

Workshops Tutorials: A valuable learning environment

Manjula D. Sharma, Kate Wilson, Rosemary Millar
Sydney University Physics Education Research Group (SUPER)
School of Physics, The University of Sydney
NSW 2006, Australia

Colleen Moroney: Australian Catholic University, PO Box 968, NSW 2059
Ian Cathers, Gilbert Vella: The University of Sydney, PO Box 170, Lidcombe, NSW 1825
Peter Logan: University of Technology Sydney, Dept. of Applied Physics, NSW 2007
Richard Newbury: The University of New South Wales, Sydney NSW 2052
George Emeleus: University of Western Sydney Nepean, PO Box 10, NSW 2747

Introduction

The objective of this talk is to present a snap shot of a successful teaching and learning initiative - Workshop Tutorials in the School of Physics, The University of Sydney. I will provide the snap shot by focusing my presentation on two key aspects of the Workshop Tutorials.

- * Firstly, I will discuss our strategies for facilitating teamwork amongst students. Included in this discussion is the role of the Workshop Tutorials in fostering the development of scientific skills.
- * Secondly, I will discuss the strategies that we have used for actively involving staff.

In the discussion I will talk about evaluation and current and future development of the project.

Background

First of all, let me provide some information on the courses in which the workshop tutorials are run.

The Workshop Tutorials are currently being run in 3 to 4 mainstream courses at first year university level in the School of Physics at the University of Sydney. More than 1000 students per week have the opportunity to participate in the hour long Workshop Tutorials and this accounts for 1/6 of official contact time.

A room, which can accommodate 60–80 students, is dedicated to the Workshop Tutorials. The staff to student ratio is 1:24 which is identical to that of the laboratories. The room is arranged as shown in Figure 1.

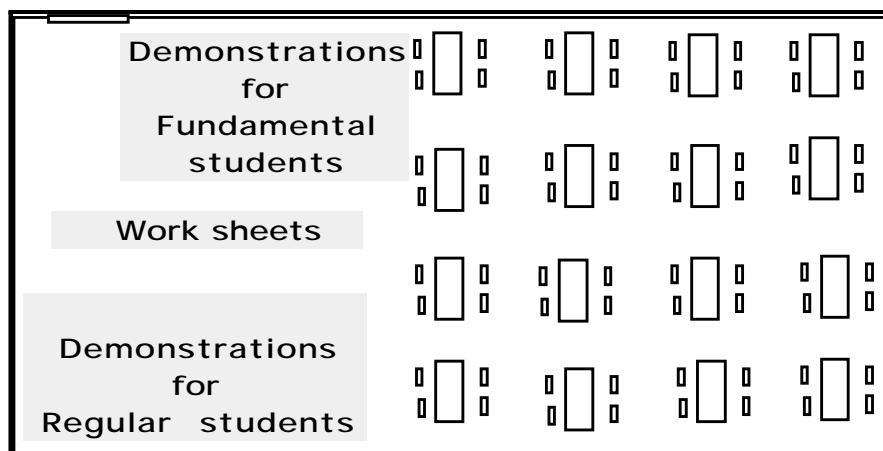


Figure 1. Layout of the Workshop Tutorial room.

Special versions of the Workshop Tutorials are run in service courses such as Physics for Agriculture and in two hour long sessions for prospective primary school teachers.

Team work amongst students

We have adopted the social constructivist model of learning. Students work in cooperative teams of four, discussing, articulating and presenting logical arguments. For successful cooperative learning to occur it is essential to provide an environment specifically designed to promote collaboration and team involvement. We achieve this by

- * the use of structured worksheets with a variety of activities
- * using material designed to promote discussion and conceptual understanding
- * being explicit about the learning that occurs while explaining/articulating within the teams
- * providing hands on activities which are basically robust lecture demonstration equipment
- * giving students the freedom to choose activities and time for each activity
- * focusing team work through the use of team answer sheets. The team reaches a consensus which is recorded on the team answer sheet.
- * providing butcher's paper for scribbling and exploring ideas informally
- * using a tutoring style which provides constructive feedback and talking with teams rather than individuals.
- * having no summative assessment attached to Workshop Tutorials
- * having voluntary attendance

The next question is “how does this learning environment foster the development of scientific skills?”

Firstly, to be successful one needs to understand some physics and to use and apply some “skills”.

Secondly, to obtain a deeper understanding of concepts in physics and to appreciate the nature of physics, one needs to do more than just know how to use the skills. One needs to understand why the required “skills” are important within the discipline.

The Workshop Tutorials provides an environment in which both can occur. Students solve problems using the necessary mathematical, communication, teamwork and reasoning skills. They also get the opportunity to reflect on the process of problem solving, and the role of the skills in effective problem solving. For example, the need for drawing diagrams and understanding the problem, as opposed to simply finding the “correct equation”, can be explored.

Actively involving staff

For a teaching and learning initiative to grow and evolve, it is essential to have the support of individuals involved in the face-to-face interaction with students. To achieve this we

- * regularly consult relevant staff
- * provide fresh copies of material even if staff have seen them before
- * listen and USE information and comments
- * provide feedback to staff (on content and evaluation)
- * appreciate that people contribute if they feel their contribution is valued.

The School of Physics has supported the initiative by saying that staff lecturing a particular section of a first year course need to tutor in the corresponding set of Workshop Tutorials. Other tutors are either staff or post-graduate students who are scheduled for a semester. Since people beyond the initiators are involved and feel that their contributions are important, the Workshop Tutorials have had a positive impact on the teaching and learning within the School. Some problems from the Workshop Tutorials have lead to healthy and extended discussions in the tearoom and a large amount of correspondence.

For a teaching development initiative to be successful, the department must take ownership of the initiative, giving it a life of its own independent of the initiators.

We appreciate that effective tutor training is essential to support cooperative learning. Particularly since it is important to use the “questioning” style of tutoring rather than just providing the correct explanation. Ideally, students are prompted to think for themselves. Although we provide tutor training this is a crucial aspect that we still need to work on.

Discussion

The Workshop Tutorials are continually evaluated, results of which are used to improve them. Some comments by students in a qualitative survey are:

- a) *Asking questions about the demonstrations really helped me clear up some concepts that I didn't understand properly, especially on waves;*
- b) *Getting to know people and discussing solutions; and*
- c) *The atmosphere is good. It's relaxed and help is always available. It makes it easier to figure out the physics without any stress.*

Words such as *excite*, *enthuse* and *enjoy*, frequently appear in student responses. Opposing phrases such as *open-ended* and *well defined* are often used to highlight positive aspects of the Workshop Tutorials.

Quantitative data analysis has shown that there is significant improvement in exam performance for students who attend more than half the Workshop Tutorials.

Current and future developments

In collaboration with the Australian Catholic University, University of Western Sydney, The University of New South Wales, University of Technology Sydney and the Faculty of Health Sciences at the The University of Sydney we are further developing the Workshop Tutorials. The development is funded by a CUTSD grant titled *Development of Cooperative Learning Thematic Physics Workshops in First Year University Courses*.

Workshop Tutorials are being run in various courses at collaborating institutions.

In September and October 2001 we will run a series of workshops at various centres in Australia. The workshops will demonstrate the teaching and learning style adopted in the Workshop Tutorials, and make available the teaching material that has been developed. The current schedule is as follows

two workshops in Melbourne on 24 and 25 September,
one workshop in Hobart on 26 September,
one in Brisbane on 2 October,
one in Adelaide on 9 October
and one in Perth on 10 October.

Conclusion

In conclusion, the Workshop Tutorials:

- * are valued by students (fun, social, content ...);
- * are popular with staff;
- * require none to some new equipment or hardware;
- * are easily incorporated into existing curricula; and
- * are not very tutor dependent.

Finally, why are the Workshop Tutorials so valuable? Firstly, they provide a learning environment with significantly more student control and choice. Secondly, they provide a variety in the available learning styles such that students with different learning style can be accommodated. In the current jargon, this provides flexible learning.

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