STATEMENT OF TEACHING PHILOSOPHY

CHARLES J. WURREY

“Tell me, and I’ll forget.
Show me, and I’ll remember.
Involve me, and I’ll understand.”
-Chinese proverb-

Introduction:

Please do NOT call me a “content provider.” A text, videotape or an Internet web site can provide content, but they may not always teach. A true teacher is much, much more than simply a content provider. While texts or videotapes or web sites may enlighten, educate, and possibly even inspire, they often do not do what true teachers do in addition to those functions, namely motivate, counsel and mentor.

Actually, the best descriptor for what it is that I attempt to do in my classroom is indeed “mentor,” a wonderful term whose origin derives from Greek mythology. Mentor was a loyal friend and advisor of Odysseus, and a teacher of his son, Telemachus. The word “mentor” today is construed as a “wise and faithful counselor,” appellations that I sincerely would hope apply to myself.

In the following narrative, I will attempt to describe my philosophical approach to teaching, but I will also need to illustrate this philosophy with examples of the teaching strategies and methods that I use. Those will be followed by discussions of how my teaching is related to my research and service activities, and then some concluding remarks.

The philosophy behind my teaching:

The major components of my teaching—or mentoring—philosophy include: (a) establishing a positive rapport with the students; (b) caring about the students as individuals, caring about my teaching of them, and caring about the material that I teach; and (c) motivating the students to give their best efforts. Clearly my teaching “philosophy” is inextricably intertwined with my teaching “methodology,” and as such must be described more in terms of what I do instead of what I contemplate. Thus, much of the following discussion will of necessity focus more on the methods and mechanics of my teaching than on its philosophical underpinnings. In addition, it should be noted that much of what follows is a result of my own experience (based on trial and error and intuition), and is not intended to be extrapolated to other teachers—who will and should develop their own approaches to good teaching.

Establishing a good rapport with the students must be based on genuine enthusiasm for the course material and for the teaching of that material to the students. Like good medical care, teaching is a deeply interpersonal interaction; computers and other instructional technology may enhance it, but they will never supplant it. The basic human connection between mentor and student is an integral part of teaching. And while students may acquire facts and information from technological sources, they acquire authentic knowledge and, ultimately, wisdom from other people, i.e., teachers, who provide a social, cultural and ethical context for those facts and that information.
It is also essential that the teacher care about the students as individuals, and this caring must be sincere. Students can spot phoniness in a moment. Furthermore, a teacher must care about how well he or she is carrying out the responsibilities of being the teacher in the learning process. The teacher should not only set high standards and expectations for the students, but must also apply those same high standards to himself or herself. Then the teacher must care deeply about the material that he or she is teaching. If the students are not convinced of the importance of the material and its real-world applicability, they are less likely to be interested in making the commitment necessary to learning that material in sufficient depth and breadth. It is incumbent upon the teacher to provide this orientation to and excitement for the material to be studied.

Finally, having established rapport with the students and demonstrated caring in the aforementioned manifestations, only then can the teacher embark upon a semester-long (or longer) voyage of motivating the students to persevere and to struggle with the material until it is learned. The teacher should also make the students aware that the completion of the course is not the “baggage claim area,” but, instead, another “departure lounge.” The teacher must inspire the students to enjoy learning and to seek knowledge throughout their entire lives.

The nuts and bolts of my teaching:

In order to fully describe how I attempt to achieve the forgoing goals in my teaching, I must identify the “mechanics” of how I teach. And this includes classes at all levels, from freshman courses in science and general chemistry through mid-level courses for chemistry majors to high-level graduate courses in specialized areas such as quantum chemistry and molecular spectroscopy.

In all of my courses, I try to include or emphasize the following: (a) making the instruction as personal as possible; (b) keeping students informed at all times of expectations, assignments, exams and deadlines, and keeping them on task; (c) explaining oftentimes difficult chemical concepts as clearly as possible, underscoring these concepts with real-world examples; (d) having the students demonstrate their understanding of the material and their problem-solving skills; and (e) accentuating authentic learning as opposed to rote memorization. These objectives are accomplished in the following fashions.

With the course syllabus I typically include a “Student Information Questionnaire,” which asks the students to tell me more about themselves, and to provide me with information on their backgrounds in science and mathematics. I request that the students then complete “Assignment Zero,” which is to bring the completed questionnaire to my office within the first week of class so we can discuss it, and I can learn more about the student as an individual. (This also forces them to find out where my office is located for those occasions when they need help.) Even in large classes, I make every effort possible to learn the students’ names, so they are not just numbers on a class roster or faces in a sea of other students.

As can also be seen in the attached course materials, I try to provide the students with as much detailed information as I possibly can through the course syllabus, lists of review topics and sample exams. These documents also serve to keep the students aware of upcoming assessments, and, hopefully, keep them on top of the material to be learned. In addition, I frequently undertake “review sessions” on prerequisite materials (such as general chemistry topics for my Environmental Chemistry class, or mathematics skills for my Physical Chemistry course) so that the students are aware of subject matter that needs to be recalled or re-learned in order to best comprehend the information at hand.
Chemistry (or science, for that matter) can be an intimidating subject if taught in the abstract. Fortunately, to my way of thinking, chemistry readily lends itself to real-world, concrete examples that the students can integrate with their personal experience in most cases. For example, I often challenge the students to identify any material item in the classroom or elsewhere that is not chemical in nature or origin. Since they cannot, this usually drives home my point about the essential and central nature of chemistry. Further, this also enables me to incorporate topics from such diverse areas as weather, cooking or the environment—topics in which the students have experience and interest—in my explanations and descriptions of chemical phenomena.

In order for students to demonstrate and acquire problem-solving skills, which I believe to be indispensable to understanding science at its most fundamental level, I am a strong proponent of regular homework assignments and problems to be worked out in detail on exams. Additionally, in order to have students communicate what they have learned about science or chemistry, I try to incorporate writing assignments into nearly every class. There is no better way to understand a topic than to attempt to explain it to others. For example, I require students in my Physical Science 110 course ("The Foundations of Physical Science") to write three one- to two-page reviews of science related articles that they find in the popular press. In my Environmental Chemistry course, the students must write a term paper of significant length on a topic related to their interests in the environment that has a substantial chemical component. Finally, in my graduate course in Molecular Spectroscopy, students are required to write a critical analysis of a recent journal article, based upon what they have learned in class.

Finally, in order to keep students from trying to memorize material instead of learning it, I allow them to bring an "information page" (which the students call a "cheat sheet") to the exams. On this page (both sides of a regular 8.5 x 11-inch page) the students may write or word-process any information such as equations, formulas, reactions, etc., that they wish to bring to the exam. I collect these pages with the exams, but it is my hope that they serve a more important purpose—namely a pedagogical one. By the very act of constructing this cheat sheet, the students may reinforce their knowledge of the material, and it can also serve a psychological function in helping to alleviate test anxiety. One additional technique that I employ as frequently as I can is to offer "re-tests" on the same exam material. These re-tests are qualitatively more difficult than the original exam, because the students will have had additional time to learn the material, and because they will have had an opportunity to learn from their errors on the original exam. However, I offer these re-tests because I feel that it is less important when the students learn the material but that they, in fact, do learn it.

The relationship of my research to my teaching:

It is perhaps fortunate that my areas of research—environmental chemistry and molecular structure determinations from spectroscopic analyses—lend themselves particularly well to informing my teaching. For instance, I can use examples such as the chlorinated dioxins that I have researched in the lab to emphasize how precisely and specifically biological activity such as environmental toxicity is an exquisite function of the molecule’s structure. This concept can be readily expanded, since all physical, chemical and biological properties of a substance are ultimately related to the structure of its molecules. Thus I can talk about such ideas from freshman chemistry as “like dissolves like” on the basis of understanding how a molecule’s polarity (and, hence, its solubility) is determined by how its atoms are arranged in space. In the junior-level Physical Chemistry course I teach, this idea is enlarged to discuss all forms of intermolecular forces and the relationship between molecular structure and bulk material properties such as boiling point temperatures or heats of vaporization. Lastly, in my graduate-
level Molecular Spectroscopy course, the intimate relationship between a molecule’s structure—or symmetry—and its rotational and vibrational spectra is explored in great detail. More important is the converse, namely how the spectra can be interpreted to yield structural information. Many such examples are incorporated throughout the warp and woof of my teaching at all levels.

The relationship of my service to my teaching:

Much of the work I undertake in the “service” arena is directly teaching-related. For example, I served for many years in the 1980s and early 1990s as the Chair of the Education Committee of the local section of my major professional organization—the Kansas City section of the American Chemical Society. In that role, I worked closely with the Chemical Educators Association of Greater Kansas City—an organization of those who teach chemistry in high schools, community colleges and four-year institutions.

Other teaching-related service work that I have performed includes my roles with (a) the Heartland’s Alliance for Minority Participation [HAMP], (b) the High School Science, Mathematics and Technology Institute [HSSMTI], and (c) the High School College Program [HSCP]. HAMP involves ten institutions of higher education in the state of Missouri whose overarching goal is to increase the numbers of minority students who obtain degrees in science, mathematics, engineering and technology (SMET) disciplines in order to diversify the workforce of the future. I have been actively involved with HAMP for five years, and have worked with and taught students from seventh through ninth grades, high school juniors and seniors, and both undergraduates and graduate students at UMKC as HAMP Scholars.

HSSMTI is a three-year academic enrichment program for bright and talented high school sophomores, juniors and seniors, which incorporates community service, research and job shadowing experiences for the students. I have taught the students in HSSMTI every summer and academic year since 1996.

The High School College Program is a dual credit program that enables qualified high school students to earn both high school and college credit for advanced courses taken in their high schools and taught by approved master teachers. UMKC’s Chemistry Department was the first department at UMKC to be involved with HSCP, and I have played various roles continuously in the HSCP program since its inception in 1980.

In all of the preceding service activities, what I have learned in “giving back” to the community has helped to improve my classroom teaching, and, in turn, my improved teaching has enabled me to do more—and do it better—in the local and professional communities.

Conclusions:

In summary, I would like to emphasize the truly dichotomous nature of what I view as “good teaching.” In my opinion, a good teacher is one who is: (a) supremely organized yet flexible enough to recognize and take advantage of “teachable moments” in the classroom; (b) firm with yet approachable by and accessible to the students, and (c) exceedingly knowledgeable yet constantly learning and seeking new knowledge and techniques to bring into the classroom. Above all, a good teacher must maintain a strong sense of humor, being able to laugh with the students (but never at them), and being able to laugh at himself or herself on those numerous occasions when that is called for.