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## The Changing College Classroom: A View from CART

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Higher education, like many institutions in the United States, is undergoing profound change. At Bridgewater, faculty members are increasingly becoming aware that societal issues, computerization and the demands of a highly competitive economy require a reevaluation of the classroom and the process of

learning. At a conference sponsored by the Center for the Advancement of Research and Teaching in May, four Bridgewater faculty members and a librarian joined in a panel discussion to offer their perspectives on "the changing college classroom." The participants' comments are summarized below:

# The Changing College Classroom: A View From CART

## THE CHANGING MATHEMATICS CLASSROOM

Glenn Pavlicek

The advent of the calculator 15 years ago led to dramatic changes in the teaching of mathematics. At first, students were forbidden to use calculators in math classes, since many teachers considered them to be a form of cheating. It took quite a while to overcome the mindset, even among math teachers, that math somehow was about

doing calculations. Even though most of us learned math by doing seemingly endless series of manipulations (multiplying tables of numbers or solving for  $x$  in 47 slightly different equations), it became evident that the calculator and later the computer could perform these tasks more efficiently than we could ever be able to. This led to a redefinition of the goals of teaching math.

The current emphasis in the classroom is not on computational skills, but rather on the underlying questions of when and why we perform these computations. New texts are appearing which replace the familiar presentation of 5 worked examples followed by 50 similar problems with the seemingly radical notion that problems are all different and should be asked in English (what our students still loathingly refer to as "word problems"— as if

in real life they will have equations to be solved dropped on their desks at work). When computation is de-emphasized, we are forced to reconsider how we define progress in our students and how we assess that progress. Students are now evaluated on their abilities to extract the critical information from a problem and to argue in favor of a particular line of attack. This introduces the student to the true skill of a mathematician, logical argument ("proof"). This is clearly a higher level skill than the ability to learn rote manipulations and requires a more open environment than the traditional rows of students huddled at their desks, pencils in hand. Students are now working in cooperative groups, writing reports on their solutions (or attempts at solutions). Portfolio analysis is one new

method of assessing development, replacing the old multiple choice exam. Students are using real (read "ugly" data) in their exploration and, as a result can work on problems that are rooted in reality. I have seen high school students use traffic flow data to decide how to time the cycle of a traffic light in a particular interaction so as to maximize traffic flow. Realizing that the subject actually has some use and is more than an esoteric mind game played by people with no social life helps to motivate and excite students.

Sandra Faiman-Silva

## ENGENDERING THE CURRICULUM

Bringing new perspectives, specifically those of race, class and gender, into the curriculum, is one of our most important tasks. Until recently, academic knowledge was largely defined and transmitted by white males. Only in the past few decades have the voices of people who were previously excluded by virtue of their color, class or gender begun to be heard. My own

field, anthropology, illustrates some of the errors and omissions resulting from an exclusively male perspective. Until the 1960's, the great majority of ethnographers were men, and their native informants were almost always male members of the tribes they studied. Having little or no access to women, these anthropologists often neglected or underestimated the importance of women in indigenous societies. Female-centered events such as girls' puberty rites and the naming of infants play a crucial role in many native non-western cultures. Several tribes of the American southwest, including the Apache, conduct elaborate rites celebrating a girl's initiation into adulthood. Because they had limited contact with women and perhaps assumed that any important tribal event would focus on men, male anthropologists failed to appreciate the importance of women in these tribal cultures. Conditioned by their upbringing in the male-centered west, anthropologists consistently failed to study

women's experiences and to recognize the fact that, in many indigenous cultures in Africa, Australia and the Americas, women are viewed as innately powerful agents in their own right.

Anthropological studies of pre-historic societies have been equally misleading. For decades, it was assumed that "man the hunter" played the dominant role in these societies. In actuality, as recent studies have shown, women, who gathered grains, roots and vegetables, were responsible for securing a larger proportion of food supplies than men. Pre-historic hunting and foraging societies practiced a division of labor, men and women working on complementary tasks with both their contributions equally necessary for survival. Many anthropologists now believe that it was women who, while gathering food, observed and analyzed growing conditions and began to plant food themselves.

Male scholars have framed the questions and defined the subjects of

intellectual inquiry in many fields. Because women were barred from formal higher education and confined to the home until early in this century, they had few opportunities to become writers, artists or historians. Much of the writing they did, often in the form of letters, journals and diaries, was not perceived by male critics and scholars as worthy of study. Only recently have women's experiences been taken seriously as legitimate objects of intellectual inquiry.

The academic curriculum, defined for centuries by white males, is being expanded to accommodate diverse voices. In an increasingly multicultural society, it is of critical importance that students hear and learn to respect these voices.



## DIVERSITY IN THE CLASSROOM

We live in a world which has become smaller, yet more complex and diverse and our classrooms will increasingly reflect that diversity. As educators, one of our missions is to prepare our students to be active participants in this rapidly changing world. To be successful in accomplishing this mission, we must engage, challenge, and empower them, expose students to the unfamiliar,

and view students as diverse integrated wholes.

To engage students means that the material they are studying must be relevant to their lives and worlds. We must encourage students to take "ownership" of their education and view learning as an ongoing, lifelong process.

To challenge students, we must promote critical thinking and encourage "trying on" alternative ways to conceptualize and solve problems.

To empower students involves listening to their voices, for example, obtaining their feedback about their experiences in our courses. Our students have much to teach us.

To expose the students to what is unfamiliar means making connections with the outside world. For example, one of my most gratifying experiences involved taking students in my "Introduction to Counseling" class to work at a psy-

chosocial rehabilitation clubhouse in Roxbury. I watched my students working side by side with clubhouse members, many of whom had been written off years before as "chronically mentally ill." With unforgettable fondness and pride, I watched one student being instructed in the fine art of seasoning fried chicken.

If we view students as diverse integrated wholes, we recognize that they are heterogeneous in terms of their world views, values and behaviors. They also come with different learning styles, which encourages us to employ multiple approaches to teaching as well as devising more varied ways for students to demonstrate competency in a given subject.

Finally, as faculty, our role as "indigenous providers" — natural supports — should not be minimized. I have been impressed by the number of life challenges and stresses that our students experience. For example, during the past semester I

have been approached by students to discuss such subjects as suspected sexual abuse of a significant other, depression, divorce of parents, mental illness in a family member, single parenthood, and difficulty accessing health, mental and social services to help deal with high family-related stress. It is up to us to decide how we wish to respond to our students' critical need for support, information and referral.

# Shu - Chen Tu

## HIGH TECHNOLOGY IN THE LIBRARY

Like most American academic libraries, the Maxwell Library began to computerize its facilities in the early 1980s and has increased its use of automation every year since then. Cataloguing, circulation and reference now involve use of automated systems; for example, users can search the

Online Public Access Catalog (OPAC) for holdings in the University of Massachusetts at Dartmouth library as well as the Maxwell Library. We have 16 CD-ROM indexes and abstracts and are in the process of setting up a CD-ROM index network on which library users can have multiple access to most of the CD-ROMs simultaneously.

All these changes have naturally affected students and teachers and, as a reference librarian, I have observed some of our library users' information retrieval behaviors:

— Once students have learned to do computer searching, they are reluctant to use the printed indexes or a card catalogue;

— Many students tend to overemphasize what the computers can do to meet their information needs, and they tend to ignore many valuable printed resources;

— Generally speaking, students appear to be more willing to learn computer searching than their teachers and seem to learn faster;

— Some teachers have arranged class library tours so that their students have group bibliographical instruction. These tours are of great value.

Teachers should plan on making periodic visits to the library in order to keep up with the frequent changes in library automation. Checking on our most recently acquired computers and databases will help faculty stay abreast of the new possibilities in information retrieval and of the problems that students encounter. For example, students who search computers to find information for their research topics often don't know which keywords to use, don't understand computer logic or don't realize that their topic may be too broad or too narrow. Because students can access so

many databases, they often retrieve more citations than they really need. It is important to teach them how to distinguish scholarly research papers from non-scholarly magazine articles, to show them how to recognize the authors' credentials, and to train them how to screen out the most pertinent books and articles from the hundreds of citations they find.