

Foreword

In our lives as faculty members, nothing comes close to matching the complexity of the task we face in teaching. Unlike the arduous but deeply satisfying and familiar job of disciplinary research, teaching requires skills that were not part of our doctoral training. Most of us discharge that complex responsibility conscientiously and feel satisfied that our students have learned by relying on our grading system as a fair and accurate measure of their learning.

However, if we consider our teaching role as an important part of our professional productivity, one of the most difficult questions we should ask ourselves is whether our grading system actually reflects student learning. Good grades may only be indicators of superficial learning. Success of top students in their ability to secure a place in graduate programs is a measure faculty frequently cite of their own effectiveness. Clearly, for professionals who are trained in critical evaluation of data, this should not be the only measure used to determine our effectiveness in supporting student learning.

It is time to start asking ourselves about the effectiveness of what we do in the classroom and, most importantly, if what we do results in student learning. For instance, if lecturing is the only method of instruction used in the classroom, we should remember that a substantial body of research indicates that little of what we say in the classroom is remembered by our students. Lecturing works well for low-level thinking and is measured accurately by multiple-choice questions. But it has not been shown to work for understanding and lasting learning. A study documenting the importance of active engagement by students in the learning process found that the highest density of material covered in a lecture is recorded in the first 10 minutes of class, as measured by density of

information recorded in students' notes. Active processing of the subject matter by students themselves, inside and outside the classroom, has also been shown to be essential in learning. Not surprisingly, active participation of students in class discussions and student collaborations have been shown to be more effective in producing learning and long-term retention than passive note-taking.

It is only recently that American higher education accrediting bodies have instituted student learning into their institutional accreditation process. The responsibility for determining student learning will ultimately fall on faculty shoulders. To facilitate this evaluative process, course design should have the overarching goal of organizing activities that result in student learning. We in higher education now find ourselves in the same place as medicine in the 1930s, when it had to change from an art into a science. Empirical evidence of efficacy was a good place to start in determining treatment, but research was needed to determine why certain drugs or treatments worked. Such research efforts evolved into what we now know as evidence-based medicine.

Continuing our metaphor, we have plenty of evidence of what works in facilitating learning. Reaching the great majority of our students should be our most important goal as teaching professionals. There is an expanding body of work that informs us about the highly complex and demanding job of achieving efficacy in teaching. Unfortunately, very few faculty members have the training, the time or the inclination to explore this literature on their own. Universities that have Teaching/Learning centers are able to support faculty with information and guidance about what works in the classroom. Sorcinelli's recent article in the *Chronicle of Higher Education* (Cook & Sorcinelli, 2002) argues strongly for the necessity of maintaining these centers to provide a support system for faculty in their teaching role.

In order to improve their course delivery, some faculty members viewed technology as a panacea for better teaching. Evidence for this view is shaky at best. The most effective technology-based interventions have proven to be only as effective as lecturing in promoting student learning. Using technology in the classroom should not be confused with teaching innovation. Technology is simply another tool and can only serve to complement or enrich the basic design of a course created by a faculty member with the essential knowledge of the discipline. It is how the technology is used to actively engage students' minds that will stimulate their learning. Excellent examples of creative and effective uses of technology in the classroom are given in several chapters of this book.

What we do in the classroom to motivate and inspire our students matters. Our task is not only to prepare an environment for our students to learn the specifics of our discipline, but also we are implicitly charged with shaping our students behavior to ease their path toward becoming learned and responsible citizens. As part of our American heritage, higher education is an important partner in achieving the overarching goal of bringing all students, not just the wealthy or outstanding, to the common table of knowledge accumulated during human history.

I view diversity as an inclusive and very American exercise, which aims to accomplish this overarching goal of sharing the rich cultural treasure of knowledge that is our common inheritance. Inclusion of all members of our society, regardless of gender, race or sexual orientation is essential if we are going to thrive in the complex, interconnected world we inhabit. Most importantly, the inclusion and retention of women in the sciences is urgent if we are going to succeed in our highly complex global economy. We may no longer rely solely on men to sustain the level of productivity needed to prevent the decline of our scientific and technological edge. Time and again it has been shown that cognitive differences are greater within members of a gender than between genders. The aptitude is there, but educational access is lacking, as are the mechanisms for retaining students in the sciences. Women who leave the pursuit of science education say that the most important reason for doing so is unsatisfactory teaching, especially at the college level, but also in high schools. We know that women benefit greatly from having science taught to them in a societal context, as exemplified by the success of feminist pedagogies in retaining women in science programs. Are we doing this in our classes? If we are not, as research suggests, are we designing courses to study science contextually? Are we requiring collaboration in the classroom, which also helps women and minorities to succeed? Also, it is well known that networking and mentoring opportunities are not optimal for women scientists or science students. Are we involved in mentoring and facilitating these opportunities for such students?

Although race in itself has no biological meaning because DNA variability is higher among people within the same race than it is between members of different races, the idea of race is a social construct, and the barriers it creates for student achievement is still a contentious and important issue that needs to be accounted for in higher education. As in gender differences of aptitude, greater cognitive and achievement differences are observed within members of a single race than between members of different races.

Uri Treisman, working with African Americans and Latino students in Califor-

nia, designed a course to help remedy the low achievement in college mathematics shown by these two groups (Treisman, 1986). Treisman created an honors course called “Calculus for Future Nobel Prize Winners.” Students were not required to have a high GPA to be included but had to accept two requirements before being admitted to the course: They had to agree to do homework before class and to work in groups. No calculus problem was solved by Treisman in class unless students had worked with each other outside the classroom. Course grades for minority students improved significantly after the course, in many cases surpassing grades obtained by their Caucasian peers. As this example clearly illustrates, racism, either overt or carefully hidden by social convention, could have very negative impact on students but may be reversed by pedagogical intervention. More importantly, and to me a great source of hope and inspiration, there is abundant evidence that *any* pedagogical intervention will benefit those students with lower achievement indicators.

If our inclusive frame of mind is going to be global and lasting, it is also very important to remember sexual preferences in our course design. Inclusiveness extended to all should include accepting differences in that aspect of human behavior, especially now when theological considerations are obfuscating our secular goals.

There are very few roles as important as ours as teachers. Our university and our department have entrusted the development of our students’ minds to help them reach their highest potential.

Luz Mangurian

References

- Cook, C., & Sorcinelli, M. (2002, April 26). The value of a teaching center. *The Chronicle of Higher Education*.
- Treisman, U. (1986). A study of the mathematical performance of black students at the University of California, Berkeley. Doctoral dissertation. University of California, Berkeley. *Abstracts International*, 47:1641A.