



Focal Points

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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 Professor Thomas A. Furtsch, Department of Chemistry. In the following essay, Professor Furtsch describes the pedagogy upon which his award was based.

ON-LINE

MANAGEMENT AND INSTRUCTION OF MULTIPLE SECTIONS OF GENERAL CHEMISTRY LABORATORY

During the thirty-odd years that I have been a member of the faculty, the Chemistry Department at TTU has had a constant goal to provide uniform and high-quality instruction throughout the multiple sections of our general chemistry laboratory. The Department has during this period taught 8-12 weekly sections in the upper-track general chemistry course and an additional 6-8 sections in the lower-track, non-science majors course. The general problems of making management, administration, and instruction of consistently high quality have been paramount—especially so because of shrinking teaching manpower in recent years.

The Department has tried many systems to manage lab instruction. Much of this effort to improve lab instruction began in 1969-70 when the Department obtained a grant from NSF under the College Science Improvement Program (COSIP). A result of this grant was the production of a series of "in house" produced television lectures over the laboratory exercises then in use. The COSIP grant made possible the establishment of a TV production studio and release time for faculty to produce the 30 or so tapes which served as our lab lectures for many years. Black and white TV fell out of favor with the students in the early 80's and use of the tapes and TV production was abandoned some 20 years ago. However growth of our graduate and research programs necessitated the use of fewer tenured faculty in lab, turning much of the lab teaching over to graduate students and senior undergraduates. This has resulted in new problems in teaching and evaluation consistency.

Three years ago the Department, through efforts of Scott Northrup and Ed Lisic, overhauled many of the laboratory experiments to incorpo-



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rate into the lab work the use of calculator-based lab (CBL's) experiments for data collection and the use of microcomputers in our new microcomputer lab for experimental data treatment.

Current Developments In TTU Chemistry Lab Instruction

Over the course of the past 18 months we in the Department of Chemistry have begun a project to develop a new system of laboratory instructional management which utilizes "on-line" instruction to uniformly prepare students for success in general chemistry laboratory. The system takes advantage of the Univer-



Tom Furtsch

sity-purchased course management software, WebCT. Our ultimate objective is to completely replace "live" laboratory lectures and at the same time provide the student with thorough laboratory preparation "on-line" so that he or she may go straight to lab each week completely prepared to carry out the experiment for the day.

Our vision for the future is that students will be provided with the following, available through WebCT and /or a Department-produced CD provided with their lab manual.

1. Lab Manual with complete discussion of each experiment.
2. A visual lab lecture over the salient parts of the experimental setup delivered by a faculty member or well-trained student, either by streaming video or on the CD (or both).
3. A set of on-line lecture notes using PowerPoint or some other suitable presentation software.
4. A pre-test over the material in 1,2, and 3 for the week's experiment, automatically graded and recorded on WebCT, including "calculate," individualized problem generation available on WebCT.
5. On-line periodic testing over the lab material on WebCT.
6. Complete storage and averaging of the students' grades on WebCT. The advantage of this is that students will be able to see their grades at any time during specified grade posting periods. This will be managed by a faculty member to insure uniformity among the lab sections.

At the present time we have instituted items 1,3,4, and 6. We began this in the Fall Semester of 2001 with all 9 of the lab sections of Chemistry

1110, and we have extended this to the 8 sections of Chemistry 1120 Lab and 3 sections of Chemistry 1110 lab in Spring of 2002. The students still meet for an hour or so before each lab for a "catch-up" lecture and must do so until we can add streaming video lectures.

The effort up front has been quite labor intensive. Pre-tests and lecture notes had to be written prior to semester start. These were initially built into a "master" web site tested thoroughly and then uploaded to the individual section web sites for each lab section just prior to entering the student lists into each section at the beginning of the semester. At present, the uploading of the web sites must be done manually each semester. All of this results in considerable time-consuming work before the semester begins. However, barring mistakes in the pre-tests, etc., after the semester begins the lab administrator can watch it all happen, more or less automatically, as the semester progresses. The effectiveness has been greatly enhanced by the availability of a microcomputer lab in Foster Hall and the prior purchase of much-needed new calculator-based experiment modules.

The results of this two-semester venture have been quite encouraging. The students seem to like the use of WebCT very much. We administered a student survey of the lab at the end of Fall Semester. The survey was given on WebCT, which has a survey module available. We had in excess of 90% of the students enrolled complete the survey. About 75 % of the respondents agreed that they felt prepared during the laboratory sessions. About the same number felt that

the pre-lab tests were beneficial in their preparation for lab and that these represented a fair part of the overall lab grade.

Future Plans

In the near future we plan to implement item 2 above and ultimately use this total method to "prep" the students for lab each week without requiring the students to gather at a corporate lab lecture. This will depend greatly on our ability to provide streaming video and/or other means of presenting to the students the important demonstration and safety content of the lab each week.

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