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ICPE Chair's Corner

Greetings from India and the new Chair! These are exciting times for Physics Education. The euphoria of the world-wide celebration of the International Year of Physics (IYP) is still with us. Our Commission and its activities have been center stage as we had tremendous opportunities to work towards fulfillment of our objectives. The IYP brought closer all stakeholders; those in schools, universities, research laboratories, national societies, government, science museums and other non-formal agencies engaged in the area of physics education. Of particular significance has been the international solidarity. Several international organizations worked collaboratively to setup spectacular global events with large scale participation form across the world. There was something for everyone.

One of our major concerns has been to involve those in developing countries and help strengthen physics education in culturally relevant ways. The deliberations at the World Conference on Physics and Sustainable Development at Durban in October 2005 led to action plans for Physics Education, reported in this issue. This conference was different as it was visualized as the starting point of a long term world-wide initiative. At the recently concluded IUPAP meeting of the council chairs, it was heartening to see all commissions endorse plans and promise proactive support. Since then, IUPAP has earmarked special funds for beginning work. A beginning is being made with a UNESCO Workshop in Morocco in April and later in the year in India followed by one in Latin America.

The best way of propagating the cause of physics education, it appears, would be for us to organize conferences on physics education in countries which have never done so before. The ICPE conference in Delhi in August 2005, the first ever in the region, certainly galvanized the community and the Government; there is now serious interest in establishing and funding a vibrant program for Research and Innovation in Physics Education in the country and a Nodal Resource Center to serve the region. We can catalyze similar interest as we travel across the world.

There is much that we need to do in the coming few years. The participation of women in physics at higher levels continues to be an area of concern. The commission also looks for ways to enhance participation of young, or more appropriately, early career physics education researchers and educators in its conferences. We have received several requests for expanding our mandate to bring about greater participation of students and institute activities that directly benefit them. We invite suggestions about the best way to proceed in each area. Starting with this issue of the Newsletter, we hope to carry information about innovative physics education resources and programs, international events wherein students can participate and mentoring possibilities.

We look forward to our next conference in Tokyo, being organized by Toshio Hyodo. As usual, it will give us an opportunity to meet and review the road map.

Pratibha Jolly

Pratibha Jolly, ICPE Chair, Delhi

In this issue

International Conference on Physics Education ICPE 2005 World View on Physics Education in 2005: Focusing on Change

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Miranda House, the prestigious college for women at the University of Delhi, had the special privilege of hosting the annual conference of the International Commission on Physics Educational the country's premiere convention centre, Vigyan Bhavan in New Delhi, 21–26 August, 2005. The conference assumed special significance as it was ICPE's conference in the International Year of Physics and also because India hosted an IUPAP conference on Physics Education after several decades. The conference brought together about 350 participants from 30 countries, with vibrant participation from the neighboring countries of South Asia, East Asia and other developing countries where Physics Education Research is still in its infancy.

The conference dwelt in depth on changes in the ways of teaching-learning of physics; in the understanding of the teaching-learning process; in the content of physics as a discipline, and in the context of physics teaching. The presence of some of the best known physics education researchers, innovators, curriculum developers and practitioners from the classroom ensured successful elaboration of the conference themes. Those who were attending a Physics Education Conference for the first time admitted that the deliberations had radically altered their knowledge of, and epistemological beliefs about the teaching-learning process per se.

Conference keynotes

In keeping with the celebratory spirit of the International Year of Physics, the Inaugural Day Program on 22 August was designed to be special The conference was inaugurated by the President of India, Dr. A. P. J. Abdul Kalam in a hall filled to its capacity of 1200. Speaking of *Injecting beauty of science in teaching*, with insightful examples of the questions posed to him by students and the strategies adopted by great teachers of science, Dr. Kalam generated awesome delight amongst the diverse international audience. (The full text of his speech appeared in the October 2005 ICPE Newsletter.)

In his eloquent keynote address, *Communicating Physics: a personal account*, Nobel Laureate Horst Stormer from Columbia University and Lucent Technologies, further elaborated the process of scientific learning and discovery with magnificent historic and pedagogic insight. This was followed by a broad overview of the concerns of physics education research by Edward F. Redish, University of Maryland, who in his engaging and highly interactive talk focused on *Changing student ways of knowing: what should our students learn in a physics class?* Professor K. R. Sreenivasan, Abdus Salam, International Centre for Theoretical Physics at Trieste, spoke aptly on *Today's physics for tomorrow: the world of physics beyond 2005*. A glimpse of physics at the frontiers was provided by Professor Anton Zeilinger, Institute of Experimental Physics, Vienna, in his talk *From Einstein to Quantum Information* and by Professor Lawrence Krauss, Case Western Reserve University, in a talk provocatively titled *Einstein's biggest blunder? A cosmic mystery story*.

Technical sessions

The technical sessions on the remaining days included invited talks, hands-on workshops, brief talks in parallel sessions; and poster presentations. Keynote talks gave an overview of current issues and findings in physics education research and elaborated the effective diagnostic tools and instruments adopted for assessing conceptual learning. Speakers reiterated the crucial research findings that show the gap between what is taught and what is learnt, presenting a convincing case for developing learning environments that encourage active mental engagement, the critical importance of hands-on minds-on activities, the role of experiments and evidence, the role of mathematics and, the role of ICT and emerging technologies in the teaching-learning of physics. Several talks emphasized the introduction of emerging areas of physics in the classroom; building of a holistic perspective about the structure of knowledge in physics; connecting research in physics to teaching-learning of physics; and teaching of physics in multidisciplinary contexts.

Also discussed were changes in the context of physics teaching, issues relating to bridging the gap between schools, colleges, universities and the workplace; connecting teaching-learning to cultural contexts; and enhancing the public understanding of physics in a modern society. A special session was devoted to nurturing women in physics.

Other highlights

These included: presentation of the ICPE Medal to Svein Sjöberg of Norway; a stage science show; exhibitions of scientific equipment form the best known international and national manufacturers and exhibition of books. Parallel programs organized each day at the National Science Centre and Museum gave some of the distinguished conference speakers a chance to address and interact with a hall full of nearly 300 excited school students. Showcasing the technology capability of the country, at immense cost, units of Indira Gandhi National Open University, the National Informatics Centre, and Indian Space Research Organization video recorded the entire proceedings as an educational resource. These were directly transmitted by EDUSAT, the educational satellite, for viewing in real time across the country. They were web cast and are now archived at the conference website.

The penultimate day conference banquet had a befitting surprise for the participants. The famous and much awarded danseuse, Shovana Narayan, herself a physics graduate, presented a specially choreographed performance in Indian Classical dance form *Kathak*, dedicated to the International Year of Physics and the conference. Titled *Anugatti – the dance of the particles*, the performance captured the physicist's imagination and sculpted concepts through interplay of movement, rhythm, sound and light.

Future plans

The conference proceeding is being brought out by World Scientific Publishing Company. The action plans include bringing together some of the best physics educators to work collaboratively and establishment of a vigorous program for *Research and Innovation in Physics Education* (RIPE) India which can also serve other countries in the region. A beginning for this has already been made at Miranda House.

World Conference on Physics and Sustainable Development

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As part of the International Year of Physics celebrations, IUPAP, UNESCO and ICTP organized a conference on Physics and Sustainable Development, in Durban, South Africa, 30 October–2 November, 2005. The organizers identified that if physics is to impact sustainable development, there is need to understand and suggest action plans for the coming years in four critical areas, namely, Physics Education, Physics and Economic Development, Energy and Environment, and Physics and Health.

Physics education goals

An international Physics Education Planning committee was established, which identified several guidelines for action planning and set the following agenda:

1. Physics education should be strengthened in ways that are sustained by local initiatives.
2. Improvements in physics education should be focused on the secondary level and the training of future physics teachers.
3. Basic physics teaching should be enhanced by the use of locally developed examples, assignments and projects.

During day 2 of the conference, approximately 100 delegates divided into four breakout groups, which discussed:

1. *Dissemination of Teacher Resources*: how to create an *International Physics Education Resource Center*, which could offer electronic access to curriculum materials and other teaching resources.
2. *Development of New Curriculum Materials*: how to identify physics topics relevant to the needs of developing countries, and to promote ways to develop and disseminate locally modifiable materials and equipment.
3. *Pilot Teacher Workshops*: how to design and implement teacher workshops using available resources, serving the needs of the three developing regions, Latin America, Africa and Asia.
4. *Mobile Physics*: how the potential of mobile science might provide access to equipment and resources; enrich teaching; support teachers; and involve the wider science community in science education

Recommendations

The following project plans were proposed by the Breakout Session Groups:

1. To give educators and students in developing countries access to high quality physics education resources by establishing a website and *Physics Education Resource Centres* in Africa, Asia and Latin America.
2. To develop supplemental instructional materials for secondary physics courses that help students understand how the mastery of physics concepts can enable them to contribute to sustainable development in their own countries.
3. To develop model workshops for teacher-trainers in Asia, Latin America and Africa that exemplify how active learning methods can be adapted to help meet the needs of students in developing countries.
4. To establish a structured multi-disciplinary mobile science community that provides support to mobile science practitioners, enabled by a web site hosted by the Institute of Physics (UK) at: http://www.mobilescience.info/.

Future plans

The IUPAP in February 2006, at the meeting of its Council Chairs and Executive Council endorsed these action plans and reiterated that there is an urgent need to give a boost to physics education if research in physics is to thrive. As part of this initiative, within the framework of the UNESCO project *Active Learning in Optics and Photonics* (ALOP): *Training of Physics Trainers*, a workshop will be held at the Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech in Morocco from 23–29 April 2006. The WCPSD committee plans to organize similar workshops in India and Latin America later in the year.

Using Enhanced Learning Technologies to Teach Nanoscience Research Techniques to Postgraduate Physics Students

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*This paper is abridged from an article in the November 2005 issue of **CAL-laborate** published by UniServe Science, The complete article may be viewed at: http://science.uniserve.edu.au/pubs/china/vol5/CP5_phys_03.pdf.*

Background and motivation

'Nano' derives from the Greek word for dwarf. 'Nano' is a prefix meaning one-billionth, so a nanometre is one-billionth of a metre. Nanoscience generally refers to the world as it works on the nanometre scale, from one nanometre to several hundred nanometres. To put that scale of measurement into perspective, a human red blood cell is about 7,500 nanometres across, and one nanometre is roughly 10 atoms wide. Industry recognises the extraordinary potential the nanotechnology field offers in the form of bulk, composite, or coating materials to optoelectronic engineering, magnetic recording, ceramics and special metals engineering, bioengineering, and micro manufacturing (Siegal 1998). The possibilities of nanotechnology are endless. Entirely new classes of incredibly strong, extremely light and environmentally benign materials could be created (Lane 1998).

Nanotechnology's rapid growth provides challenges to our academic communities and they are reacting slowly to prepare the workforce for emerging opportunities in nanotechnology. No specific training programme exists within the Irish education system, for example, and students who are engaged in research in nanotechnology gather their information on nanotechnology from books and the Internet. A survey carried out for the purpose of this study in the University of Limerick (2001) revealed 96% of nanotechnology related research students believed there was a need for a web-based teaching package in nanoscience materials research. *Nanolab* was developed to provide up to date information about facilities and experimental techniques, to reduce the burden on supervisors, to fully utilise the facilities created by external funding and to attain excellence in research. The system is a web-based teaching/learning package that uses the Internet as its platform for delivery. Internet applications offer the potential to combine the advantages of the traditional and new education methods when sufficient bandwidths are available.

Design and development of *Nanolab*

The underlying educational theory for *Nanolab* is Piaget's theory of Constructivism. This assumes the learner takes control of his/her own learning, constructing knowledge by building on previous experiences. *Nanolab* is consistent with this theory as learning starts with issues around which the students are actively trying to construct meaning. The package focuses on primary concepts rather than isolated facts. Since education is inherently interdisciplinary, the package measures learning by making the assessment part of the learning process, ensuring it provides students with information on the quality of their learning. Currently, there are no widely recognised models of web-based design. The field of instructional design (ID) is in a state of rapid change (Wilson 1997). Existing models of instructional design for both traditional instruction and for software instruction contain elements that are suited to instructional design for web-based learning.

For the purpose of developing *Nanolab* it was necessary to draw from existing models of instructional design when designing the web-based teaching package. This approach allows the development of both the technological solution and the pedagogy required to make a useful adaptive learning system. The author adapted Stoner's framework (Stoner 1996) and McNutt's lifecycle (McNutt 1991) and merged their models with educational theories to create one model that would then be the basis for the implementation and development of the teaching/learning package *Nanolab*. This model promotes a step-by-step procedure. The first step recognised the potential for development in the initiation phase through preliminary assessment of the situation. This called for appropriate research of the relevant literature, which led to the definition of course aims and objectives. The next phase analysed the required level of integration including content inclusion and the appropriate selection of learning technologies. This enabled the progression to the design phase, which considered the learning activities, course structure, interface design, media design, interaction design, and assessment integration. This was then implemented and evaluated in a cyclic format until the most appropriate system was devised.

Definition phase

The explicit definition of the course objectives for *Nanolab* satisfies a number of different requirements for the later development of the project, from providing a number of metrics one can measure the implemented system against to provide prospective users of the system with an explanation of how the implemented system can benefit them.

The audience that the system *Nanolab* targets are postgraduate students at the University of Limerick who are engaged in research on materials in the nanoscale range. The audience definition was compiled from online survey results of students currently researching nanomaterials and first hand knowledge of the group. At present there are approximately 20 students researching materials in the nanoscale range. They breakdown into the following categories: Thin Films, Electrochemistry, Biomedical, Magnetic Materials, and Surface Science. The researchers are based and affiliated with different departments including Physics, Chemistry, Engineering, and Materials Surface Science. The group as a whole are computer literate and have access to a computer each day.

Analysis

Nanolab adopted a hybrid structure, organising the content on the server in a combined hierarchical/network structure. The root of this hierarchical tree is the main navigation menu; the sub-sections consisting of a network of related components are directly accessible from this menu. Researchers searching for particular information will yield the best result from a broad menu system with fewer levels to the hierarchy. Information, demonstrations and illustrations were organised in ordering discrete components into a coherent flow chart detailing how the component sections interrelate to form the modules. The approach employed by *Nanolab* resembles a traditional feedback loop, by using a continuous improvement/ refinement process to integrate the technology into the university environment.

Learning technologies (LT)

Local Area Network (LAN) generally refers to a high-speed and fault tolerant data network. LANs are capable of transmitting data at very fast rates. It is at present the most popular networking protocol, used by approximately 80% of networks worldwide (Woodward, Gattuccio and Brain 1999) The LAN speed at the University of Limerick is 100 MB s-1 Ethernet LAN. This is the network structure used in *Nanolab* to allow researchers to access the course materials. *Macromedia Authorware* was the graphical authoring tool selected to produce the web-based executables for distribution of *Nanolab* to it intended audience. Animations, illustrations and possible interactions were implemented as Flash animations, using a browser plug-in to view the resulting program.

Interface and interaction design

To achieve consistency, the system employs the following conventions. The main menu is accessible to the user at all times and sub-sections open within this frame. This simplifies navigation for the user — see Figure 1, which illustrates the user interface design used to navigate around *Nanolab*. Each topic starts with a new display and is labelled accordingly in the screen title. Consistent key actions are offered to navigate through the site, and forward and reverse progression are available. Global control is provided in the form of help, glossaries and termination is available at all times. There are a number of different interactions available to the researchers; these vary from direct email, to more involved possibilities such as online discussion forum. The researchers are all based at the University of Limerick, and so are in close proximity. The use of discussion forum will be to stimulate lively discussion and provide alternative views in aiding fellow researchers. For the purpose of contacting supervisors, email should prove an adequate means of communication.

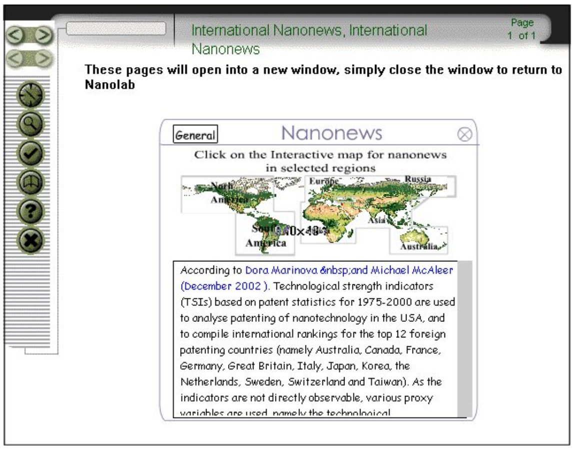

Figure 1. User interface design used to navigate around *Nanolab*

Implementation

The package is presented and subdivided into ten sub-sections: For the purpose of this paper examples of the sub-sections have been displayed independently of the user-template to conserve space (Figures 2 – 4). Researchers will log-on to the system and can work collaboratively with their peers through the use of the discussion forum. Hypotheses can be constructed and challenged, references can be shared, and they can discuss their approach and evaluate it against the work of others. Researchers can be encouraged to self-assess through the use of the online quiz after exploring the techniques and analysis sub-section. Feedback to question gives encouragement when a response is correct and an explanation when the response is incorrect.

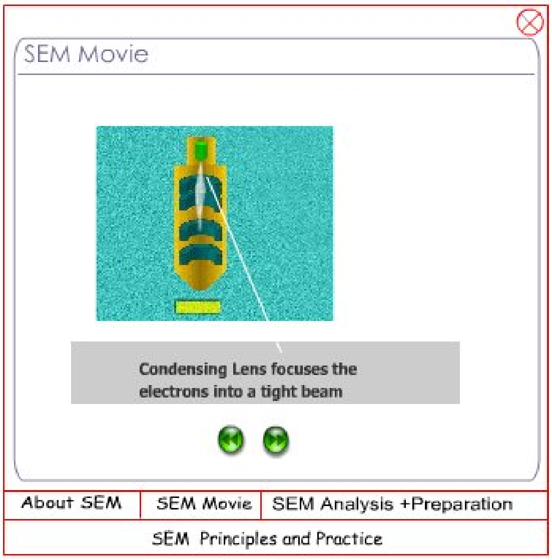

Figure 2. Movie created using *Flash MX* showing how the Scanning Electron Microscope works

Figure 2 illustrates a movie created using Flash MX about how the Scanning Electron Microscope works and Figure 3 demonstrates the Nanoscale range using an interactive animation of an oak leaf. The system will function as a source of information by providing a glossary of commonly used terms and acronyms used in nanotechnology research, a database of equipment and researchers at the University of Limerick and a reference sub-section of Nanonews internationally. The Virtual Reality (VR) subsection offers environments in which the learning is more realistic and in context. This enables researchers to use attractive and user-friendly interfaces, which encourage use of the equipment and techniques and greatly increase user involvement. The use of multimedia technology in *Nanolab* facilitates multi-sensory education by allowing users to interact with the system and receive not only textual, but also video or audio feedback. Video, audio, animation and images also make possible the production of highly memorable, illustrative explanations of concepts (Crosby and Iding 1997) This further enhances interaction and makes applications more intriguing and appealing to the user and lead to better knowledge retention on the part of the user.

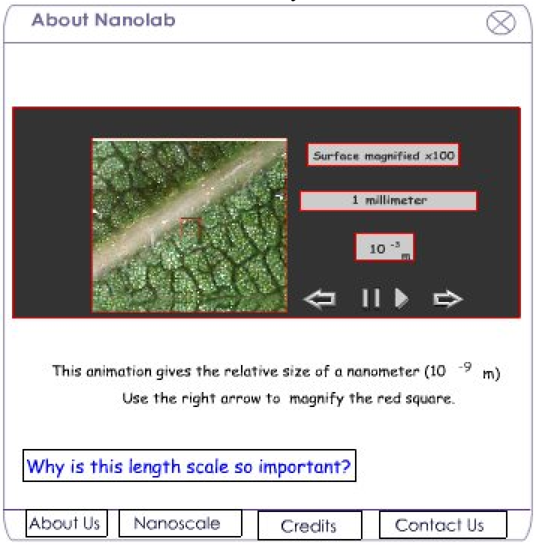

Figure 3. Interactive animation of an oak leaf demonstrating Nanoscale range

Figure 4. Explains and illustrates samples collected by researchers using Atomic Force Microscopy

Assessment
The course assessment evaluates the actual course based upon the feedback information from the user to improve the system. This will be achieved by implementing an online survey for researchers to communicate information about the system. The evaluation of the package will be an ongoing process using a variety of methods such as field trials, focus groups and expert panels and this will be an integral part of the system development. This will provide useful information on user-friendliness and ease of implementation as well accuracy and currency of content.

Conclusions
The system *Nanolab* was designed, developed and implemented based on an adopted educational model by Stoner's (Stoner 1996) and McNutt's lifecycle (McNutt 1991). The underlying learning theory for the system is Constructivism. For this system, course assessment and feedback will be of primary importance in improving and tailoring the system to best suit the needs of the researchers to maximise the benefits obtained from the system whilst minimising the shortfalls. It is intended that this web-based learning system *Nanolab* will provide essential skills in various analytical and experimental techniques used in nanoscopic materials research, accelerate learning and enhance research while reducing instructor and travel costs typically associated with traditional training methods.

Acknowledgement
The author would like to acknowledge the support of Dr. Zakia and Dr. Abdur Rahman, the University of Limerick Foundation and General Electric who financially supported this work.

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University Physics Education in Australia

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(The complete project team consists of academics from a broad cross section of Australian universities, drawn largely from the Physics Education Group (PEG) of the Australian Institute of Physics (AIP).)

*This report is substantially abridged from an article which appeared in **Australian Physics** (2006), B(1), 20–26.*

In 2004, a project entitled "Learning Outcomes and Curriculum Development in Physics" was commissioned by the Australian Universities Teaching Commission (AUTC) to answer, *inter alia*, these questions:

- How is the context and nature of physics education in Australian universities changing?
- What factors are constraining staff and departments in providing quality teaching and learning?
- How can we best share good practices so that physics education strengthens, is sustained and grows?

The current context for physics education in universities is indeed complex with quite dramatic changes occurring during the last decade within most institutions. These include changes to the nature and expectations of the student body, changes in staffing, infrastructure and resource allocations in departments, changes in employer expectations and emerging multidisciplinary areas. In response to these changes, departments have identified and employed various strategies to provide high quality physics teaching and learning. Individual, departmental and collective experiences captured in this project provide opportunities for sharing understandings of the current context and advancing the teaching and learning of physics in Australian universities in effective and efficient ways. Recent major studies in the USA[1] and UK[2] have informed and complemented this project.

> The project aimed to capture the essence of physics teaching and learning in Australian universities, and map the path forward based on collective experiences, both successful and not so successful.

Data collection

The project surveyed the 34 Australian universities in 2004 whose teaching ranged from the archetypal Bachelor of Science degree with a major in physics to relatively new degrees such as nanotechnology, photonics and security technology, with most departments also teaching service or multidisciplinary physics subjects.

Several different procedures were used to gather data. These included accessing web pages, seeking questionnaire responses from physics departments, engaging in focus group discussions with students, and conducting interviews with individual department heads, curriculum co-ordinators, physics graduates and employers. More detailed data was obtained through interviews and focus groups at nine departments, selected to represent each state and capture the diverse types of departments.

> The project focused on undergraduate physics education – 3 year and 4 year programs, service and multidisciplinary physics subjects, and double/combined degree programs.

Findings

The major findings of the project were presented in the Stage 1 Report "Learning Outcomes and Curriculum Development in Physics"[3]. Copies of this report have been distributed to each participating university. Each major section of the report gave rise to a series of recommendation, some of which are discussed below.

The Executive Summary, containing the complete set of recommendations can be downloaded from the project web pages[5]

The findings and recommendations were grouped under six main headings:

- The changing nature of students: implications for teaching;
- Skills, capabilities and employment;
- What are we teaching?
- How are our students learning and how are we teaching?
- Staffing challenges and responses; and
- Future directions.

To give the reader a feeling for the kind of results contained in the Stage 1 report, the findings and recommendations of the first major section, concerned with the background of physics students, may be quoted here.

The changing nature of students: implications for teaching

Investigation of the changing nature of physics students gave rise to several recommendations related to appropriate teaching. Most departments have identified changes in the background of students commencing physics studies, and have adapted in a range of ways, as shown in Figure 1 (from ref 3, Figure 5.2).

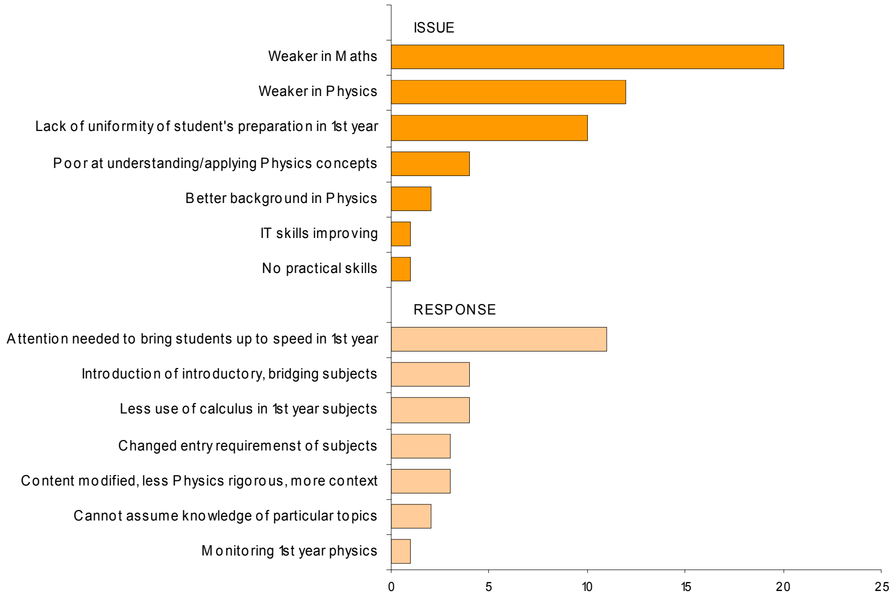

Figure 1: Categorised and quantified questionnaire responses to "B7. *Please make any general comments regarding student backgrounds entering physics, including effect of changes to high school physics or mathematics. How has your own department adapted to these changes*?"

Recommendation 3.1:
That physics staff include in the curriculum learning activities that cater for a variety of learning styles and contemporary technology.
Recommendation 3.2:
That physics staff recognise and value diversity of student background, such as previous physics and maths studies, work experience, gender and cultural background in designing the curriculum.
Recommendation 3.3:
That physics staff acknowledge the competing demands on students' time, including part time work, when designing learning and assessment tasks.
Recommendation 3.4:
That physics staff communicate their expectations of students clearly and explicitly.
Recommendation 3.5:
That physics departments involve younger academics and consult students in teaching and learning decision-making.

The project also sought answers to the questions *How are our students learning?* and *How are we teaching?*

In the face of a decline in staff numbers and in laboratory and information technology (IT) facilities on the one hand, and poorer preparation of our students on the other, departments are responding by restructuring the curriculum and laboratories, changing their subject offerings and introducing new learning activities and new technology.

The effectiveness of these responses was evaluated in part by asking students which activities are most helpful to their learning. The most common responses included interaction with helpful and knowledgeable lecturers, tutors and demonstrators, regular assessment, and worked examples in class.

Recommendations related to this section of the report arise from an awareness that the goal of improving learning and teaching quality in Australian physics departments depends on teaching staff having a better awareness of approaches and resources which have been evaluated and demonstrated to be pedagogically sound and efficient in terms of human and financial resources.

Recommendation 6.1:
That physics departments and the Australian Institute of Physics, through the Physics Education Group, support and undertake research into the effectiveness of learning and teaching strategies such as the use of IT and e-learning, the contexts and benefits of undergraduate research projects, and opportunities for optimising our investment in and commitment to laboratory experience.
Recommendation 6.2:
That further research into effective physics learning and teaching in the Australian context should be supported, with particular attention to Generation Y.
Recommendation 6.3:
That heads of physics departments and the Australian Institute of Physics cooperate in establishing improved mechanisms for promoting and sharing good practice, such as supporting academic exchange visits and contributing to the national clearinghouse, UniServe Science.
Recommendation 6.4:
That the AUTC project team identify academic staff with an interest in physics for biological and medical sciences, and encourage them to collaborate in the production of common course materials appropriate for the Australian context.

Dissemination

In 2005, the project team concentrated on disseminating findings, strengthening networking amongst the higher education physics community and developing strategies for sharing good practices. Among major initiatives in this stage of the project were the publication of *Snapshots*[4] and development of the web page[5].

Snapshots of good practice

"*Snapshot – Good Learning and Teaching in Physics*"[4] is a small booklet which provides descriptions of the range of good learning and teaching practices currently taking place across Australian institutions. Twelve themes are featured:

- Large Classes;
- Online Learning;
- Service Teaching;
- Distance Learning;
- Context-Centred Teaching;
- Tutor/Demonstrator Training;
- Laboratory Work;
- Interface to Employment;
- Small Class Activities–Tutorials;
- Communication Skills;
- Undergraduate Projects; and
- Teamwork.

The booklet features some 40 examples in addition to overview articles and has been widely distributed to Australian physics departments and learning and teaching centres at all participating universities.

Project web pages

A resources web-page[5] has been set up so that academics can readily access the best sources for physics education research based teaching and learning materials. It includes links to teaching resources which have been developed or implemented at Australian universities, and to Australian publications related to research in physics education. This will continue to develop over time.

More complete information is available in the Stage 1 report[3] and the *Snapshots* booklet[4] distributed to all Australian physics departments, and via the project web pages[5]:

http://www.physics.usyd.edu.au/super/AUTC/

Acknowledgements

The project has been funded by the Australian Universities Teaching Commission and the Carrick Institute for Learning and Teaching in Higher Education. The project team appreciates the support and input from physics departments, the physics community and the Expert Advisory Panel members.

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ICPE 2006 (Tokyo)
International Conference on Physics Education 2006
Toward development of physics for all
August 13–18, 2006
Tokyo, Japan

The Japanese Society of Physics Education will host The International Conference on Physics Education 2006 – Toward Development of Physics for All – in collaboration with International Commission on Physics on Physics Education of International Union of Pure and Applied Physics (IUPAP/ICPE), The Physical Society of Japan (JPS), Japan Society for Applied Physics (JSAP), and Association for Physics Education in Japan (APEJ).

The Conference will be held at National Olympics Memorial Youth Center, Tokyo, Japan. It will focus on the development of teaching methods and the contents of "Physics for All", from the elementary school to the undergraduate university level.

The following five subjects will be discussed:
- Development of physics curriculum
- Structure and methods of physics education in the classroom
- Development of teaching materials
- Training and support of pre- and in- service teachers
- Popularization of science (physics)

Participation of school teachers is highly encouraged. A special session for high school teachers will be high-lighted in the conference. In this session teachers will exchange their experiences and visions. It is hoped that an international network for physics teachers is created through the discussion.

The deadline for the early registration with reduced registration fee is June 15, 2006. For more information contact Prof. Toshio Hyodo (ICPE2006@komed.c.u-tokyo.ac.jp) or visit the conference web site:

http://www.komed.c.u-tokyo.ac.jp/ICPE2006/

GIREP Conference
International Research Group on Physics Teaching
August 20 – 25, 2006
Amsterdam, Netherlands

GIREP Conferences aim to bring together physicists, physics educators and physics teachers from all levels of education concerned with issues in physics education and physics education research. The biannual conferences are major events with typically over 300 participants from all continents except Antarctica.

The theme of this year's conference is ***Modelling in Physics and Physics Education***. Speakers include David Hestenes and Ronald Thornton (USA), Vitor Teodoro (Portugal), Silke Seifert-Mikelskis (Germany), Hans Fuchs and Michele D'Anna (Switzerland), Ian Lawrence and Laurence Rogers (UK), Piet Lijnse and Peter Sloot (Netherlands).

The main theme of the conference guides the morning lecture sessions and some workshops. The parallel paper, poster, symposium, and workshop sessions can address this theme as well. However, they can also focus on other main themes in physics education such as Physics Curriculum, Laboratory, Equipment, Teacher Education and Professional Development, Assessment, and Use of ICT in Physics Education, Teaching Physics for Engineering or Medicine, etc. The local organiser of GIREP is the AMSTEL Institute of the Faculty of Science, University of Amsterdam.

GIREP, Amsterdam, and summer make a very nice combination. The conference will be in University of Amsterdam facilities in the heart of the city at walking distance or 5 – 10 minute streetcar rides from the main sites.

The deadline for submitting papers is April 30.

For any questions regarding papers, posters, and symposia please contact Ton Ellermeijer (ellermei@science.uva.nl) or Ed van den Berg (eberg@science.uva.nl).

For information about registration, call for papers, accommodation, and other details visit the conference web site:

http://www.girep2006.nl/

First Step to Nobel Prize in Physics

First Step to Nobel Prize in Physics is an annual international competition in research projects in physics. All secondary (high) school students regardless of country, type of the school, sex, nationality etc. are eligible to enter. The only conditions are that the school cannot be considered as a university college and the age of the participants should not exceed 20 years on March 31 (the deadline for submitting the competition papers). There are no restrictions concerning the subject matter of the papers, their level, methods applied etc. The papers, however, must have a research character and deal with physics topics or topics directly related to physics.

Participation in the competition does not need any agreement from the school or educational authorities. The pupils conduct their research in the way and under conditions that are the most convenient to them.

Characteristic features of the *First* Step:

1. The criteria used when evaluating the papers are quite adult - we do not apply any discounts for the young age of the participants.
2. There are no material or financial prizes. Instead, the winners are invited to our Institute for one month (usually in November) during which they are involved into real research works going on in the Institute.
3. Every year the proceedings with all the awarded papers are published.

The ***First Step*** (as far as we know) is the only competition that publishes proceedings with practically all the awarded papers. Because of that, all our most important decisions may be verified.

Main aims of the competition:

1. Promotion of scientific interests among young pupils;
2. Selection of outstanding pupils (especially in countries in which access to science is difficult) and their promotion (our winners are often sent to better universities with financial help from local authorities);
3. Enhancing motivation of pupils to scientific work;
4. Stimulation of the schools, parents, local educational centres, etc. for greater activity in work with pupils interested in research;
5. Establishing friendly relations between young physicists (currently winners are invited to the Institute at the same time, they are accommodated in the same place, they co-operate with each other, etc.).

For all further information, contact the chairman of the Organizing Committee, Waldemar Gorzkowski, (gorzk@ifpan.edu.pl) or visit our home page:

http://www.ifpan.edu.pl/firststep/

ICPE Members

The General Assembly of IUPAP held at Cape Town in October 2005 brought in several new members on board the Commission for a period of three years.

The reconstituted commission is:

Chair: Pratibha Jolly, India
Vice-Chair: Mauricio Pietrocola, Brazil
Secretary: Dean Zollman, USA
Members: Pedro Goldman, Canada
Diane Grayson, South Africa
Hiroshi Kawakatsu, Japan
Robert Lambourne, UK
Sung-Muk Lee, Korea
Xingkai Luo, China
Andra Patkos, Hungary
Ann-Marie Pendrill, Swenden
Elena Sassi, Italy
Hans-Joachim Schlichting, Germany
Associate Members: Minella Alarcon, UNESCO
Lakshman Dissanayake, Sri Lanka
Eduardo Molto, Cuba
Vivien Talisayon, Philippines

The contact addresses of the members are available at www.iupap.org.

We thank the members who have made way:
Gunnar Tibell (Chair)
Toshio Hyodo (Vice Chair)
Ernie McFarland (Secretary)
Jon Ogborn
Sung-Jae Pak
Jacques Treiner and
Matilde Vicentini
for their tremendous contribution. They will, of course, continue to be associated with the ICPE projects.

With this issue, our editor for many years, Vivien Talisayon, has passed on the onerous task of editing the Newsletter to Ian Johnston (Australia). We extend him a warm welcome and look forward to the changes he will bring to this publication.

Pratibha Jolly
Chair

From the Editor

The ICPE newsletter has a new editor. In that capacity, my first job is to express, on behalf of all our readers, our heartfelt thanks to the previous editor, Vivien Talisayon, for the constant dedication she brought to the job, and the excellent standard she upheld for the newsletter over the more than six years while she was at the helm. Thank you Vivien. I only hope that I can keep the standard as high as you did.

What of the future then? It is worth remembering that one of the prime aims of ICPE is "to promote the exchange of information and views among the members of the international scientific community in the general field of Physics Education". That is where I believe this newsletter comes in.

It seems to me that the working life of a physics teacher can be quite isolated. Mainstream physics researchers usually have professional associations and technical journals through which they can make contact with others in their field and share common experiences. Those interested in physics education are often not so well served. Establishing and maintaining links with other physics educators, finding the funding to attend education conferences, — these things can often be very difficult. That is certainly true in my country (Australia), and I would guess it applies to other countries as well.

I hope that this newsletter might contribute, admittedly in a very small way, to alleviating this problem. I would like it to be a voice for a worldwide community of physics educators, from all nations and at all levels, where we can improve the links with one another and share our problems and solutions. I hope some of you will write and send me articles on some aspect of physics education in your country.

In the meantime, for this issue I have included an article which gives an overall picture of university physics teaching in Australia. (Australia has not very often featured in these pages in the past. I'm sure you will forgive me if I want to change that.) And I have also included an article describing how a package of new learning technologies can be used to teach one specific area of physics in a university in Ireland (almost at the diagonally opposite end of the globe to Australia).

I hope you enjoyed them.

Ian Johnston
Sydney, Australia

IUPAP – ICPE

International Commission on Physics Education
International Union of Pure & Applied Physics

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For comments, questions, suggestions please contact the editor.

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Visit our web site at:

http:// www.phys.ksu.edu/icpe/