

scending order of frequency, included: (1) The value of congregating a group of physician educators to share, consult, and critically analyze project outcomes together. (2) The value of being able to receive the input from colleagues all of whom are involved in similar endeavors. (3) The value of defining as a result of the group process clear outcome goals and objectives. (4) The value of outside views and opinions from those less closely connected with the project. (5) The strength of the continuous improvement model as a pragmatic approach to curriculum development. (6) The affirming value of institutional support in organizing a forum to focus on projects important to the physician-educator leaders. (7) The need to bring the groups together every four or five months to hear progress updates and to bring projects to presentation and publication.

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Limiting Tutorial-group Size

Problem-based learning (PBL) is often perceived to be an expensive method of teaching. In discussing ways to save resources, the size of tutorial groups is recurrently debated. But what should be the maximum number of students? Until now, empirical data have provided no answer to this question. However, we would argue that tutorial groups should be kept small—with a maximum of eight students—for three important reasons.

First, in setting an upper limit on tutorial-group size, some cognitive goals of PBL such as elaboration, self-regulation, and motivation must be carefully considered. Research on instructional

conditions that best enable students to learn has shown that elaboration facilitates the processing and comprehension of new information.¹ The tutorial group is an appropriate environment for stimulating elaboration. Studies investigating the effects of group size show that an increase of group size is associated with a decrease in students' participation.² This implies that an increase of group size will also result in a decrease in elaboration. Furthermore, decreased participation, as well as the difficulty presented by large groups of providing timely and appropriate feedback, might undermine the development of the self-regulation that enables students to reflect upon and control their own activities. Decreased participation may also lead to a decrease in students' motivation, since research has shown that one reason that students in PBL are highly motivated is that they are actively involved in the issues at hand.³

Second, group dynamics may be adversely affected if groups are large, because it is difficult to maintain positive interactions within such groups. Furthermore, students' individual contributions will be less visible and less comparable with other students' contributions. This may in turn mean that the degree of social control will decline, which may subsequently negatively influence students' active participation. Thus, considerably more direction from the tutor will be required to get all students involved and to maintain positive interactions in the group, at the risk of shifting the locus of control from the students to the tutor.

In tutorial groups, students become skilled in cooperatively debating, reaching a decision, integrating information, and sharing tasks. In addition, students learn to communicate better by giving explanations, structuring meetings, and distinguishing major from minor issues. A third reason, then, to limit group size is that small groups give students more opportunities to train in these cooperation and communication skills.

Those in favor of increasing group size might argue that the number of ideas and solutions generated by a group will increase as the group's size increases. Although this result might seem desirable, it may backfire and lead to a fragmented and superficial discussion.

We recently surveyed 31 schools using the PBL e-mail interest group and learned that the average group size for most schools is between six and eight students. Only a few reported having larger groups, and these respondents said that they had encountered the problems discussed above. The results of our informal survey indicate that tutorial-group size should not exceed eight students, because in groups larger than this some of the essential benefits of PBL will be undermined.

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A Database for PBL Students

Students and faculty need to access increasing amounts of information in order to build and expand their knowledge bases. Although there has been an explosion both of software and