

Reflections

REFLECTIONS

from the Classroom

*A collection of essays on teaching written by notable teachers
at the University of Kansas*

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Reflections from the Classroom

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Foreword

The academic year of 2001-02 was a year of transition for the KU Center for Teaching Excellence, with the return of founding director Fred Rodriguez to the School of Education as its associate dean and my own appointment as interim director. Much of this year was spent examining the mission of the CTE and considering how this mission might be best accomplished. Accordingly, this issue of *Reflections from the Classroom* begins with a look back at the first five years of the CTE and our views of what worked, what didn't work so well, and what challenges might await us in the future. As *Reflections* traditionally consists of personal reminiscences and observations, along with a more scholarly "white paper," this article takes the spot of the latter and, instead, serves as a kind of collective reminiscence. I would like to personally thank Judy Eddy and Sandra Gautt for their work on this paper, and the many Ambassadors, TEAM members, and other interested parties who took the time to provide us with feedback about the CTE and to offer their suggestions for the future.

One of the first symposia of the Kemper Teaching Fellows was dedicated to how faculty might learn from their mistakes. Rick Snyder of the psychology department has distilled his excellent lecture on the topic into his contribution for this issue. Clearly, learning from one's mistakes is—or should be—a global aspiration, and it is an inspiration that even the best instructors can continue to improve. The topic of "inspiration" leads naturally into the next contribution, from Val Smith of the ecology and evolutionary biology department. Professor Smith's essay draws both upon his experiences as a student and as an instructor in his essay, "Engaging Students in the Classroom." It is great to read about Smith's time in the class of Clark Bricker, if only because Professor Bricker is usually invoked in hushed tones when talking about great teachers of great big classes.

Another tradition of *Reflections* is to draw upon the experiences of our emeritus faculty, and Rudolf E. Radocy has provided an offering of his experiences as a member of the music faculty. As Professor Radocy's reminiscences deal with matters of personality and philosophy over a long period of time, physics professor Alice Bean's essay is firmly rooted in facts and specifics pertaining to a much shorter period of time. Many of us have heard lectures or read articles about interesting teaching innovations (some of them published in *Reflections!*), only to wonder how we could actually implement them in our own teaching. Professor Bean provides a candid account of her endeavors to innovate her teaching of introductory physics and how students have responded to these efforts. And we end the issue with an intensely personal and thought-provoking essay by Don Steeples, geography, considering the tough topic of depression in students and its toll on their academic careers and subsequent lives.

I would like to thank all of the authors for taking the time to share their experiences and wisdom with us. Also, a special thanks is extended to Judy Eddy, who did all of the real work associated with compiling and editing this anthology. Finally, I hope that you, the reader, will find something in each of these articles to teach and inspire you as you teach others.

Jeffrey Aubé
Interim Director, 2001–02
Center for Teaching Excellence

Five Years Into the Future: Reflections on the Center for Teaching Excellence

By Jeffrey Aubé, Judith Eddy, and Sandra Gault

May 2002 marked the completion of the fifth academic year for the Center for Teaching Excellence (CTE) at the University of Kansas. The passing of this anniversary seemed an appropriate time to reflect upon how the Center began, what it has achieved, and what directions it may take in the future.

The Center for Teaching Excellence was established in 1997 to promote and facilitate effective teaching across the KU campus. The fundamental premise behind CTE's approach is that the institutional culture of teaching can be enhanced by communication and by making the relevant scholarship of teaching available to faculty. The Center for Teaching Excellence, as embodied both in its physical facility and in the people who work and meet there, is dedicated to supporting teaching and to increasing the visibility of the teaching mission of the University.

History, Purpose, and Programs

History. The Center grew out of a desire by faculty and administrators to provide support for effective teaching on the Lawrence campus and to increase the visibility of the University's teaching mission. Substantive campus dialogues on teaching and the quality of the undergraduate experience occurred during the 1995–96 academic year as a part of the University's strategic planning process. Maintaining the quality of instruction expected and meeting increased demands of instructional and technological change required a clear institutional commitment to providing faculty necessary supports for these efforts. As with many research universities, the teaching mission, although strong, had become almost invisible. The Center for Teaching Excellence was established in 1997 to support the institution's long tradition of teaching excellence at the undergraduate and graduate levels, thus increasing campus visibility of teaching.

Since its inception, CTE has developed goals for supporting and recognizing faculty in their role as teachers and scholars within the context of a major research university. In so doing, the Center has become

the focal point for campus dialogue regarding effective teaching and student learning and a resource for faculty development and innovation in teaching.

The founding director of the Center for Teaching Excellence was Fred Rodriguez, associate professor of teaching and leadership. Professor Rodriguez led the establishment of most of the programs and organizational features of CTE as it currently operates. An award-winning teacher, he brought to the position an understanding of instructional pedagogy and administrative experience. In the summer of 2001, Professor Rodriguez moved from CTE to assume the position of associate dean in the School of Education.

During the 2001–02 academic year Jeff Aubé, professor of medicinal chemistry, served as the interim director for the Center. He was joined by CTE's Distinguished Teaching Fellow for 2001–02, Tony Rosenthal, associate professor of history and sociology. The Center is well positioned for the future with the appointment of Dan Bernstein, professor of psychology from the University of Nebraska at Lincoln, as the new CTE director. Professor Bernstein brings to CTE a record of recognized excellence in teaching and an impressive record of scholarship, including nationally recognized work on the scholarship of teaching.

Purpose. The Center's purpose is to provide development opportunities in teaching that enhance student learning and to facilitate campus discussion of teaching and teaching issues. Specifically, CTE aims to:

- Provide opportunities for faculty to discuss student learning and ways to enhance it in their classrooms.
- Support faculty as they implement their ideas for improving student learning.
- Bring research about teaching to the attention of the university community.
- Encourage involvement in the scholarship of teaching and research on learning.
- Offer course development assistance at any stage: planning, teaching, evaluating.
- Foster instructional innovation.
- Advocate and recognize teaching excellence.

Two fundamental concepts underlie the Center's approach. The first premise of CTE is that to support and enhance instruction effectively, teaching must become community property. This means, in effect, that teaching must move from the solitary experience of teacher-student interaction in a specific instructional setting to include ongoing, collegial exchange and dialogue regarding teaching and student learning. The second premise is that teaching is ongoing scholarly, intellectual work based on a body of knowledge reflecting content and process.

Programs. The Center uses two complementary approaches in implementing its programs and services. The first approach recognizes that the expertise, experience and insight of teaching faculty from all disciplines at all levels is our most precious resource and that we have much to learn from one another. Two main characteristics of this "caring and sharing" approach are advocating the multiple ways to approach teaching and utilizing the untapped resource of experience. The best way to mine these resources is through continuing exchange and dialogue. This is accomplished by individual consultations/mentoring and by bringing faculty together in various settings ranging from small-group discussions to formal presentations by faculty and other speakers. These interpersonal interactions are further enhanced through collaboration between faculty and Center staff in the development of scholarly and reflective publications.

If teaching is viewed as a process of ongoing inquiry and reflection, even the most experienced teachers benefit from the corpus of scholarship that has been collected over the past decades. Accordingly, CTE seeks to provide access to this scholarship in the most accessible way possible. To this end, CTE maintains a small library focused on practical literature from the field, it publicizes the availability of new books on teaching in higher education, it maintains a web site with extensive information about teaching and other teaching centers, and it sponsors workshops and other presentations by expert faculty from around the country. The quarterly newsletter, *Teaching Matters*, disseminates research-to-practice content to faculty and instructional staff.

If the scholarship of teaching is to become a part of the institutional culture, opportunities must be provided for faculty to engage directly in such scholarly endeavors. Within research universities, it is particularly important to reinforce the interconnections between

teaching and research and recognition of teaching as scholarly work. Faculty must not only be the recipients of scholarly research on teaching, but must engage in similar thinking about teaching as about research within their disciplines. To engage faculty in teaching as a scholarly, intellectual process, CTE produces two publications: this one, *Reflections from the Classroom*, and *The Scholarship of Teaching* (reports of KU classroom research).

One of the most serious challenges for any campus faculty development initiative designed to impact an institution's culture and its faculty, from all disciplines at all levels, is how to build a sense of ownership/participation where faculty live. Change must occur in the context of daily faculty lives—within the department. A secondary challenge is how to maintain an effective communication link that not only disseminates the Center's information but which can provide direct input into the Center's programs and planning. Both are challenging due to the heavy workload and many people who compete for the faculty member's time and attention. The CTE Ambassador program has been a highly successful model for connecting the Center to faculty and addressing these challenges.

Each year, every department on the Lawrence campus is asked to assign a faculty member to serve as a liaison between the Center and the departmental faculty. Ambassadors are informed of the Center's activities through e-mail and campus mailings, and in turn they agree to spread this information throughout their unit. Ambassadors meet with the CTE director twice a semester. These meetings include informational items related to the activities of the Center, as well as lively discussions related to teaching and learning issues of interest to all the participants. Most important, the grass-roots nature of this approach reinforces the concept that teaching is community property.

The CTE advisory committee comprises faculty representative of the major discipline areas (humanities, social sciences, natural sciences, and the professional schools) and currently numbers eight members, who each serve a four-year term. Committee members are selected based on their campus perspective, commitment to quality instruction, and recognition as effective teachers/scholars. Teaching Excellence Advisory Members (TEAM) meet monthly and advise the CTE leadership on practically every matter related to the function of the Center. In addition, TEAM or a subset of it is charged with selecting Faculty Fellows and

other positions associated with the Center, as well as other activities that recognize teaching.

Introspection

In the five years since it has been established, CTE has become a visible campus entity associated with teaching excellence. The Center is the focal point for increased campus dialogue regarding teaching, and for support and encouragement of excellence in teaching. It has developed a strong positive reputation among comparable centers, particularly in this region.

Critical questions for the Center at this stage are these: Do faculty perceive the Center as a focal point for dialogue regarding teaching issues and individual assistance? Has CTE struck a balance of activities consistent with faculty needs and interests and campus priorities? Has the teaching mission and teaching itself become more visible on campus? Has change occurred that recognizes teaching excellence and moves teaching to becoming community property?

CTE's success in meeting its mission is evident in the role it plays in the daily life of the University. In 2001, attendance at Center activities totaled more than 1800 faculty, instructional staff, and GTAs. CTE's quarterly newsletter, *Teaching Matters*, reaches nearly 2200 faculty and instructional staff. However, in-depth individual consultations are relatively small in number. Faculty ownership in the Center's mission and activities is most strongly vested in Ambassadors. Nevertheless, faculty from various disciplines are actively involved as presenters in workshops as well as the events associated with the KU Summits. Faculty across campus were surveyed during 1998 and 2000 to assess the visibility and effectiveness of CTE and its programs. The surveys indicated a high level of satisfaction with the Center's overall programming and provided constructive feedback for change. Based on this information, shifts in the types of activities offered have allowed the Center to focus on more popular formats, such as Lunch and Conversation and focused workshops.

The Center needs to become a place for informal dialogue on teaching. Strategies to encourage a sense of place have been moderately successful. Increased use of technology and off-campus technology capabilities as well as multiple demands on faculty time have changed the way faculty go about their work. These changes may well be contributing factors to the limited success of these strategies. This perception is reinforced by feedback from structured experiences such as the

Summits and Best Practice Institutes, indicating that a major outcome is the opportunity to meet with colleagues to talk about teaching and teaching issues.

The campus culture is beginning to change, as well. Teaching is a more visible part of the academic community and beginning investments in making teaching community property are apparent. The change can be attributed to several factors, including the increasing use of technology in instruction and related initiatives and the advent of a major teaching award program, the Kemper Teaching Fellowships. However, the most marked influence on the culture of the University has been the Center and its activities. The teaching mission is clearly moving from an isolated practice in the privacy of individual classrooms to open collegial dialogue of effective teaching and instructional issues.

A significant characteristic of the annual CTE Teacher Appreciation Banquet is the students' insight into the work faculty do as teachers. New faculty continue to meet to discuss instructional issues after the summer Best Practices Institute. The initiation of the Department Teaching Award generated substantial interest and documentation of department teaching initiatives. The KU Summits have routinely attracted over 300 participants for a half-day devoted solely to teaching issues. Comments from faculty indicated that participation in the Summits not only indicates that the campus cares about teaching but also reinforces their identity as teachers. While the information is observational, it is also persuasive. These efforts lay a strong foundation for continued growth in the tasks of impacting the culture of the institution and achieving a synergy between the research and teaching missions. Opportunities remain for creating a broader dialogue concerning the scholarship of teaching and recognition of the role of teaching at KU.

A strength of KU as a research institution is the dedication of its faculty to teaching excellence. The foundation laid since the Center was established five years ago positions it well to continue to fulfill its mission and to play a major role in the campus' goal of continued enhancement of the quality of instruction. Some of the challenges that will face CTE in the future include the need to expand the impact and reach of the Center through innovative programs, encourage initiatives on the scholarship of teaching, and promote participation in national initiatives. These are exciting times for the Center as it looks toward its future.

What I Have Learned From My Mistakes as a College Teacher

By C. R. Snyder

I have made my share of mistakes as a college teacher. So, too, have I learned from these mistakes. As I embark on my fourth decade of teaching, I would like to describe some of these mistake-generated lessons. In chronological order, I will describe issues related to getting ready for a course, things that happen during the class period, examinations, and grading.

Before the course: Getting ready

But They HAVE to Read That, or How to Overwhelm Students. Fresh out of graduate school, I thought that undergraduate students had to digest enormous amounts of reading materials. I still remember the early course evaluation feedback—the students opined that there was more reading required in my course than in any other course they had taken. As I throttled back on the sheer amount of reading and concentrated on the crucial sources, I realized that to some degree the huge reading assignments reflected my own insecurity. Concerned about my ability to cover the material adequately via lecture, I overcompensated by making sure that the students would get more than the necessary information in their readings.

The Evolution of a Syllabus, or When the Teacher Is Also a Lawyer. The syllabus is a working educational contract between the instructor and students. In previous decades, syllabi were meager documents, perhaps one page of itinerary about the readings for a 16-week semester. I quickly learned, however, that my undergraduate students rightfully wanted to know what the grading policies were. As a new instructor, I was not very concerned with grades—after all, I already had made my grades and gotten my degrees. Students, on the other hand, were very focused on issues surrounding grades and how they would be determined.

Over the years, I have come to appreciate the importance of syllabi for detailing grading policies, and whenever I make up a new syllabus, I remember how important grades are to students. Furthermore, I now have a lawyer mentality in that I try to craft clearly the requirements of the course and the repercussions for

various student behaviors. Although some colleagues have suggested that our litigious times beget more “lawyer-like” student behaviors regarding grades, I see it as a student’s right to understand these policies.

Things that can happen during the lecture

“I Know This Topic So Well That I Can Just Wing It.” When I first started teaching, I can recall thinking that I knew the material so well that there was no need for preparation. This arrogant attitude, of course, was far from accurate. I still recall that “deer with headlights in its eyes” reaction I had as I looked out over the large hall without a lecture in hand (or mind). To this day, I am ashamed of having wasted the time of students who had paid good money to hear more than off the cuff ramblings of a new Ph.D.

Related to this “I Can Just Wing It” is “Thinking I Can Explain Something I Don’t Understand Myself (Especially New Material I Read Just 30 Minutes Before the Lecture).” My stance now is that I do not try to teach something unless I thoroughly understand it. In the same general category is “Trying to Answer a Student’s Question for Which I Haven’t a Clue.” My antidote to this latter problem is captured in the simple response, “I don’t know, but I will try to find out.”

The Perils of Being Over-Prepared. Having learned the disaster that ensues from not being prepared, I vowed to change my ways so as to become extremely prepared. Unfortunately, my lectures became elaborate reiterations of readings. Instead of a loose or nonexistent outline that went with the previous no-preparation approach, I adopted an in-depth, lock-step overview of the readings. This resulted in a new set of problems.

I Can’t Take Questions From Students Because I Need to Get Through the Material. Looking back, I see how ludicrous this response was to my students wanting to ask questions, but then it seemed the only way to get through all the points I wanted to make.

“Oh My God, I Have Only Five Minutes Left to Cover and Pages of Lecture to Go” or “How Fast Can I Possibly Talk?” Struck with the insight that there was little time

left, I saw my only option as being to speed up. The students were taking notes furiously, and it took me a searing set of student evaluations about “SLOWING DOWN!” before I was able to go more slowly.

“There’s No Need to Check My Lecture Folder Before I Walk to the Auditorium,” or *“Where Is That Lecture?”* Sometimes in my zeal to include the various materials that I planned to use to augment a lecture, I have forgotten the most crucial thing—the lecture itself. Accordingly, I now have a final check ritual where, before closing my office door to walk to the lecture hall, I make sure that I have the lecture. In making this final check, I find it also is crucial to verify that I have the correct lecture. In the disconcerting event of “That’s not the lecture for today!,” I have brought the wrong lecture to the classroom. Again, my final check works to prevent this eventuality.

Because I am coming clean about my teaching mistakes, I should mention that I also have lost my lecture after giving it. Because I get so caught up in the flow of the class period, I sometimes neglected to return my lecture materials to my office file. Or, if I did manage to get the lecture materials back to my department, I would misplace them somewhere in the building. To counter this problem, just as I have a final check before leaving for a class, I now have a check after class to make sure I have returned the lecture materials to the same location in a special teaching file in my office.

Things I Have Learned in Dealing With Classroom Equipment: Having Nothing to Say if Audio-Visual Doesn’t Show, or the Wrong Film Is Delivered. Usually, this situation occurs because of a scheduling mix-up. In my early days of teaching, I never gave much thought to checking the audio-visu-als. Now, I am somewhere between obsessive and compulsive in such matters. At the beginning of the semester, I now make sure that I am sent a copy of the audio-visual materials that I have scheduled. Also, at the beginning of the week of particular audio-visual materials, I call to verify the line-up. On the day of the lecture, I arrive early at the auditorium to check out the audio-visual materials.

In a version of this particular problem called “The Equipment Fails,” I have discovered at the start of class, or during a film, that the equipment is malfunctioning. As a backup for such instances, or to handle the problem of the wrong film being delivered, I prepare a detailed script of what the film depicts. With this script in hand, I can either lecture on the content, or I can play producer and have class members act out the

film events. Sometimes I think that this latter approach is more effective than the original film in terms of getting students involved.

Transparency or PowerPoint Dependency, or the Day the Equipment Died. When I first started teaching, all that I had as teaching aids were films and the ubiquitous chalkboard. Films I already have discussed, and blackboards need no discussion because they cannot break or malfunction. Of course, the chalk itself can be left all over the lecture hall, so I learned to put it down in the same place. (Thank you students for all the years of telling me where I have left the chalk.)

For the largest part of my teaching career, transparencies were the most effective means of displaying lecture points. I wrote key points on transparencies as I worked through a lecture. The problem with this approach was that students could not read my writing, and the writing took my time and attention away from the class itself. For most of two decades, therefore, I used typed, large-font outlines of my lectures—and I had these prepared ahead of time. Likewise, as I did with the chalk, I always put the transparency pens in the same location. I also learned to have a backup projector ready. Furthermore, there is a small but important lesson I call “Transparencies, Lecture Notes, etc., Don’t Need to be Numbered Because I Won’t Drop Them.” This problem has a simple remedy. I now number everything that I could drop. (This same principle applies for presentations at professional meetings.)

The day of computer-based lectures is upon us. By now, you probably have surmised that all my solutions to teaching problems are rather obsessive-compulsive. This diagnosis is an accurate one. For example, I test the lecture before I leave my office, I take a backup copy of the lecture on a Zip disk, and I take my own laptop with the lecture on it. Because I have run into situations in which I could not get computer-based lecture machinery to function, I also take two or three transparency overheads with major lecture points on them. Much of my zeal about such precautions stems from the fact that I teach a large undergraduate course of 300 students, and any malfunctions in the lecture result in literally hundreds of hours of wasted time.

If They Are Taking Notes, They Are Learning. Early in my teaching career, I assumed that learning in the classroom was occurring to the degree to which my students were bent over, taking copious notes. This was related to my belief that “Providing an Outline of My Lecture is Cheating.” Over time, however, I have

changed my views. I now give outlines so that students do not spend as much time in note taking and instead can process and think about the lecture information.

If You Don't Laugh at Yourself, You Have Missed the Biggest Joke of All. In the examples that I have given so far, it is obvious that there were times when various aspects of my teaching did not work. In such instances, it was clear to me that a somber demeanor wasn't helping matters. My attitude toward such instances has become "If You Don't Laugh At Yourself, You Have Missed the Biggest Joke of All." The classroom, the ongoing activities, and the instructor are all sources for potential humor. Being able to laugh at oneself takes the pressure off—it frees a teacher to take risks and to try educational approaches that may or may not work.

I have one major caveat about humor. It *never* is acceptable to aim humor at students. Doing so reflects a put-down mentality that undermines the trust that is so crucial to education in general, and a classroom in particular. There is no place in my classroom for disrespect of students. Occasionally, students will laugh at their fellow students. In my teaching a large undergraduate course in the psychology of individual differences, there have been instances in which class members will break out in laughter in response to a question posed by another student. In such circumstances, I remember, "There's No Dumb Question From the Perspective of the Student Asking It." Accordingly, I always spring to the defense of the student so as to turn the laughter onto me.

This issue of respect for students reminds me of my early teaching maxim, "No Sleeping Beauties in My Classroom." As a young teacher, I took it as a personal insult if a student nodded off in my classroom. I felt so strongly about this that I used to brag to my students about a technique I could use to prevent people from sleeping in class: If I saw someone sleeping, I would whisper that I wanted everyone who was awake to stay seated when I hollered into the microphone, "EVERYONE STAND UP!" This would result in the sleeping student being shocked from slumber and standing up—thereby experiencing profound embarrassment and not sleeping ever again in class.

Of course, this vignette is a clever one, but I never used this technique; it grossly violates my values about respecting students. Furthermore, over the years, I have heard heart-rending stories of students who may be working two extra night jobs to pay for their schooling, or of a mother who has been up for nights

with sick children. Obviously, such students are not sleeping in my class in order to show disrespect. They are sleeping because they are exhausted.

"My" Examples Are the Best Examples. Examples provide marvelous vehicles for teaching. Examples enable students to better understand a concept, and they help to bring that concept to life. As a young assistant professor, I just assumed that the examples from my own life were the best ones. After all, these examples seemed so interesting—to me. I no longer believe that the best examples come from my life. On the contrary, now I routinely ask students for examples from their lives. Their examples typically are more related to the lives of the other 20-year-olds in the class than are my 50-something tales of yesteryear. Using student examples also makes the class more student-centered, and everyone knows that she or he may have the opportunity to give an example at some point in the class.

This use of examples from students is related to another lesson—"You Are Not the Only Teacher in the Classroom." Whatever the instructor can do to enlist the participation of the students in the exposition of the material can enhance the educational experience. Of course, instructors sometimes may encounter a student who is all too willing to take up class time with his or her questions and comments. With my first "Class Hog," I made the mistake of letting the person ramble on and on. What I learned was that the other students resented that student taking up so much time, and they resented me for not intervening. Now, when I see a potential class razorback, I immediately have a private meeting with the student to talk about the issue, to search for the reason for such behavior, and to ask the student to lessen such hogging. This approach works. I also meet with the student later and praise him or her for improvements in "class hog" behaviors.

At the other end of the continuum from the class hogs are those students who are so shy that it is very difficult, especially in the context of a large class, for them to ask questions or to make points. From the beginning of my teaching, I have found that it was easy to respond to those students who would ask questions or state their views. I did not do a good job, on the other hand, of making contact with the more reticent students. To this day, I believe that I need to do more to reach these quieter students.

About 20 years ago, I came upon the idea of the "Beef Box" as a mechanism to allow more reticent students to inject their voices into the course. Here is

how the box works: On the first day of my class, I hold up a 1 x 1 x 1.5 foot rectangular cardboard box (see Figure 1) with a picture of a steer on the box top. There also is a slit in the box into which students can drop handwritten notes as they leave the auditorium at the end of each lecture (the “Beef Box” is placed on a table near the rear exit). In these notes, which may or may not be signed, students can write questions or opinions. At the beginning of the next lecture, I respond to the notes. This has proven to be successful in allowing shy students to break the sound barrier so as to have their ideas heard. (On one occasion, the “Beef Box” was taken hostage around Halloween.) I also use e-mail as a similar vehicle for teacher and student interchange.



Figure 1: The Beef Box

Through inputs to the “Beef Box,” along with e-mail feedback and direct one-on-one interactions with students, it sometimes becomes clear to me that something I have said or done has hurt the feelings of a student. Although I do not think that I should refrain from using evocative, controversial teaching materials that make students grapple with difficult issues, I do not have the right to embarrass or cause pain to my students. When such an instance is brought to my attention, I publicly apologize in front of the entire class. I owe this to my students.

No One Is Complaining to Me About My Course, So Everything Must be Going Well—I’ll Wait and Get Feedback at the End of the Course. As a new instructor, I assumed that if students were not openly disgruntled,

then course matters were in pretty good shape. This simply is not the case in my experience. Sometimes quiet may convey satisfaction, whereas in other instances it masks student discontent. My solution is to take a mid-course evaluation of students’ perceptions so as to remove any ambiguity. This approach can allow for mid-course changes to address any concerns.

Examinations and Grading

We Have Figured Out Your Examinations. Because of the large size of my undergraduate courses, I have given multiple-choice tests. In one instance, my students told me that they did not need to know the correct option in order to do well on my exams! They informed me that the option that was the longest probably was the correct one. The reasoning here was that in order to describe correctly an option, I had written it longer so as to include all the facts. Alas. I think that students may have been correct in their assessment, and I now avoid this habit.

Special Accommodations Are Needed for Students With Learning Disabilities. In my early teaching years, I unfortunately was leery about the veracity of this need. In part this was due to my own ignorance, as well as the lack of research in this area. In an ironic personal twist, I later spent a good deal of time trying to argue with grade school, junior high, and high school teachers that accommodations need to be made for some students because of their learning disabilities. Two of those students were my sons! I now am very careful to respond to the special needs of such students, whether it is in taking notes or examinations or any other matters that involve leveling the educational playing field for them.

There Is No Defense Against a Bomb Scare on Test Day. Never in my preparation to become a college teacher did I dream that I would have to deal with bomb scares on test days. When this became a problem at KU, my first reaction was to call off the exam. With further thought, it occurred to me that an alternate location could be found if such a threat were to transpire—the class and I would have a mass migration to a preset safe location. As more instructors adopted similar preparations, the incidence of bomb scares abated.

My Answers Are the Only Correct Ones. In my earliest examinations, I was confident that I could construct questions for which there was only one correct answer. Such overconfidence was quickly dashed, however, as I examined the psychometric analyses of my

examinations. What to do? I discussed the situation with my late colleague B. Kent Houston, and he noted that he had been using a rebuttal system to deal with this issue. Accordingly, I have adopted this approach. It involves giving students one week to write a written rebuttal to any question. There is no verbal arguing of the rebuttals because students tend not to be very lucid in their logic—perhaps stemming from the anxiety in making such presentations. These rebuttals then are graded. Over the years, I have found that they are seen as being fair; moreover, students often do demonstrate that their answers should be given credit.

Singling Out a Stellar Student. Coming out of graduate school, I assumed that publicly praising a student for an excellent performance on an exam would be a good thing. It turns out that instructors must obtain students' permission to do this (because of the Buckley Amendment). Moreover, I found that many students did not want to be praised amid their peers, and their peers were uncomfortable with this process. In this instance, my natural instincts were wrong.

"They Broke Into My Office to Steal the Exam, and I'll Show Them!" Years ago, as I came to my office one morning, I noticed that there were footprints going up the outside wall in the hallway adjoining my office. Someone had climbed the wall and pushed aside the ceiling tiles to get into my office—presumably to find the examination that was to be given in my class later that day. In the six hours until I was to give the exam, I produced 100 new questions. I was angry, and I wrote very difficult questions. Unfortunately, although the exam was fair technically, I think that it caused many innocent students to feel that they had not done well and that they were being punished for something that they did not do. I later apologized to students.

Inflexibility can compound your problems

Perhaps the major teaching lesson I have learned over the years is that being inflexible can be disastrous to students and a course more generally. Part of such inflexibility, in my case, stemmed from my belief that the instructor is the "captain of the ship." Whenever I begin to sense a reemergence of such grandiose "captain" inflexibility, I remind myself of this vignette: Radio dispatch from source 1: "Change your course to avert hitting us."

Radio dispatch from source 2: "Will not comply."

Source 1: "This is U.S. Vessel Navy 47. I say change your course immediately to avert hitting us."

Source 2: "Will not comply."

Source 1: "This is U.S. Navy Vessel 47, the largest, most powerful aircraft carrier in the world. I command you to change your course immediately. You must avoid the terrible damages that you would incur if you should hit us!!!!"

Source 2: "Will not comply. This is Rocky Cliff Point Light House. The decision about course change is your call."

Sometimes there is no way of anticipating what will happen in the unfolding of a course. Instead of dreading these events, I have come to see them as wonderful, fun teaching opportunities. The best example of this occurred in my individual differences class in the early 1980s, as we were discussing various dimensions on which people can be compared to each other. Then, IT happened. A naked man and woman entered from the rear doors and ran up the aisles to the front of the lecture hall. They circled the instructor and exited up the aisles to the applause of the surprised and delighted students. I too roared in laughter. As the auditorium quieted, I asked, "Now class, what individual differences did we just observe?" "SEX," shouted a student, and we were off on a lively educational interchange.

Concluding thoughts

Making mistakes as a teacher is not something to be feared or avoided. Rather, such mistakes provide opportunities for improvement. Each of us brings unique talents and strengths to the teaching process. My personal saga, as briefly outlined in this essay, tells of how I have used "mistakes" in a diagnostic sense so as to build my strengths as a teacher.

My purpose in writing this, however, is not to suggest that others necessarily will encounter the same or similar misadventures. Indeed, it would be ludicrous to propose some defined set of weaknesses that should be fixed in all college teachers. Instead, I believe that we should strive to remain open to feedback from our classroom environments and to build on our particular skills. This remains as true of me today as it did 30 years ago when I walked into my first classroom.

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Engaging Students in the Classroom

By Val Smith

When I first arrived at the University of Kansas as a freshman in Fall 1968, I took Chemistry 21 from Dr. Clark Bricker, and I was able to see firsthand a teacher who could keep the class in the palm of his hands. Dr. Bricker's teaching skills are now legendary; he was a four-time winner of the HOPE award, and he taught chemistry to many thousands of young people during his many years as a faculty member at KU. I believe that the personal touch that was so evident in his teaching is as relevant today as it was in 1968.

Since I first began teaching almost 30 years ago, I have tried to emulate Dr. Bricker's methods for engaging students in the classroom, because I feel that engagement is one of the most important keys to success in teaching. During the first few weeks of school, Dr. Bricker brought in a camera to the introductory freshman chemistry labs, photographed each and every student, and committed a large proportion of these names and faces to memory. He then amazed us by calling upon students by name to answer questions that he posed to us from the front of the old Hoch Auditorium, and also by greeting us warmly by name whenever he would meet us on campus. He also made himself extremely accessible to students, and going to his office to discuss questions about chemistry was always a tremendous pleasure (and not in the slightest bit intimidating). I don't have Dr. Bricker's prodigious memory for names and faces, which he used to help personalize the classroom for us. However, I have used with success his general technique of learning as many names and faces as possible, and then calling on these people by name in class. I introduce this method on the first day of class, especially when I already know some of the participants. I also immediately indicate to the students that this will be a highly interactive classroom experience. I tell the students that they need to come to my classroom prepared to think, because they never know when I may call upon them to answer a question that is closely related to the topic we are discussing in class.

For example, if we are talking first about agroecology in EVRN 148 (Principles of Environmental

Studies), I ask the students to raise their hands if they had been raised on a farm. From this subset of students I then begin asking questions like these: Where was your family farm? What crops did your family grow? Did you help them in the fields? Did your family use pesticides or herbicides to maximize their potential crop yields, and thus help them to guarantee a reasonable annual income each year? In this way I try to break down barriers to student-teacher communication before they can form, to demonstrate to the students that my course will be dynamic and interactive, and to empower the students to ask questions without hesitation or fear of speaking up in class. I have found the students to be somewhat reluctant during the first week, but to become much more interactive as the class proceeds. Even those who are very shy by nature will increasingly tend to come up to me after class to ask questions that they did not feel comfortable posing during class, and sometimes their questions or comments are particularly penetrating. If so, I often will begin the next class period by bring up the point that the student had raised and clarifying the issue for the whole class.

Following Dr. Bricker's example, I also do not stand still while lecturing. I typically lecture in front of, and not behind, any lectern present whenever possible in order to remove any perception that I am removed or artificially distanced from the students. In large classes, when making a point, I walk to the front center of the class, sometimes moving to only a few from the first row and other times walking partway up the center aisle, and sometimes even sitting down next to students to ask them what they think. In smaller classes such as EVRN 149 (Principles of Environmental Studies, Honors), where I am particularly certain that it will work, I will toss my chalk to a student whom I have special confidence in and will ask him or her to go to the board to illustrate the point that I have been making. Even if students initially struggle a bit, I coax and guide them until they achieve success; because I choose these students carefully, I have never had a case in which this did not succeed.

I also use personal anecdotes wherever possible to make the topic that we are discussing more real. For example, when I was growing up, my parents had in the living room a very large (about one pound) chunk of yellow-cake uranium ore that a miner had given them. In the 1950's we knew little about the environmental and biological effects of radiation, and to me this was just a pretty yellow rock. I later moved it to the rock collection in my bedroom, where it remained for many years until I left for college and my father stored it in his garage. In the early 1970s when I was home for the holidays, I broke off a small piece of the uranium ore and brought it back to Rutgers University to give it to a fellow graduate student who also collected rocks. However, on impulse she decided to check its radioactivity with her research laboratory's Geiger counter. To our great alarm and horror, the needle almost went off the scale, and we quickly moved the uranium into the lab's lead-shielded container, where we left it for disposal. My father also disposed of the original rock.

After telling the class this humorous incident (*Teacher Gets Unexpectedly Irradiated for Years!*), I then told them that much later in 1990, I had the unpleasant surprise of developing a thyroid adenoma which had to be surgically removed, and that I have always wondered if there was a connection between the two events. This very personal story was much more effective than any textbook example in getting across the potential hazards of radiation exposure.

In a later lecture on human health risks from air pollution, I also educated the EVRN 148 students on the hazards of carbon monoxide, a colorless and odorless gas that can cause asphyxiation. When asked, few of the students had a feeling for how toxic this gas could be, so I related a story from Minneapolis, Minnesota. It was a bitterly cold winter with temperatures well below zero for several weeks, and I had winter-proofed our small rental house by caulking the windows to reduce heat leakage. Unfortunately, this also had the effect of cutting down on outside air exchange. Although I did not know it, a metal sleeve in the chimney had slipped down, blocking the escape of exhaust gases from the furnace in our basement and causing a deadly buildup of carbon monoxide in our house. I woke up in the middle of the night feeling like I couldn't breathe, and realizing what was happening, I opened the window by our bed just in time to

avoid blacking out. If I had not, my wife and I would both probably have been killed in our sleep!

As a result of my frequent use of these and other examples, my students feel free to speak up in class when we are discussing other topics to provide *their own* questions, anecdotes, humor, and personal observations. I have found that these students' contributions enhance and much more effectively underscore the material that we are discussing than I could ever do by simply giving cut-and-dried lectures. For example, in a recent lecture in EVRN 615 (Environmental Impact Assessment), we were discussing ecological aspects of impact assessment. During the portion of my lecture on the utility of considering ecosystem-level nutrient budgets, one student raised his hand and asked how what we were discussing related to U.S. Senator Sam Brownback's recent push to study carbon sequestration in Kansas soils. Although completely unplanned, this question allowed me the opportunity to apply the concepts that we had been discussing to an issue of strong local relevance.

In another example, my students in EVRN 148 several years ago asked me if I could tell them more about real-life health risks of toxic substances. As it turned out, I had just been talking to an Environmental Studies major who had recently moved into an older house and whose toddler unexpectedly became exposed to lead when workers came into the house to strip off and remove old lead paints. I inquired further, and the husband of my advisee very thoughtfully volunteered to come to my class in Wescoe Hall to talk to them about the dangers of lead. He was almost in tears by the end of his talk because it took such extreme efforts to remove the lead from his child's system and return the child to health. The paint-removing workers had inadvertently created an aerosol of fine lead-containing particles in the air in the home, and their toddler became very acutely ill from breathing these particles before they realized that the problem existed; possibly because of the parents' larger body size and total blood volume, however, breathing the same particles had a much less harmful effect on them than on their child. The students in this EVRN 148 class were spellbound and strongly moved by his presentation, and I have no doubt that each of them will look at the issue of paints in older houses in a very different and much more cautious light when they purchase their own homes.

Teaching can be a very challenging endeavor, because each new class brings with it a new set of students having their own unique histories, attitudes, and approaches to learning. However, I have learned over the past three decades that actively engaging my students from Day One is perhaps the most important investment that I can make in turning each class into a successful and enjoyable experience for both the teacher and the students. In my opinion, by encouraging my students to be active participants rather than passive transcribers of knowledge, I help them to learn information more effectively, and I help to make it much more likely that they will retain this knowledge long after they have left my classroom.

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Teaching: The Agony and the Ecstasy

By Rudolf E. Radocy

I came to the University of Kansas in August 1971 to begin my career as a university professor. I was not without teaching experience: I had been a one-person music department in two Michigan districts, and I had once been a teaching assistant at the University of Michigan. In my journey from a graduate research assistant to a research staff position at the Pennsylvania State University, I had done a few guest shots in classrooms. I had extensive experience in teaching instrumental music lessons privately. But KU was the major leagues, the big time. Now I was a “real” professor, charged with creating as well as distributing knowledge and inspiring others to do the same.

As with most professors at research-oriented universities, the teaching function was not my only role, and for me it seldom was the most important role. “Publish or perish” was very real: one could be Socrates reincarnate, but if the publications were not there, there would be no tenure. (And once tenured, there would be only trivial merit salary raises. Of course, for me, as for many KU faculty, many raises were trivial regardless of merit!) I have no complaints about the emphasis on scholarly productivity, because I had reasonable success within that culture. Yet, humans interact more easily with each other than with the printed word. Some of my fondest memories are related to the classroom. So are some things that are less enjoyable to recall. I would like to share some of the high and low points from my 29 years with KU.

Teacher, teach thy self

One really good thing, for me, was the way my teaching responsibilities motivated me to learn. Although I taught numerous classes in diverse areas of music and music education, I primarily was hired to teach psychology of music and musical acoustics, areas which had a long curricular history in music education and music therapy at KU and were partly responsible for the success of our graduate programs. There was one problem initially: I knew relatively little about acoustics! I began to read voraciously once I knew that I was hired, and seldom has anyone learned so much

so fast as I did those first few semesters I taught acoustics in 312 Bailey Hall. Over the years, as course responsibilities changed and my interests evolved, I learned quite a bit about a lot of things in order to update knowledge in the interest of teaching responsibilities. Certainly, the need to explain something to others is a great motivator for seeking knowledge. A professor’s research frequently impacts what he or she does in the classroom; that was true for me. In my case, though, I may not have been able to engage in some of my writing endeavors were it not for what I learned in the interest of teaching.

The captive audience

Another really good thing was the opportunity to talk. I like to talk and explain things. The traditional college lecture format, despite all its putative negatives, was ideally suited for me. There was something very special about the feeling after a class where words just flowed and students (well, *some* students) seemed to give rapt attention. No PowerPoint presentation, no film, no panel discussion, no cooperative learning could ever produce that feeling for me. Oh, I had ample opportunities to lecture elsewhere, to fellow academicians as well as students at other universities. (Funny thing—students elsewhere seemed more impressed when I told them the same things I told my own students. A professor is not without honor, save in his native land...) But addressing and interacting with an audience was quite intrinsically rewarding.

We’re there for students—or in spite of them

Another real high point of my teaching experience was the students. There was something gratifying about seeing students paying heed, maintaining eye contact, moving their pens at strategic times. Even more gratifying were the questions that were both challenging and pertinent. The student who questioned the relevance of string harmonics to orchestra direction opened opportunities for explaining practical applications of acoustic theory. The student who questioned the mathematics of scale derivation opened

opportunities for further explaining how scales are made of relative, not absolute, frequency structures. Even students who usually were silent were rewarding when they came to class, paid attention, and looked interested in what they were doing.

In music, we have the tradition of private lessons, where close student-teacher relationships develop. I did very little studio teaching, but I had numerous thesis and dissertation advisees and developed strong interpersonal relationships with many of them. Although I never wrote a thesis or dissertation for a student, I did a lot of editing, and many documents certainly showed my influence. Then there were the students for whom I basically just had to say, "That's nice; shall we schedule your oral?" Students who needed more help with writing were more satisfying in a way because my help made a difference; yet, the brilliant students who taught me some things were exciting, too.

Many years ago, when I was considering a teaching career, my clarinet teacher told me that I would know that I succeeded as a teacher when students came to me to ask about things other than the subject matter. While such interaction was not common, there were those times when I counseled students about family issues, human relations, and sundry issues that went beyond the classroom.

Unfortunately, students also were a low point. I was not a success with all students, far from it. My undergraduate classes were not among the favorites of most students, particularly ones interested in nothing but grades and, maybe, information regarding how to get children to sing and play. Students who slouched in their chairs and maintained an expression that said, "I dare you to teach me anything" were no joy. Students who missed half their classes and were late for most others were no delight, either. Yes, you have to accept people as they are and move on. Yes, you have to inspire the unmotivated. But it's a lot easier to get excited about students who look and act interested!

Fortunately, with the perspective of some years away, one can largely forget most of the unpleasant student relations and take joy in seeing what happened to some of the students who were a source of excitement. It is gratifying to see a band march by with their instruments in position to take advantage of acoustic principles (such as keeping the trombones away from the ground and pulling sound out from drums rather than beating it in) when your former student is the band director. It is gratifying to see your former disser-

tation advisee land one of the most prestigious music education professorships in the country. It is gratifying to read your former students' publications, especially when they are written in a style that you may have helped develop. (Of course, it's a little scary when your former students have advanced so much that you have some trouble understanding what they are saying!) These students probably succeeded in spite of me—but their successes are nonetheless gratifying.

Evaluator, evaluate thyself

Evaluation always was a significant part of my teaching. I took great pride in my test development skills, and I wrote many a multiple choice exam, as well as a potpourri of other types of exams. Most students were unimpressed by high reliability coefficients, but they usually considered my exams to be fair. I often enjoyed observing students' exam behaviors—moving lips, staring into the middle distance, writing notes in margins, sudden bursts of writing, sitting and staring at a paper long after most other students had submitted their papers. Oral examinations were interesting, especially with thesis and dissertation students. One had to admire the ability of some students to talk around a question in a seemingly intelligent manner; you knew they could be good professors some day.

Evaluation also included evaluations of me. My department chair once told me that I was the most dichotomous faculty member in the department—students either liked me a lot or not at all. During my time at KU, student evaluations of faculty members' instruction went from a voluntary curiosity to a mandatory event. Much was made of the impropriety of any one form for all-university evaluations, but the School of Education eventually settled on the Curriculum and Instruction (C&I) Survey. Later, we used our own MEMT survey, and in my final years, after the department moved to the School of Fine Arts, there may have been some other form. Student comments varied. Some were just complaints about the work load or exams, but some commented regarding parts of the course that were perceived as valuable. The numerical ratings always were higher in graduate classes. Only twice did I get straight 5's for overall effectiveness, but usually the student evaluations were satisfactory. I found that I cared less and less about ratings as I taught longer. Yet, over the years, I learned some things and made some improvements in my teaching as a result of what students had to say.

Creature comforts—er, discomforts

Bailey Hall had a certain rustic charm, and I had a very nice office. Unfortunately, creature comforts sometimes were lacking. There were the summers when we had no air conditioning. Before screens were added to Bailey's windows, we had to open screenless windows and run fans. Large hornets, attracted by the ivy blossoms that once adorned Bailey's walls, would fly into the classroom, as well as an array of smaller stingers. Students would be nervously watching over their shoulders as I would try to explain various things. Pens were guided by sweaty hands. Of course, sometimes the sweat came in the late fall, as the heat came on with the thermostats (which we could not control) set to summertime "energy saving" settings. That was balanced by the delay in turning on the heat at all during the energy hysteria that gripped the campus around 1980. I gave several lectures in 303 Bailey while wearing my overcoat and gloves.

Ah, 303 Bailey, where class size forced us on numerous occasions. In that acoustic nightmare, students had difficulty hearing other students' questions. Dim lighting and a vibrating ventilation system did not add to the decor. Then there were the times when birds flew around the room.

We had several interruptions due to Bailey Hall fire alarms. Before the no-smoking policy was in effect, the dean's pipe was the alleged culprit for setting off the smoke detectors erroneously. Later, someone decided that the culprits were tiny spiders who would get into the detectors; their coloring and texture were such that the system interpreted them as smoke. Clang! Buzz! To make matters worse, the alarms were not in tune with each other; one could add to the cacophony by walking slowly through the hall and hearing the clashing alarms. Fortunately, there never was a fire.

So, what would I tell a young professor?

No one has asked me for advice based on my long professorial career, but if anyone did, I would share the following suggestions:

- Do not be a professor for the money. In particular, elementary and secondary teachers should not aspire to become education professors because they think they will earn more—they probably will not. Do become a professor for the challenge of working with people who are your intellectual peers, students and colleagues alike.

- Find your own teaching style, one that seems to work with most students. Do what comes with relative ease, not what the latest fads extol.
- Recognize that not everyone is going to respond positively to you. Some people are just harder to work with than others.
- Be open to meaningful change and opportunities for improvement, yet maintain a certain skepticism toward pronouncements from higher administration and politicians. "This too shall pass" is a useful attitude for the tough times.
- Keep your word. If you make a promise, follow through. Avoid promises that you can not keep. Sometimes a "definite maybe" is the best answer you can offer.
- Find something to enjoy in each class. Maybe it's interested students, maybe it's the subject matter, maybe it's a feeling of effectiveness—but try to enjoy something, even when the classroom is uncomfortable, the semester is too long, and the University is nagging you for more data.

Above all, look for the humor in what you do and encounter. The academic world is downright hilarious!

Rudolf E. Radocy is professor emeritus of music education and music therapy. During his 29 years of teaching at KU, he taught courses in acoustics, psychology of music, research methods, learning theories, measurements, and woodwinds.

Implementing Interactive Learning Techniques into an Introductory Physics Course

By Alice Bean

I have been a professor in the Department of Physics and Astronomy at KU for over seven years. The first course I taught when I arrived at KU was the calculus-based introductory mechanics course for scientists and engineers, Physics 211. The constraints and traditions of our department at KU mean that the course is taught by the same lecture style used when I learned the subject material in the 1970s. Like most faculty members, I vigorously pursue a research career in addition to teaching. I travel often to accelerator facilities. This full lifestyle of the modern college professor often is quite frustrating, if one strives to improve one's teaching as well as students' abilities to learn.

There has been a long tradition in the physics and astronomy department of outreach projects that focus on improving physics education. In addition, the faculty is continually examining how courses are taught and what students are expected to learn. The situation at KU is similar to many across the country, as a similar type of course is taught at most colleges and universities. In fact, many have pursued a redesign of the course structure to provide a more interactive learning setting for the students.¹ Our department has invited several physics education specialists to KU in an attempt to learn of these new techniques. During the spring semester of 2001, I was assigned to be the course coordinator for Physics 211. This provided the incentive for me to try and rework the course format to see how these new ideas could be implemented. There was considerable trepidation on my part, because unlike the seminal work by science education specialists at other institutions, I was going to attempt to continue my full research schedule and use the constrained resources of the department.

Physics 211 is a four-hour course covering mechanics and thermodynamics. It is designed for first-year engineering and science majors and is calculus based. It consists of three hours of lecture each week, plus a two-hour laboratory. Several aspects of the course structure have been negotiated with the School of Engineering, in order to assure proper compliance with

National Engineering Accreditation standards, as well as to coordinate materials presented in different classes. The syllabus for the class covers many topics in one semester and is a subject for debate within our department. There are a total of 200–300 students each semester who enroll in Physics 211.

Problem sets with a preset due date are assigned weekly in all three lecture sections. These sets are provided through the homework server that several classes in physics and astronomy use online, and they are customized for each student. This system is based on Michigan State University's Learning Online Network with CAPA program.² It was originally adopted for use in the KU physics and astronomy department by Professor Stephen Sanders, who actively pursues research in the field of experimental nuclear physics. He continues to maintain and improve the system and takes on this responsibility for the department with little recognition or reward for his services. For the Physics 211 course, instructors add additional problems each semester; however, it is an ongoing problem to keep putting new problems into the database. A significant amount of time was spent by two of the lecturers checking the existing problems and maintaining the system when grading questions arose. I spent my online efforts for the class incorporating warm-up exercises and group learning exercises into the curriculum.

With the constraints on the format of the course, I set out to see whether components using the interactive learning research could be added to the course. Some of the new ideas that I pondered were these:

- Adding group activities during the lecture
- Changing the lecture coverage by the instructors in order to be able to implement new ideas
- Students performing small experiments during lecture
- Implementing interactive labs into the schedule
- Submitting pre-class exercises online
- Using some means to entice students to attend the optional problem session
- Starting to assess student performance with standardized tests.

The logistics of some of these precluded their use. I chose to implement group activities by changing the lecture coverage, submitting pre-class exercises online (warm-ups and puzzles), and using standardized tests.

There were three lecture sessions taught by the three instructors on each Monday, Wednesday, and Friday. My travel schedule implied trips near the end of the week. To implement interactive activities with groups, the instructors would need to spend some effort in class preparation. I successfully convinced the other two instructors to have only one instructor teach each of the three lecture sessions on Fridays. Thus, each instructor taught only one Friday in every three. Then the instructor who taught that Friday could expand his or her preparations to include group and other interactive learning activities. It was understood that on Mondays and Wednesdays the lecture material for the chapters that week would be covered, and Friday would involve special problems or group activities of a more interactive nature. The Friday activities were chosen by the instructor for that Friday. Unfortunately, Friday is traditionally a day of weak attendance. Approximately 60% as many students attend on Friday compared to those who regularly attend the other two lectures during the week. This attendance problem limited the ability of some groups to have regular members attending every Friday. While the group aspect of these Friday sessions might not have contributed to the student's experience in a strong way, it was clear that the students appreciated having a different format for this lecture. In addition, each of the three instructors received positive feedback about having different lecturers for some of their Friday meetings.

After I read the book *Just in Time Teaching*,³ I decided to implement warm-ups and puzzles into the course. With this technique, students are required to submit work online before every class period. The two types of questions which were used are both available from a web site. The warm-up exercises are supposed to be given before a topic is covered in the lecture session. One goal of presenting warm-ups is to get the students to prepare for the lecture. The student is expected to have completed the assigned reading for that lecture before attempting to answer the questions. The instructor is able to view student responses online prior to the lecture session and include a discussion of them during the lecture. The puzzles are challenging questions posed after a given topic is covered in class.

The material normally consists of applying what has been learned to a more realistic situation than that normally covered in homework problems. These puzzles challenge the better students in the class.

For the spring 2001 semester, students received credit for answering warm-up and puzzle questions. The warm-ups were not graded for correctness, so students received full credit for virtually any attempt to answer the questions. For the puzzles, credit was given to any student attempting an answer and extra-credit for the course was given for correct answers. The warm-up and puzzle answers were collected through e-mail responses. About 90% of the students in the class responded to most of the assignments. Puzzles were assigned once per week and the solutions posted on the web after extra-credit had been awarded. I incorporated the warm-up and puzzles into each of my lectures. There were lively discussions in class about most of the puzzles. The other two lecturers for the course did not discuss the puzzles or warm-ups in their lectures. This was the only difference in implementation of the course among the three sections.

Continual feedback was requested from students, through verbal, e-mail, and a few in-class written comment sessions. However, to determine students' perceptions of the course, two formal assessments were given near the end of the semester. The first assessment was composed by me (Course Specific Assessment, or CSA) to target specific questions about the format of this course. The second assessment was the C&I survey used by most KU instructors in their classes to solicit feedback. The results of CSA were tabulated using statistical analysis packages that allowed correlation of information between questions as well as among the three sections. Some general comments can be made about the results, but drawing a statistically-based conclusion is difficult for most of the questions. Most class members thought there was some benefit for them in each of the following: homework assignments, warm-ups, puzzle exercises, and Friday activities. There is conflicting information as to whether the class favored group activities for the Friday sessions. Even though an overwhelming majority wanted to do some group activities and found them useful, still approximately half of the class would drop this component for future implementations and found it to be the least useful component of the course. From this, one concludes that having a wide range of different learning opportunities is good, but there is no overwhelming evidence

to suggest that group activities or warm-ups are approved by most students. On the C&I form, I scored above average but not outstanding.

While finding out what students thought of the class is important, the primary goal was to see how well students learn physics. Finding a way to define whether students are learning has always been very difficult. This course focussed on problem solving, and as other physics instructors have found out, the performance on exams and homework may not reflect student understanding of basic physics concepts. To start measuring the performance of students at the University of Kansas in comparison with other programs, the Force Concept Inventory (FCI) Exam⁴ was administered near the end of the semester. Material covered in the FCI Exam could be mastered through understanding five of the 20 chapters that were covered during the semester. On this exam, a score above 60% indicates that students have grasped Newtonian concepts. A score above 85% indicates a very good understanding. My section had 59% of the students scoring above 60% on the exam. It is very hard to determine whether the higher scores on this exam in my section were due to focussing on conceptual learning through a more concentrated effort on warm-ups and puzzles, or because I had a higher quality of students than the other sections. However, during the first day of class, all sections participated in a placement exam to help determine the group composition. There was no discernable difference among the sections based on the placement exam, so one could conclude that my section's scores might be significant.

The first question many of my colleagues ask is whether I would do the course the same way again. The answer is yes with qualifications. Once the effort has been made the first time to implement the course in such a manner, it is worth pursuing again. I believe a significant reduction in course preparation time could be achieved if I were to teach the course again. There were technical problems with the warm-up and puzzle submissions that could be corrected by programming short answer questions into the framework of the existing online homework server. There is evidence from the FCI results and the overall student grades in the course that discussing the warm-ups and puzzles during my lectures aided the student's conceptual learning. It was clear that all three instructors liked the format of teaching one Friday in three. However, all of the instructors were overwhelmed by having to cover

the amount of material in the syllabus during the other two lecture sessions during the week. This is what all consider to be the main problem to be solved for this course implementation.

It is clear there has been exciting progress around the country in trying to enhance instruction in physics courses with a more interactive approach. Questions I hoped to address or comment on are these:

1. Is the fundamental interactive method aiding the students, and are they doing better because a change was made?

I cannot answer this question, as previous semester classes have had no standardized tests given. One hopes that the physics and astronomy department can track learning in all semesters of the course by administering these kinds of tests each semester.

2. Can a professor continue his/her research activities while starting implementation of new approaches in the course?

There was a significant effort involved in providing a course of this nature. During the semester, I was able to continue my research at a reasonable level; however, my personal life was compromised. I will continue some aspects of the course implementation if given the opportunity again. However, without support such as web support staff and full departmental cooperation, it will be difficult to sustain such an effort for teaching.

3. Did the other programs succeed because of the increased resources given to their implementations through special grants?

I feel that having online support staff and teaching assistant support can only help the course. While it is possible to succeed in teaching courses of this nature without this aid, it will be difficult to convince other faculty members to do this type of work and to sustain momentum for this type of teaching.

4. Is it better to teach a few topics well, or introduce a broader range of topics at a more basic level?

There will continue to be debate over this in physics and astronomy; however, I feel it would be better for the students' benefit to teach a few topics well and unclutter the syllabus.

5. How can one implement the best of the suggestions without having to completely change the whole course philosophy for the department?

The instructors for the spring 2001 Physics 211 course were able to implement the change, so it can be done.

Incremental changes to the course will probably work better within the framework of the physics and astronomy department as opposed to large changes in the course structure at one time.

6. Do the students like the interactive learning styles better?

It is hard to tell whether students liked these styles better. It is clear that there are many types of students who learn in different ways in the course. Therefore, providing different avenues for learning probably helped more of students appreciate the course better.

7. Do the students learn more using the interactive learning styles?

There was some evidence that students performed better on the FCI exam in the lecture section that focussed more effort on the warm-ups and puzzles. It was unclear whether the course as a whole benefited from the Friday interactive learning sessions.

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A Backward Glance at a Second Chance

By Don Steeples

I reached my friend Jeff's office just as an undergraduate student with a stunned look on his face was leaving. It was the last day to drop a class at KU, and Jeff had told the student that he would not be given a WD—a "withdrawal passing." Further discussion revealed that the student had been remiss in fulfilling his academic responsibilities for most of the semester in Jeff's class.

"What I do not understand is why he waited until the last minute to come and talk to me and ask for a WD," Jeff said.

Having been in that student's situation myself, I replied, "My guess is that it could be a case of depression. He got behind in his homework, skipped a few classes, was not able to catch up, got depressed, and treated his condition by ignoring the problem until the last minute."

My purpose in writing this essay is to persuade some of my faculty colleagues that following the unbending academic high road is not the only way to treat a comparable situation. I champion this view primarily because I have experienced what I believe Jeff's student was enduring, and I hope to convince the reader that poor performance in the classroom does not necessarily mean a lack of ability or even a lack of academic background. I am not trained in psychology or medicine, but to some degree, a backward glance at my own academic failure may shed some light on the plight of certain of today's students. For example, as an undergraduate at Kansas State University, why did I flunk some courses and get D's in a few others? How and why was I able to recover academically and go on to earn a Ph.D. at Stanford? What role did the words or actions of some of my instructors have in the unfolding of this story? I risk boring the reader with the answers to these questions in the hope of stirring even one colleague who has never experienced serious academic difficulty to treat with compassion students who may be undergoing academic or other adversities.

When I entered K-State as a freshman, there was reason to believe that I would excel academically. I do not remember the exact outcome of my ACT exam,

except that I was assigned to the honors program on the strength of my test scores. Even though I was valedictorian of my graduating class of 18 students, the truth is that I studied just hard enough to get top grades in my high-school classes. I do not remember ever having to do homework—in grade school or high school—because I managed to get everything done in one 45-minute study hall early in the morning (when most people in the school, including the sixth-, seventh-, and eighth-graders, were at band practice). In retrospect, this study habit probably set me up for a hard time in college.

When I was a freshman at K-State I made three major mistakes, which I am convinced led me to a bout with depression and failure. First, I significantly underestimated the amount and consistency of effort that would be needed to fulfill even my poorly defined academic objectives. Second, I was in the wrong major (the machinery-design option of agricultural engineering) and stayed there too long because my father had said to me many times, "Don't be a quitter!" Mistake number three is related to mistake number one and may surprise the reader, but I firmly believe that I should not have participated in the freshman honors program at K-State. My transcript indicates a grade of "C" in English Composition I. That C in an honors course cost me the last three years of a four-year academic scholarship that covered tuition and books. I will go to my grave believing that I could have easily earned a B—or even an A—in that course if I had not been placed in an honors section populated by the best freshmen from Wichita, Topeka, Kansas City, and elsewhere. I was well prepared in terms of grammar, vocabulary, and spelling, but I was not equipped to budget my time so that I could keep up with the required reading. I have a mild case of dyslexia, and reading was and still is a difficult and unpleasant experience for me.

Losing that scholarship was the beginning of my descent into the academic doldrums. I had disappointed my parents, and the loss of the scholarship had put an additional financial burden on them at a difficult

time. Also, my confidence was shaken when I earned slightly less than a B average my freshman year, thanks to the C in honors English. Additionally, I was bored with my engineering courses because I was in the wrong major.

By the spring of my sophomore year, a knee injury sustained in high-school football had healed to the point that I could play football again. However, my next mistake was beginning to hang around with my football-player colleagues. Most of them were majoring in physical education and, while we were playing pool at the Student Union, one or another would mention having a test in, say, tumbling the next day, whereas I had to face an exam in differential equations. I tended to spend about the same amount of time preparing for my exams as they did for theirs, which did not work out too well in terms of my GPA. I flunked eight hours of engineering courses that semester but, by some miracle, I did manage to get a C in differential equations without going to class or doing the homework. At that point in my academic career I had spiraled downward into a depression alleviated only by time spent in the company of my football buddies.

When my parents got my grades, my dad did not react with anger—just disappointment that I was not doing as well as I could and should. Over the summer, as I lifted weights and began a running regimen with the goal of lettering in football at K-State in the fall, I made what I thought would be a new commitment to my engineering studies. I was determined to get straight A's and to make my parents proud. In the fall of my junior year, both studies and football were going well until one day during practice I took a knock on the front of my helmet. Three weeks later I underwent life-saving brain surgery to repair a broken artery, and my football career was over. A month in the hospital caused me to drop a couple of engineering courses, but I was able to earn A's in the remaining courses, one of which was Introductory Geology.

That geology course changed my life, and when I changed my major to geophysics, my grades began to improve. One moment stands out in my mind as being especially influential with regard to my choice of a career in geoscience. It came in the spring of my first of two-and-a-half senior years (part of the price for flunking courses and changing majors in the middle of my junior year). The late Joe Chelikowsky was teaching Structural Geology, and I thought he had unfairly whacked off about 15 points for my answers to three

technical questions on my midterm exam. Joe was someone with whom it was notoriously difficult to argue about exam points, but I got them all back. As I was leaving his office, he looked at me and said, "You know, you have the potential to get a Ph.D. in geology." I will be forever grateful to Joe for saying that. I was still recovering from having been beaten down academically and without his encouragement, along with the faith and support of my wife, Tammy, it would not have occurred to me even to consider graduate school.

Unfortunately, the low grades I obtained during my period of depression were an albatross about my neck. I graduated with a 2.7 GPA on a four-point scale. Concerned that I would not be able to get into a Ph.D. program anywhere, I wrote to a few bottom-of-the-barrel graduate schools for information and learned that there was an entrance exam called the Graduate Record Exam that I would have to take. So, I paid my money and spent a Saturday taking both the general test and the advanced test in geology.

A few weeks later, our department head asked me to stop by his office. I walked in and he said, "We just got your GRE scores, and here is a list of graduate schools you should contact."

As I thanked him, I glanced at the list: MIT, Caltech, Stanford, Berkeley, Columbia... I was intrigued by the prospect of attending Stanford, partly because it had one of the best broad-based geophysics programs in the world and partly because, between my junior and senior years in high school and prior to my knee surgery, Stanford had indicated an interest in my athletic activities. Much to my surprise and delight, I was admitted to the graduate program in geophysics at Stanford, with a scholarship. My decision was sealed when I was considering a slightly better financial offer from Texas A&M. K-State Professor Doug Brookins (an MIT Ph.D.) said, "If you have a chance to go for a Ph.D. in geophysics at Stanford and don't take it, you are a fool!"

But the year was 1970, and the U. S. was at war. To forestall the draft, I had participated in the Army's Reserve Officers Training Corps advanced program; moreover, I assumed that my brain surgery would keep me out of the Army. Even though I definitely would have flunked a draft-board physical, I was already considered by Uncle Sam to be in the Reserves. As a result, much to my chagrin, I fell under the Army's retention rules rather than the induction-and-enlistment rules. The 24-mm-diameter hole that had been

drilled in my skull during my surgery was a mere 1 mm short of the size needed to render me physically ineligible for military service. Fortunately, Stanford's generous policy of readmitting students following active military service—and providing the same financial package as before—allowed me to plan a future.

Two years in the U. S. Army in Virginia and Alaska merely strengthened my resolve to earn my Ph.D. and build a career that would allow me to inspire others as I had been inspired and perhaps one day to be my own scientific boss. I felt that at K-State I had learned some important lessons about academic performance, such as the need to set lofty goals, so I entered Stanford with the specific but unstated objective of being the best student in the Department of Geophysics. Again, that was a colossal mistake. First, I had to make up for all those days at K-State when I had played pool in the Union instead of going to differential equations class. Second, there were (and are) a significant number of really brilliant graduate students in the Department of Geophysics at Stanford with whom to compete.

I studied 100 hours per week for the first several weeks and then added another 10 hours or so to my schedule the week before midterms. In the classes I was taking, homework counted for a lot in the overall grading scheme. I was doing exceptionally well until the additional sleep that I lost just before midterms caused me to get sick. I managed to struggle out of bed just long enough to get B's on all of my midterm exams, but I could not bring my grades back up to A's before the academic quarter was over. Lesson learned: It's not worth giving up one's health to be top dog, which, it was clear to me by then, I could not have been anyway. I settled into a routine that provided for increasingly satisfactory grades but also sufficient sleep.

Good fortune came my way when it was time to select a topic for my master's project and my doctoral dissertation, and my research went well. From start to finish, I completed my M.S. and Ph.D. degrees in 35 months, which I understand is still the all-time quick-finish record for two graduate degrees in the Department of Geophysics at Stanford.

About a month before my doctoral defense, one of my closest friends defended his dissertation and subsequently confided to me that he had passed with distinction. In the early 1970s Stanford produced only a handful of Ph.D.s per year in geophysics, and my friend had been informed that his was the first with-distinction dissertation defense that had been granted

for several years. A few days after I defended my dissertation, my wife Tammy called me at my office and said that a postcard from the Stanford Graduate School had just arrived and that it indicated that I had defended my dissertation with distinction! That moment was absolutely the biggest thrill of my life and remains so to this day. As I rushed home on my bicycle to see the postcard, I suddenly realized that tears of joy were running down my cheeks for the only time in my life. I finally felt some vindication for my abysmal academic performance at K-State. I also called my close friend and confided to him that I was proud to join his rather exclusive club.

Now back to my original point about poor performance and second chances. I was inspired to write this while reading an extraordinary essay by Dick Schowen that appeared in the KU Center for Teaching Excellence fall 2001 publication, *Reflections from the Classroom*. In it, Professor Schowen expresses his conviction that we as faculty owe our students collegial respect and should exhibit it from the beginning, without requiring any sort of quid pro quo. He expressed the belief that student and teacher are engaged in the important task of education, and that the teacher should want to be helpful to the student. For me, one of the things this means is giving students a second chance when they need it, not just when they deserve it.

Assume that you have a student who wants, as Jeff's student did, a WD-passing. You have no information about the student's home life, financial situation, or trustworthiness. All you know is that the student has performed poorly in your class. To you, perhaps, taking the academic high road means looking into your gradebook, shaking your head, and assigning a WD-failing. However, to me it seems that the educational process and the University as a whole are not compromised when a student is allowed to withdraw gracefully, without the stigma of a WD-F on record. Indeed, when you grant a WD-P, you have also granted someone a second chance. Consider, too, that the student has already paid tuition, which is not refundable late in the semester. Moreover, the granting of a WD-passing rather than a WD-failing is not going to provide a student with an advantage over his or her peers in the scramble for jobs and positions in graduate or professional schools. One of the many things that I loved about Stanford was that one could drop a class at any time without prejudice and without having to state a

reason. This policy does not seem to have damaged Stanford's academic standing, nor has it affected its alumni adversely.

During my first 17 years at KU, I held a research position at the Kansas Geological Survey (a KU research division) on West Campus, but I also taught on a volunteer basis. As I was driving to class my first morning as a new full-time faculty member in the KU Department of Geology in 1993, I realized that I had not developed any sort of teaching philosophy. So, on that five-minute trip to campus, I came up with three basic principles: The first is to show students that I care, which is also the logical basis for granting second chances and harks back to my opening remarks. The second is to go to the office early and stay late. And the third is to work like the devil in between. I try every day to observe these simple precepts and, having once been given a second chance myself, I hope that the philosophy they represent may be of use to others, as well.

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