



## **The Workshop Tutorial project book launch during the 2003 UniServe Science Conference**

**M. D. Sharma, R. Millar, K. Wilson**, Sydney University Physics Education Research group (SUPER), School of Physics, University of Sydney  
**Colleen Moroney**, Australian Catholic University  
**Richard Newbury**, The University of New South Wales  
**Peter Logan**, University of Technology, Sydney  
**Ian Cathers and Gil Vella**, University of Sydney  
m.sharma@physics.usyd.edu.au

The Workshop Tutorial project has grown in answer to the perceived need to provide students with an opportunity to use and discuss principles of physics and their applications in a learning environment that encourages interaction with peers and supervising staff. In this manner the Workshops compliment the large traditional lectures that students are expected to attend. The style of the questions and activities are chosen to provide a mixture of quantitative and qualitative concept-based questions and concrete hands-on activities. Reference to research in physics education on student misconceptions has been made in formulating questions (Sharma, Millar and Seth 1999).

The collaborative nature of the Workshop Tutorials provides students with an opportunity to improve communication skills, both written and oral, as well as the ability to work with others in a team and the acceptance of personal responsibility. Thus the teaching strategies employed are aligned with the increasing emphasis placed on generic skills possessed by university graduates. Employer surveys show that communication skills, teamwork skills and problem solving skills can be more important to prospective employers than subject specific knowledge.

The Workshop Tutorial project has been published in three volumes (Wilson, Sharma and Millar 2002a, 2002b, 2002c). They have been published both on paper and on CD. The first volume covers Mechanics, Properties of Matter and Thermodynamics and the second covers Electromagnetism, Waves (including optics) and Quantum Mechanics. Every worksheet has a solution sheet to accompany it. The third volume describes the hands-on-activities for all topics with descriptions of the apparatus and the physics illustrated in each case (Wilson, Sharma and Millar 2002d).

The set of teaching materials is designed to encourage active learning in first year physics classes. These materials are formatted so that they are readily available for use in any standard first year physics tertiary teaching program. By providing an electronic version on CD teaching material can easily be reorganized when necessary to suit any syllabus. Most Workshops have three different versions: an introductory version; a version suitable for students in the physical sciences and engineering; and a version for students in the life sciences.

To our knowledge, the workshop tutorials are used with all mainstream physics subjects at the University of Sydney as well as physics for primary education and sports mechanics. At the University of Sydney College of Health Sciences (USyd CHS) they are used in a health sciences bridging course. They are also being used at four other Australian universities; the Australian Catholic University (ACU), the University of Western Sydney (UWS) the University of New South Wales (UNSW) and the University of Adelaide.

During the project we have carried out extensive evaluations. Feedback from staff and students using the Workshop Tutorial has been wholly positive. An important feature is students who attend

more than half the tutorials perform statistically better on traditional exams than those who do not (Sharma et al. 1999). Participation in the tutorials, coupled with motivation and interest produces positive attitudes towards physics and the study of physics (Sharma, Wilson and Millar 2001; Wilson, Peseta, Sharma and Millar 2002e).

The production of the teaching material has been funded by a 1999 National Teaching Development Grant (Organisational) through the Committee for University Teaching and Staff development (CUTSD). Additional funding for the project have been provided by the College of Sciences and Technology, Faculty of Science and Science Foundation for Physics at the University of Sydney. The teaching material is published by UniServe Science, the University of Sydney.

The Workshop Tutorial books have been short listed for the 2002 *The Australian Awards for Excellence in Educational Publishing* under the Single Title Wholly Australian category.

## References

- Sharma, M. D., Millar, R. and Seth, S. (1999) Workshop Tutorials: Accommodating student centred learning in large first year university physics classes. *International Journal of Science Education*, **21**, 839-853.
- Sharma, M. D., Wilson, K. and Millar, R. (2001) The use of feedback to describe sustainability and growth of a teaching development initiative. *Synergy – A forum for the discussion of teaching and learning at The University of Sydney*, **16**, 14-15.
- Wilson, K., Sharma, M. D. and Millar, R. (2002a) *Workshop Tutorials for Physics: Mechanics, Properties of Matter and Thermal Physics*. Sydney, Australia: UniServe Science
- Wilson, K., Sharma, M. D. and Millar, R. (2002b) *Workshop Tutorials for Physics: Electricity & Magnetism, Waves & Optics and Quantum, Atomic and Nuclear Physics*. Sydney, Australia: UniServe Science.
- Wilson, K., Sharma, M. D. and Millar, R. (2002c) *Workshop Tutorials for Physics: Activities*. Sydney, Australia: UniServe Science.
- Wilson, K., Sharma, M. D. and Millar, R. (2002d) Using hands-on activities in tutorials. *Proceedings of the 15<sup>th</sup> Australian Institute of Physics Congress, Sydney*, 256-258.
- Wilson, K., Peseta, T., Sharma, M. D. and Millar, R. (2002e) Evaluation of a research based teaching development in first year physics, *Proceedings of Research and Development into University Science Teaching and Learning Conference*. Sydney: UniServe Science, 63-68.