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Problem solving in small groups

The class of 220 students is divided into eleven weekly recitation sections, each facilitated by a graduate teaching assistant (TA). Within a given recitation section, the students are divided into five small groups. The membership of a group remains constant for seven weeks so that the four group members can develop trusting relationships. Groups are reassigned at mid-semester to expose students to a different set of peer perspectives.

Students bring to each recitation section their completed homework assignment. It is critical that students spend adequate time on their required homework as a way to prepare for the ensuing small-group discussions. The group receives a handout on which a challenging problem is presented. Because all members are seeing the problem for the first time, they are encouraged to brainstorm out loud. Their spontaneous and varying ideas for how to approach the problem force the group to examine and debate which concepts are most relevant and why. A group will often pursue a number of ineffectual strategies before finding a successful solution.

In addition to each student's responsibility of contributing to the group discussion, individuals are assigned roles within the group. The roles are rotated on a weekly basis and are designed to encourage healthy group dynamics. The **Leader** keeps the group on task and watches the clock. The **Encourager** makes sure that each group member participates in the discussion. The **Prober** asks students to elaborate or support their assumptions/approaches. The **Recorder** writes down the group's solution that is to be submitted for a group grade.

The TA circulates through the class and eavesdrops on the group discussions. When a group is completely frustrated or lost, the TA might ask them a leading question to generate further discussion on the right track. However, it is never the goal for the TA to show the students how to solve the problem; this would only lead to greater reliance on the TA's help and lower the students' self-confidence.

Sample exercises are provided to illustrate the design of the group activities. The first example asks students to work with the concepts of elemental composition, the mole, and molar mass in a non-chemical application. The second example treats entropy in a statistical manner to make the Second law of Thermodynamics seem more intuitive.

Video clips showing a group of students engaged in cooperative problem solving demonstrate how group discussion can promote individual understanding.