



Focal Points

the College of Arts & Sciences
Tennessee Technological University

Vol. 11, NO. 3

A Newsletter Supported by the Terry Martin Stonecipher Fund

October 2006

Innovative Teaching Issue

Each spring semester, CAS faculty members are nominated for the Dean's Award for Innovative Teaching. A faculty committee, chaired by the Associate Dean, selects the annual recipient, and this year the award winner is Scott Northrup, Professor of Chemistry. In the following essay, Dr. Northrup describes the pedagogy upon which his award was based.

--Jack Armistead, Dean

Transforming to the Student-Centered Classroom Scott Northrup

A crisp January day dawns brilliantly upon the hallowed halls of Foster as a much younger version of me saunters into my eight o'clock class. A new semester is at hand and a fresh set of apprehensive faces meets me as I hand out my traditional paper syllabus and topical calendar, items that will be out-of-date by the second week of the course. There for the next fifty minutes I will hold forth in one of my patented monologues to an audience whose sleepy yawns and listless notetaking are safely hidden from my consciousness by my own self-absorption and the darkened classroom, lit only by the overhead projector. I am thoroughly enjoying my own brilliant performance and live in the self-delusion that learning has taken place. How could it not? Information has been deftly transferred; my notes have become their notes. Job accomplished. Or has it been?

The semester rushes onward. Much as the earth's age can be estimated by studying geologic strata, the semester's timeline can easily be reconstructed by the thickness of stacks of ungraded, unreturned paper homework piled about my office. How can anyone possibly grade all these homework papers, I ask, not really expecting an answer. Late in the afternoon I prepare students for their first major exam with a help session, one of my famous "chalk talks." Unfortunately for many, only a few in the class have schedules that allow them to be present at the chosen hour.



May arrives and the semester has flown. Though I enjoy the ease of finding a parking space, I experience an unsettling melancholy that descends on the deserted campus. Only then do I have my epiphany - "You know, teaching and learning is all about *students*, not about *me*. And yet my classes have been the epitome of the *professor-centered* classroom!"

The story above is, thankfully, just part of history, for I have embarked on a new challenge to create a dynamic student-centered learning environment. It is a work in progress to more actively engage students



through the use of thoughtfully-chosen technologies.

Nowadays, the web-based course management tool WebCT provides: (i) a *living* paperless calendar for the class which can be changed at a moment's notice and is always accessible to students; (ii) a *private and secure* paperless posting of student scores, complete with statistics showing where they stand in relation to other students; (iii) posting of instantly-accessible, paperless exam keys, handouts, lecture notes, and help notes.

A major improvement in student learning has been gained by implementing web-based electronic homework. Having students work problems with instantaneous feedback affords a more student-centered, active learning environment. With online graded homework there is no more keeping up with masses of paper, grading only a fraction of the students' work, recording scores, and returning papers – *eventually!* And it makes my students work problems! They work until they get it RIGHT, rather than a one-shot all-or-nothing attempt.

My mode of classroom lecturing has also changed by using a TabletPC attached to a projector. A PowerPoint *shell* of my notes created in advance serves as a skeleton of the notes needing to be filled in during class. Students download these shells off the Web prior to class or purchase them at the bookstore. Using the TabletPC as a whiteboard, I hand-annotate the PowerPoint slides. Students get to observe the

process of problem solving, which is not easily reflected by canned PowerPoint. Annotations are saved and web-posted as necessary. Pop quizzes are spontaneously composed on the Tablet leaving a record of the question and its solution to post on WebCT later. In large classes I combine all of these things with the use of audience-response (clicker) technology to give pop quizzes and surveys to encourage classroom participation.

It is of particular advantage to use the TabletPC during help sessions. As students ask me to work specific homework problems or practice quiz items, I call up and project the question immediately rather than wasting precious time writing it down on the blackboard. I solve the problem on the Tablet PC, and for those unable to attend the help session, I publish the solution on the web. The Tablet obviates the time-consuming input of equations, chemical formulas, and other notation.

Finally, not everything that actively engages the students is done through technology. In both general and physical chemistry lecture classes, large and small, I use group-participatory simulation exercises to demonstrate the law of mass action, reversibility of chemical reactions, and first order rate processes. In these simulations the students *become* the molecules and execute dynamical behavior based on coin-flips.

In conclusion, the judicious use of technology has markedly affected the way I teach my chemistry classes, and it has positively affected the way students learn. Without changing my grading standards from previous years, I find myself giving many more A's and B's. My student evaluations are *strikingly improved* in nearly every class. I cannot imagine going back to teaching this course the old-fashioned way.



Focal Points is published once or more per year by the College of Arts and Sciences at Tennessee Technological University, a Constituent University of the Tennessee Board of Regents. The newsletter is designed to foster community within the college and to inform friends and alumni.
TTU: /An EEO/AA/Title IX/Section 504/ADA university 294-527-05

Editor, Jack Armistead, Dean
Editorial Assistant, Glenda Pharris

College Staff
Paul Semmes, Associate Dean
Colleen G. Harris, Executive Aide to the Dean
Susan Maddux, Coordinator of General Education Events

College of Arts and Sciences
Tennessee Technological University
Box 5065
Cookeville, TN 38505-0001
(931) 372-3119
Fax: (931) 372-6142
e-mail:
FocalPoints@tntech.edu

