught in Miranda House eight years before joining Department of Physics at the University of Delhi as Research Scientist. There she began work in the area of Physics Education Research and Curriculum Development at the tertiary level.

She returned to Miranda House as Principal in 2005. Under her dynamic leadership, the college has regained its reputation as a pioneering institution for liberal studies in Arts and Basic Sciences. Her multifaceted work has led to the establishment in 2008 of the D S Kothari Centre for Research and Innovation in Science Education at Miranda House with generous funding from the Department of Science and Technology.

She became a commissioner of ICPE 2002–2005, and became Chairperson 2006–2011.

### Dean Zollman



Dean is University Distinguished Professor of Physics at Kansas State University. From 2001 to 2011 he was the William & Joan Porter University Distinguished Professor, and Head of the Physics Department

He also holds the title of Distinguished University Teaching Scholar. He has focused his scholarly

activities on research and development in physics education since 1972. He has received three major awards – the National Science Foundation's Director's Award for Distinguished Teacher Scholars (2004), the Carnegie Foundation for the Advancement of Teaching Doctoral University Professor of the Year (1996), and American Association of Physics Teachers' Robert A. Millikan Medal (1995). Dean has served on ICPE for 9 years. During the past 6 years he has been the Commission's Secretary.

His present research concentrates on investigating the mental models and operations that students develop as they learn physics and how students transfer knowledge in the learning process. He also applies cutting edge technology to the teaching physics and to providing instructional and pedagogical materials to physics teachers, particularly those teachers whose background does not include a significant amount of physics. He has twice been a Fulbright Fellow in Germany. In 1989 he worked at Ludwig-Maximilian University in Munich on development of measurement techniques for digital video. In 1998 he visited the Institute for Science Education at the University in Kiel where he investigated student understanding of quantum physics. In addition to numerous papers in refereed journals, Dr. Zollman is co-author of six videodiscs for physics teaching, the *Physics InfoMall* database, a textbook and *Visual Quantum Mechanics* project which developed interactive materials for teaching quantum physics to three different groups of students -- non-science students, science and engineering students, and students interested in biology and medicine.

### Elena Sassi



Elena Sassi is Professor of Physics and Physics Education, Department of

Physics, University of Naples "Federico II". Though retired, she continues her Physics Education Research activities. She is a member of EPS-PED (Physics Education Division). She is a former researcher in Elementary Particle Physics at CERN and the National Laboratory in Frascati, Italy.

She is also a former Dean of Physics Curriculum at Naples University. Her main research fields are in lab-work activities, inquiry based science learning (IBSL) and teacher's preparation (pre-service and in-service).

Since 2004 she has been involved in GULUNAP, didactical and scientific collaboration with the Science Faculty of Gulu University in Northern Uganda, where she participates in the Bachelor degree for teachers-to-be and organizes workshops for in-service physics teachers. She is the author and co-author of more than 100 papers in national and international journals, didactic materials; educational software, etc.

### Ann-Marie Pendrill



Born in 1952, Ann-Marie received her PhD in 1978. After postdocs in Seattle (1978-80) and Oxford (1980-81), she returned to University of Gothenburg, where she was appointed "docent" in 1984 and "professor" in 1999. In 1982 she married Leslie Pendrill and they have three children born 1983, 1984 and 1991.

Learning in informal settings is a special interest of Ann-Marie, in particular learning in amusement parks, where she has developed simple experiments to illustrate

fundamental physical phenomena (<http://physics.gu.se/LISEBERG/>).

This development had its root in a new educational programme "Problem Solving in Natural Sciences" at University of Gothenburg. This programme was developed in the 1990s with one of the aims to be attractive to female students. It combined Mathematics, Physics and Environmental Science, as well as communication, ICT skills and project work. An amusement park project was among the first assignments for the students.

In addition to teaching physics to university and engineering students, Ann-Marie has also been active in teacher education, in physics, but also in math and technology education, as well as courses addressing interdisciplinary issues, including environment, multicultural classrooms and the role of science in society. In recent years, she has been a part of the University of Gothenburg interdisciplinary graduate school "Educational science and teacher research", where teachers share their time between teaching in school and graduate studies in education. Educational science research questions of interest to her include: How students understand the concepts of acceleration and force; whether students' learning and understanding Newton's laws is facilitated if the body that experiences forces is your own and how informal learning situations contribute to public learning and understanding of science.

Since 2009 Ann-Marie is the director of the Swedish National Resource Center for Physics Education (<http://fysik.org>), with the mission to support physics teaching in schools and preschools. Ann-Marie is a board member of the Swedish Physical Society and also serves on the editorial board for Physics Education, and has been a member of ICPE 2005-2011.

Ann-Marie's physics research background is in computational atomic physics where she focused on accurate calculations needed to interpret experimental data. The studies of atomic-

parity non-conservation and electric dipole moments have given information about weak interaction parameters and about possible violations of symmetry under parity and time reversal. Her calculations in connection with isotope shifts and hyperfine structure have enabled more accurate extractions of nuclear charge and magnetization radii. Her work has also included studies of fundamental questions in connection with relativistic many-body theory. She has published about 80 refereed papers in atomic physics.

She has served on several committees, including the physics committee for

the Swedish research council and on the Council for high-performance computing. In 1997, she was elected a fellow of the APS "for her contributions to the development and use of atomic many-body methods to explore relativistic effects and parity non-conservation in heavy atoms"

Ann-Marie's research background is in computational atomic physics where she has collaborated closely with experimentalists and focused on accurate calculations of relevance for connecting experimental results for atoms with nuclear properties or interaction parameters. She has served on several committees, including the physics committee for the Swedish research council and on the Council for high-performance computing. In 1997, she was elected a fellow of the APS "for her contributions to the development and use of atomic many-body methods to explore relativistic effects and parity non-conservation in heavy atoms".

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### Saalih Allie



Saalih Allie is associate professor in physics and academic development at the University of Cape Town, South Africa. He studied physics at the University of Cape Town (UCT) where he obtained an M.Sc degree in 1984. He then spent two years in the ion-solid division of iThemba LABS, the South African cyclotron facility, where he worked on laser doping of semiconductors. He obtained his PhD at UCT in 1997 in the area of experimental nuclear physics where investigated the process of neutron-proton capture at intermediate incident neutron energies. His physics interests are centred around research

that involves the detection of neutrons.

His teaching career started in 1986 when he was appointed to teach a special access course in physics at UCT for students from educationally disadvantaged backgrounds. This led to his appointment in 1991 of Coordinator of the Science Academic Development Programme. His main responsibility in this role has been to oversee redress and equity initiatives aimed at increasing successful participation of students that are deemed to have the potential to succeed but who would not be admitted on the basis of their high school results. His work is carried out at several levels ranging from designing new approaches to the first year physics curriculum to make it more accessible to the students in question, as well putting together flexible degree structures such as extended degree programmes that allow for differential pace.

These activities led naturally to carrying out research in the area of physics education where his interests include laboratory work, conceptual understanding, and language issues in physics. He has published several papers with colleagues on topics that include laboratory report writing in physics and student understanding of experimental measurement. The broad theme that underlies his present research is the way that context, at a fine-grained level, influences student understanding.

Between 2004 and 2006 he was a visiting associate professor with the Physics Education Group at the University of Maryland and in 2000 he was a Mandela Fellow at Harvard University. During his free time he likes to enjoy the abundant natural beauty of Cape Town including both mountain and beach walks.

### Edward Kapuścik



Edward Kapuścik was born in 1938 in a small town Racibórz, Poland. He got his Master of Science in physics in

1961 at the Jagiellonian University in Kraków. He got the PhD in physics in 1965 as well as the habilitation in 1975 at the same university. Since 1988 he is a Professor of Physics.

He started the research in 1961 at the Institute of Nuclear Physics in Kraków and Joint Institute for Nuclear Research in Dubna, Russian Federation. His main subject is foundation of physics, quantum mechanics and quantum field theory, special and general relativity as well as teaching of physics. He wrote 120 scientific articles and one book. Since 1984 till 2006 he was the Head of PhD Studies at the Institute of Nuclear Physics in Kraków. During 1992 till 1998 he was a professor of physics at the Pedagogical University at Kraków and from 1998 till now he is the professor of physics at the University of Łódź where he heads the Chair of Modeling the Teaching Processes.

In 2009 he retired from the University of Lodz. He is a member of the Polish Physical Society and in the period 2004-2009 he was the Editor of Chief of the journal "The Old and New Concepts of Physics"

<http://www.conceptsofphysics.com>

At present he is teaching at the Alfred Meissner Graduate School for Dental Engineering at Ustron, Poland..

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### Alexandru Jipa



Alexandru Jipa is Professor of Nuclear and Particle Physics at the Faculty of Physics of the University of Bucharest, Romania. He obtained the educational degrees (Bachelor, Master of Science, Ph.D.) at the University of Bucharest (1981, 1982, 1990), having the same scientific advisor (Professor Călin BE LIU). In the 30 years of activity he worked in the Institute for Nuclear Power

Reactors Pitești (1982-1984), Research Institute for Electrical Engineering (ICPE) Bucharest (1984-1988), and Faculty of Physics, University of Bucharest (since 1988). Therefore, the publications list – including over 150 papers in different journals and over 300 scientific communications – cover different Nuclear and Particle Physics fields, from Ultracold Neutron Physics to Applied Nuclear Physics. The main research field is Relativistic Nuclear Physics, having collaboration with different institutes (JINR Dubna (Russia), Brookhaven National Laboratory (USA), GSI-FAIR Darmstadt (Germany) etc). He is co-author of 4 books up to now.

He is member of the Romanian Physical Society and European Physical Society, Nuclear and Particle Physics divisions, as well as, Education Physics divisions. During the time he occupied in Romanian Physical Society different positions in the board of the divisions or at National Council level. He is member of different national committees in the field (Romania – JINR, Romania – FAIR, Romania – CERN).

As Ph.D. advisor he conducted 10 physicists in the Nuclear and Particle Physics and Educational Physics for obtaining already the title of Doctor in Physics, another 20 Ph D students being in different stages of preparation of their theses.

For 8 years (2000-2008) He was Scientific Secretary of the Professors' Council. In present is the Dean of the Faculty of Physics (since 2008). He was member of ICPE of IUPAP for one mandate.



WCPE  
The World Conference on  
Physics Education

July 1-6, 2012



Conference theme:

**The Roles of Context, Culture and Representations in  
Physics Teaching & Learning**



Venue: Bahçeşehir Üniversitesi, Istanbul / Turkey



[www.wcpe2012.org](http://www.wcpe2012.org)

## ICPE Celebrates 50+ Years

Dean Zollman,

University Distinguished Professor at Kansas State University, and Retiring Secretary of IUPAP's Commission on Physics Education

[http://web.phys.ksu.edu/icpe/newsletters/n60\\_supplement.pdf](http://web.phys.ksu.edu/icpe/newsletters/n60_supplement.pdf)

*This article appeared in the August-September issue of APS News, and is reproduced here with permission.*

Last year the International Commission for Physics Education, Commission 14 of the International Union of Pure and Applied Physics (IUPAP), celebrated the fiftieth anniversary of its founding. The concept of creating a commission devoted to physics teaching and learning was developed at an international conference in Paris. Thus, it was fitting that the 50th birthday party occurred at an international conference in France.



*ICPE Chair, Pratibha Jolly, offers a piece of birthday cake celebrating ICPE's 50 years anniversary.*

As described in two articles on the ICPE website, ICPE was founded by a group of physicists who saw a need for collaboration and cooperation related to the teaching and learning of physics at all levels of instruction. As with all of the commissions of IUPAP, ICPE seeks to foster cooperation and collaboration on issues related to research and development in the teaching and learning of physics. Of course, education systems are vastly diverse in different countries (and sometimes even in different regions within a country). However, research over many years has shown that physics instructors at all levels face many of the same challenges and can utilize many of the same solutions worldwide. In this article, I will discuss some of ICPE's approaches to international collaboration in physics education.

The international character of physics education research is very apparent in an area of research called conceptual change. As an example, we find that many students come to us with a somewhat Aristotelian

world view—a constant force results in a constant velocity. Helping students to learn the limitation of this view, and to adopt a Newtonian view, is to change the students' conceptual view of nature. Reinders Duit at the Institut für Pädagogie der Naturwissenschaften in Kiel, Germany has created a bibliography on research concerning conceptual change. A quick glance at this bibliography (<http://www.ipn.unikiel.de/aktuell/stcse/stcse.html>) shows that the study of this topic and development of materials to address it are truly international.

Of course, differences between countries in teaching and learning do exist. For example, we see at the secondary level, differences in achievement on standardized tests such as The International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA). The meaning of these differences is discussed widely and is beyond the scope of this article. However, in spite of cultural differences and a variety of educational systems throughout the world, physics instructors and physics education researchers find a large number of common concerns and are frequently able to share results and instructional materials which are a benefit in many different situations.

Within physics education research, similarities of student learning and struggles with physics seem much more common than they are different. To encourage exchange of best practices, the Commission undertakes a variety of activities to encourage physics educators and physics education researchers to share their research, success and concerns through sponsoring an annual conference on a specific physics education theme. In 2010, the conference entailed a joint meeting with Groupe International de Recherche sur l'Enseignement de la Physique (GIREP) and the Multimedia in Physics Teaching and Learning Group (MPTL). Both GIREP and MPTL are international groups with a majority of their membership in Europe. The theme of the conference was "Teaching and Learning Physics Today: Challenges? Benefits?" and was held at the Université de Reims, Champagne Ardenne, Reims, France. A summary of the conference can be found in the Commission's newsletter which is available at [http:// web.phys.ksu.edu/icpe](http://web.phys.ksu.edu/icpe). This conference ended with a celebration of ICPE's fiftieth birthday.

The next conference, "Training Physics Teachers and Educational Networks", takes place in Mexico City, 15-19 August 2011. The cosponsor for this conference is the Latin American Physics Education Network. The website is: [http:// www.icpe2011.net](http://www.icpe2011.net).

Most of the ICPE conferences have had a format typical of physics conferences. Thus, they include plenary lectures and invited and contributed presentations. A somewhat different format is being envisioned for the World Conference on Physics Education (<http://www.wcpe2012.org/>) which will be held in Istanbul, 1-6 July 2012. ICPE and GIREP are the primary sponsors of this conference and the American Association of Physics Teachers Executive Board has endorsed it. Other physics education organizations are expected to be involved as well. Rather than just including presentations and workshops, this conference will focus on identifying common interests in physics education research and development.

The format of the conference mentioned above will be modeled on the education strand of the World Conference on Physics and Sustainable Development (WCPSD; <http://www.wcpsd.org/>) that was held in Durban, South Africa in 2005. During the 2005 WCPSD, one of the working groups of the education strand noted that many of the instructional innovations which are based on physics education research had not had wide dissemination and implementation in developing countries. The working group proposed establishing a series of workshops which could provide hands-on experiences for physics faculty in these countries. In 2009, three members of ICPE (Pratibha Jolly, Elena Sassi and Dean Zollman) working with Priscilla Laws created the first such workshop. PHYSWARE: A Collaborative Workshop

to Promote Physics Teaching and Learning in the Developing World was held at the International Centre for Theoretical Physics (ICTP). Support for the workshop came from a variety of sources including follow-up funds from the World Conference, ICTP and APS. Thirty-two faculty from Africa, Asia and South America participated and agreed to further disseminate the ideas of the workshop in their home regions. More information can be found in the International Newsletter on Physics Education and at the website for the workshop at

<http://cdsagenda5.ictp.trieste.it/>

This workshop was conceived to be the first in a series of such workshops on physics pedagogy for university faculty in developing countries. Present plans are to hold a regional PHYSWARE workshop in Delhi, India, in the autumn of 2011.

Using this model, we anticipate that the 2012 World Conference on Physics Education will encourage collaborations which will continue after the conference in much the same way that the PHYSWARE Workshops developed in Durban have continued beyond the 2005 WCPSD. The Commission and GIREP anticipate holding such a conference once every four years.

Over the past 20 plus years, physics education has emerged as one of the areas of research and development that has a home in many physics departments. This emergence has provided an increased need to pay attention to the international nature of this sub-discipline of physics. Thus, after 51 years since its founding, the International Commission for Physics Education continues to be active and vital to the improvement of physics teaching-learning worldwide and to the goals of the physics community.

**ICPE – IUPAP**  
**International Commission on Physics Education**  
**International Union of Pure & Applied Physics**

*Editor:*

A/Prof Ian D. Johnston  
 School of Physics  
 The University of Sydney  
 Sydney, NSW 2006, Australia  
 tel: +61 2 9351 5982  
 email: [i.johnston@physics.usyd.edu.au](mailto:i.johnston@physics.usyd.edu.au)

*Publisher*

UniServe Science, Science Clearinghouse  
 Carlaw Building (F07)  
 The University of Sydney  
 Sydney, NSW 2006, Australia  
 tel: +61 2 9351 2960  
 email: [science.uniserve@sydney.edu.au](mailto:science.uniserve@sydney.edu.au)

web: [http://sydney.edu.au/science/uniserve\\_science/](http://sydney.edu.au/science/uniserve_science/)

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