APPS/PSNZ Meeting - Sydney 2003

Symposium 7: Active Learning

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Chair: Ann Sefton

Active learning: If it works, why aren't we all doing it?

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What is active learning? We are all familiar with passive learning (rote memorisation). When students are engaged in active learning, on the other hand, they are overtly testing and refining their mental model of the new information being acquired. Active learning is usually interactive, and it is much more student-centered than passive learning. When students learn actively they are more likely to achieve meaningful learning (learning with understanding).

What does it mean to say that active learning "works?" When we ask whether active learning "works" we need to be clear about what criteria are being applied. Does more learning occur? Is more knowledge accumulated? Is less time required for learning? Is the learning "deeper" (greater understanding)? Is retention of new knowledge better . . . short-term or long-term? Or are we asking whether students, or even faculty, "like" it better than something else?

How would we attempt to find out if active learning "works?" Obviously we need to define some measure(s) of the outcomes to be assessed. We would want to try active learning in a wide variety of disciplines and courses, and with a wide variety of students. Unfortunately, the wider our sampling, the greater number of known and unknown variables that might be present to influence the outcomes we measure. Finally, we are clearly most interested in long-term outcomes (does active learning affect performance or behaviour one month, one year, 10 years later). But even if we can do the required studies, the longer we wait to look, the more intervening influences will be present (other than the exposure to active learning) that can potentially affect the results.

Does active learning, in fact, work? The available evidence, whether obtained in the cognitive science laboratory or the classroom, overwhelmingly supports the efficacy of active learning. That is to say, active learning has been shown to result in more learning with understanding, acquisition of more knowledge, and better retention of what is being learned, at least in the short term. There have been few, if any, studies carried out about the long-term effects.

If active learning "works," why aren't we all doing it? It is clear that we do not all teach in a way that encourages and facilitates student active learning. There are many reasons for this. First, change is always difficulty and many teachers perceive that a change to an active learning mode of teaching would require too much additional work. Second, teaching in an active learning environment can be scary for many teachers, even quite experienced ones. The teacher has less "control" than in a more passive learning environment and students are more likely to ask questions for which the teacher doesn't have ready answers. Third, many teachers fear that active learning will take so much time that they will not be able to "cover" all the material they think they need to cover. Finally, many teachers are discouraged from pursuing more active learning approaches by clear opposition from students who do want to have to learn in a new way.

What does it take to get started doing active learning? The two necessary, if not sufficient, steps are: (1) recognition that learning is done by the learner and only the learner, and (2) recognition that your job as a teacher, really the only thing that you can do, is to help the learner to learn! Once you have redefined your job in this way you will find that creating an active learning environment in your classroom is a natural step. Then, of course, you have to actually do it.

Promoting active learning with a Generic Skills Guide

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A "No Frills Generic Skills" guide for physiology students was compiled in 2000 to bring together various learning resources and exercises which had been produced over the previous decade, and presented to students in a series of learning tutorials. It was initially provided in paper form, but with the advent of WebCT as a means of managing resources for our units of study, it was incorporated into this platform for 2003.

The guide consists of nine sections, each headed by fairly simple questions which a student might ask in relation to a particular topic, and for which the answer is then provided. Anecdotal accounts of experience with earlier student cohorts are included in order to illustrate the development of our ideas over time. Additional documents include Exercises, a Skills Development Table, and five Appendices on different aspects of learning.

Use of the guide to foster active learning is encouraged by various links:

1. from Course Resources, the complete hyper-linked text
2. from Learning Tutorials, a summary table showing relevant connections
3. from notes for Writing Essays and Practical Reports
4. from Challenge Questions for practical self-assessment

The questions relate to three broad topic areas:

skills for science graduates -

- What are generic skills?
- Which generic skills are most relevant to science graduates?

skills for designing experiments, analysing and reporting data -

- What is meant by scientific method?
- What are the main ingredients of a successful experiment?
- How should I record my data? How should I analyse my results?
- How should I report my findings? How should I write scientific material?

skills for effective learning and exam performance -

- What are the characteristics of a successful learning style?
- What is the best way to study for exams?
- What new ways of learning can I try?

The additional documents include exercises on data handling, common confusions, logical thinking and concepts, excerpts from "The Making of Memory" (Rose, 1993), extended matching exercises and problem-based learning examples.

The question on a successful learning style is the most relevant to our symposium on Active Learning. The answer begins with three definitions of learning, lists four essential attributes of successful learning, then uses the analogy of building a wall, first developed by Mike Prosser (personal communication), to expand on eight key characteristics. It concludes with seven tips for taking responsibility for personal active learning, which are also included in our course guide.

How effective this learning resource for active learning has proven to be will be discussed with reference to various outcomes.

Rose, S. (1993) *The Making of Memory.* Bantam Books: London.

Where should we focus, teaching or learning?

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If we were to list what we believe to be the generic characteristics of a good scientist and to compare that with what can be achieved by students in most undergraduate courses, we would find a great difference. The list for the scientist would contain attributes that would be described by the more complex categories in Bloom's (1956) taxonomy for all three domains of learning, cognitive, affective and psychomotor. The achievements of undergraduate students, particularly as reflected in assessment tasks, are best described by the simplest categories in the taxonomy, and are largely confined to the cognitive domain. Given that the more complex categories of learning cannot be achieved by passive processes, there is a need to develop strategies which allow active learning and which can be applied efficiently to classes with large numbers of students within the financial and human resources available. Ideally, one would achieve this with a planned development of the student's skills over the three years of the degree.

A number of approaches to the theory, tutorial and practical activities that are more active than the traditional physiology courses will be outlined. These have been planned to provide a sequential and graded development of skills. Evaluation of the impact of these learning activities has allowed an informed, progressive refinement in the quest of that elusive perfect course.

Bloom, B.S. (1956) *Taxonomy of educational objectives: the classification of educational goals.* London: Longman Group.