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## Team skills and problem-based learning

By Richard James

This article describes an innovative approach to managing workshops for large student groups in science, which was devised by Professor Clyde Herreid of the State University, New York. Professor Herreid presented a seminar to members of HERDSA Victoria in February 1994.

The approach is significant in that it genuinely attempts to develop teamwork skills in students, using as motivation a thoughtful approach to assessment. Strategically designed assessment, encouraging learning at different levels, is at the heart of the apparent success of this technique.

### Groups

The approach was developed to improve the effectiveness of teaching and learning in tutorials with around 70 students. The student group is divided into lecturer-nominated, heterogenous groups of four to six students. A classroom which is convenient for small group interactions is desirable.

### Assessment

The success of the approach relies heavily on the design of the assessment. The assessment has three components: individual grade, group grade, and peer evaluation. All three categories must be passed individually in order to pass the course overall. In the early stages, students decide, by group processes, the weight which will be given to each component -- but not less than 20%, or more than 60%, can be allocated to each component. The assessment components provide a vital mechanism for establishing a climate for effective team-work in the groups.

Peer evaluation is achieved by requiring each student to allocate, from a sum of say 40 points, points to his/her colleagues. Useful rules are:-

- Equal scores cannot be given to all students.
- A maximum point score should be set - to minimise pacts and bargaining which may subvert the process.

It is a good idea to suggest to students that pacts may cause undesirable friction.

### Classes in the first phase

The first phase of the course is designed for what might be called 'low-level' learning. This phase contributes, say, 30% to the overall course grade in the form of individual and group grades.

Upon arrival at class the students go straight to their groups. Immediately, students complete, individually, a 15 minute multiple-choice quiz which is based on carefully



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chosen assigned reading. Following this, each 'team' also completes group answers by discussion (yes, it is noisy). Answers are recorded on mark-sense computer cards. A team leader takes individual and group answers to a card-reader in the room, so that immediate feedback is provided -- to individuals, teams, and the lecturer. The group records their scores (and attendance, by the way).

There is an appeals process, whereby each group can appeal on the basis of:-

- The answer given is incorrect.
- The question is ambiguous.
- The assigned reading was incorrect on the issue.

Only groups that appeal can have credit granted if the appeal is upheld.

During such a class the lecturer walks around the room monitoring what is happening. At some stages, clarification is necessary.

This entire process takes the allocated 50-60 minutes of lecture time.

### **The second stage**

The course now moves to 'deeper' learning, involving the application of concepts from the first phase. The second phase contributes around 70% to the overall course grade.

This phase requires the application of concepts to specific contexts and problems. The emphasis is on non-trivial applications that can generate student interest -- controversial case studies, involving social as well as scientific concepts, work well.

The work expected of students in this phase can be diverse, depending on the issues chosen. It may involve debates or mock courtrooms, journal writing, seminar presentations, written papers, conventional examinations, and even intervention projects in local communities. Peer assessment and grading of group work continue throughout this phase.

### **Some thoughts**

It is usually difficult to transfer approaches to teaching to new contexts. Clearly, there are limitations to the ease with which a model such as this could be transferred to new settings -- availability of suitable teaching spaces, the need for electronic hardware and the constraints of existing assessment policy, to name but a few. Nevertheless, the ideas sketched above may be useful for staff faced with ever-increasing numbers of students in what have traditionally been small group learning environments. These ideas may also be useful for lecturers looking for techniques to develop students' teamwork skills or to encourage them to move from a reproductive to a more analytical or speculative approach to learning.