LEARNING IS A SOCIAL ACCOMPLISHMENT.
Physiology is important, but learning occurs within social environments, and it is mediated by the communication norms of those environments. As NCWIT Social Science Network member Margaret Eisenhart and colleague Elizabeth Finkel write, learning develops when one “changes from novice to expert, newcomer to old-timer, or naïve to mature practitioners in a social practice such as the activities of a science curriculum or an engineering workplace” (p. 8).

Decreased confidence among women is a frequently recurring theme in STEM and IT research. Women are more likely than men to lose confidence in their ability to complete the tasks required for earning acceptable grades, even when their performance is equal to males’. This loss of confidence can result from the suggestion that women do not fit the image of “scientist” or “engineer.” We know that students and professors maintain mental models of the types of people who belong and what they can or should contribute. For example, two studies in engineering showed that despite entering their engineering majors with stronger academic preparation than their male peers, women were often considered less capable academically or even described as “not the real engineering type.” Not surprisingly, women in these studies eventually came to view themselves in the same way, resulting in either dropping out or practicing on the margins in their project groups. With repeated and often subtle messages that one is not like the other students – not as smart, not interested in the same activities, not a “real” computing major – it becomes difficult to imagine oneself developing the identity of computer scientist.

Classroom opportunities for holding intellectual conversations can help to alleviate the loss of confidence among women, while allowing them to develop support groups and networks of intellectual support. Hearing other students talk about what they are learning gives women better information for making judgments about whether they in fact do belong there. And other students hearing women’s intellectual talk forces them to recognize that women are competent contributors to the intellectual enterprise.
CASE STUDY: “THE CONVERSATIONAL CLASSROOM”

This intervention, tested and repeated at the University of Colorado with excellent results, is based on the rationale that students could read their assigned books where the content of the course was clearly laid out. They did not also need for the professor to plan and deliver lectures covering the same material. Instead, they needed access to the professor and each other for asking questions, testing hypotheses, exploring new ideas, etc. In short, professors believed that students needed to engage each other and the professor in intellectual conversation about the material. Therefore, the professors facilitated discussions of the material for each class period. That is, instead of lecturing, professors come to class and asked students if they have questions. In this way, the professor requires that students take control over the flow of information.

The first time he used the Conversational Classroom method, University of Colorado Professor William Waite says that students resisted very strongly; their years of socialization made it difficult to change the way they practiced learning. But it was also difficult for Waite; he came close to buckling under student pressure. After four weeks, however, students began to take responsibility for their own learning.

Computing faculty today face many pressures to integrate collaborative and cooperative learning approaches in courses, increase active participation by students in classes, and increase the participation of under-represented groups in computing. The pressures come from many sources, such as the emphasis on team work by the Accreditation Board for Engineering and Technology, the Joint IEEE Computer Society/ACM Task Force in the “Model Curricula for Computing,” and especially, industry. Research in computer science suggests that when a student’s educational socialization is dominated by individualized learning and homework, they end up with a preference for working alone, tend to procrastinate, are unwilling to support other students, and have a disregard or lack of understanding of team process. This “guide on the side” teaching technique can overcome students’ negative conceptions of collaborative learning.

EVALUATION

Although the examinations and homework assignments given were judged to be identical in difficulty to prior semesters when the course was taught as a traditional lecture course, students in the conversational classroom outperformed the prior semesters’ students both during the pilot semester and a subsequent semester. Not only was student interaction a substantial feature of the course, changing classroom climate (for the better, according to student interviews), but student performance also improved.

GENERAL PRINCIPLES AND ESSENTIAL INGREDIENTS

This teaching model requires that students take responsibility for their learning. They will resist because of many years of deeply ingrained socialization. Professors also must hold out and resist the demands of students to go back to the lecture mode. It is worth it, according to the professors who have implemented this intervention. Not only do students learn the material better, but the course structure also requires that they engage with the professor and their fellow students, two known factors in increasing the retention of women in computing.

FOR MORE INFORMATION


National Center for Women & Information Technology

Revolutionizing the Face of Technology

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