Reflections From the Classroom

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Foreword

In the fall of 2003 KU psychology professor Rick Snyder made an open invitation to colleagues to join in a day of conversation about teaching. Rick called it "Professors Speak Out," and he wanted to share a day with teachers talking about teaching. In November of 2003 the Center for Teaching Excellence hosted this gathering of faculty members generated by Rick's invitation, and there were six papers and lots of comments. The papers and the conversations were very good, and we are offering the papers as a set in this issue of Reflections From the Classroom.

It is very appropriate that these works be united under the term "reflections" as they are connected by the theme of reflective learning and teaching. At its heart, reflection is a process in which people think about and consider some ideas, actions, or contexts that are of interest. When those acts of reflection are directed at one's own thinking or learning, this process is sometimes called "meta-cognition"—that is, thinking about thinking. I find it interesting that each of these essays represents that kind of thinking about ways of learning, and I believe you will find these examples interesting and generative.

Professor Paul Atchley (psychology) opens the conversation by asking whether majors in his department are being thoughtful about their own education. He argues that there is a coherent thread to the educational plan psychology offers, but often students do not recognize it. He describes a program intended to help students become intentional, reflective learners by guiding that emergent understanding instead of relying on students to discover it on their own. Professor Sheryle Gallant (psychology) writes about a similar goal for her students within the context of one course. She has had good success in helping students learn a wide range of content, but she wants them to be more critical in their engagement with the material. Her essay describes a plan to help them be more reflective about what they are learning.

Professor Joe Heppert (chemistry) wanted to upgrade the experience of students in laboratories, and he framed their assignments as an inquiry rather than an exercise in following procedures. Interestingly his experience shows that a mental frame of inquiry per se is not sufficient to engage learning; there needs to be engagement with content as well. Professor Janet Bond-Robinson (chemistry) explored what it means to give an explanation to students in her chemistry class. She searched for an alignment between their reflection on the nature of explanation and her understanding of the same idea.

Professor Rick Snyder (psychology) offers a meditation on his learning how to engage students as he and they gradually become more different in age and cultural context. He has learned that he can engage students and achieve more satisfying learning when he steps outside his own life circumstances and connects his teaching with his students' lives. Professor Earle Knowlton (special education) urges faculty members to be reflective in their use of technology. He notes that we need to remain thoughtful about the learning impact of instructional practices, using technology only as it serves those ends.

Overall, this set of papers offers ways that both students and teachers can step outside of the regular business of "doing" our classes and consider critically what assumptions we make and what implicit practices we have automatically absorbed from our own experiences in education. We hope that reading these essays will be an invitation for you to "go meta" about your own teaching and your students' learning.

Dan Bernstein
Director, Center for Teaching Excellence

Content with Context: Goals in Higher Education

Paul Atchley

College is a pathway to student goals, both explicit and implicit. • Universities are designed with implicit goals for students. • These goals are reflected in the curriculum and our methods of instruction. • Student and university goals are not consistently considered together. • We need to consider how the university experience serves to support long-term student goals and how we can design our curriculum to meet these goals.

The very first student I advised was a bright young man who expressed a desire to attend graduate school in psychology. After asking him why he decided on this path, I polled him about what year he was at KU so we could plan accordingly. He told me that he was a senior, set to graduate in a few months. I was stunned. I had to inform him that the application deadlines for graduate programs for the next year had already passed. This experience has been repeated many times. I have also dealt with students with unreasonable career expectations, or career expectations guided wholly by popular media (such as wanting to become a "profiler" and catch serial killers) and not faculty advice, as well as students who are unaware of the numerous training and service-learning opportunities available to them outside of the classroom. Most students have been unaware of many immediate opportunities and long-term options. My experiences with students, many of whom we would consider to be very bright, and my participation in senior exit interviews for three years have led me to ask why more of our students are not prepared to succeed.

When students select and subsequently enroll at a university, they have a number of expectations about their experience. Non-academic expectations aside, it is reasonable for students to anticipate that the university experience will in some way make their future a better one. This betterment may come in the form of acquiring a better understanding of themselves and the world around them or a better understanding of a particular topic that holds their interest. However, what most students will say they expect is the chance for a better job. I do not feel qualified to speak to the thoughts of students in years past, but when I speak to my students, their biggest concern seems to be about what their opportunities will be once they finish at the University of Kansas. They seem to implicitly accept that their chances of finding a good job or a satisfying career are better with a college education, but it is generally unclear to them why. When I ask students why they should expect a better job with a college degree, they have no satisfactory answers. They seem unsure if they have developed any skills that set them apart from non-college graduates other than domain specific knowledge gained in coursework. In a point I will return to, they seem equally unaware of how the curriculum that they are required to take supports future success, leading some particularly jaded students to report that the University simply imposes a set of requirements to "get their money."

Historical context

The curriculum of the University was not set for financial reasons, but because of underlying goals that have changed throughout its history. As I began to consider what I perceived as a disconnect between student preparation and a clear desire on the part of the University for student success, I decided to examine the University's explicit goals. An understanding of my second and third statements ("Universities are designed with implicit goals for students" and "These goals are reflected in the curriculum and our methods of instruction") follows from this research.

I first engaged the question of university goals by taking advantage of the wonderful archives in Spencer Research Library to look at the stated goals for the University of Kansas at its inception. Since institutional practice is built upon historical precedence, I thought that it would be helpful to determine what the institution set as the goals for instruction when it began. (I should note here that this examination is centered around liberal arts and sciences, since the University started with liberal arts training and sciences alone, with a provision for professional education later.) Examination of the original 1866 University of Kansas catalogue (A General Description of the University) revealed that goal statements were fewer in number (one) than faculty (three) or statements about the influence of religion on

University activity (two)[1]: "The object of the University shall be to provide the inhabitants of this State with the means of acquiring a thorough knowledge of the various branches of Literature, Science, and the Arts" (p. 8). In other words, the University shall provide a university education. Examination of the curriculum reflected this mission. First session: Latin, Greek, algebra, geometry, Grecian history; second session: Latin, Greek, geometry, plain trigonometry, Roman history. The following sessions are similar.

As I moved forward, the theme continued. In 1879, the Methods of Instruction indicated that students of Mental and Moral Science were "prepared by previous study for more critical research," followed by a "critical review of the whole subject" and combined with recitation with the President, who was responsible for instruction (p. 53). The 29th Biennial Report (1922) lists the "Functions of a University" as threefold:

> "1. The education and intensive training of students. 2. The discovery of new truth through investigation in the arts and sciences. 3. The dissemination of knowledge among the people … First of all, experience has demonstrated that there is a wide distribution of talent among all classes of people. It exists among the poor as well as among the rich, and it is essential in a democracy that this talent be discovered and trained. A state university is thus a talent-discovering, career-saving institution" (p. 3).

What can best be described as the "betterment" model of higher education is best summed up in the 30th Biennial Report's (1924) College of Liberal Arts and Sciences Statement of Purpose: "The combination of applied science with basic science and with cultural and citizenship subjects is therefore intended not only to prepare young men and women to succeed in some definite technical work, but also to lead a successful and well-rounded life" (p. 25).

In the modern era, it is not obvious that university documents provide a clearer view of the goal of higher education. Students reading about the "Aims" of an education in the College of Liberal Arts and Sciences in their 1976 catalogue would have this to guide them:

> "The purpose of the baccalaureate degrees in the College of Liberal Arts and Sciences is liberal education, which is different from both vocational training and isolated specialization. A rigorous education includes both the understanding of our past and a concern for the future through discovery of new knowledge. Breadth of knowledge is necessary, but risks superficiality; depth is equally important, but risks over-specialization. A liberal education presupposes intensive study of the sciences, the social sciences, and the humanities.
>
> In addition, a liberal education embodies both theory and practice, the knowledge and experience of both being requisite to an understanding of the sciences, the humanities, and the social sciences. Thus such an education is active and relevant in the most fundamental sense" (p. 3).

It is difficult to see how, from a student's perspective, this aim could be turned into a concrete plan for approaching education. Lacking in this and earlier goal statements are clear descriptions of what students should extract from their college education beyond "an understanding of the sciences, the humanities, and the social sciences." Again, I am not arguing that this betterment approach does not lead to student achievement or improvement. However, students engage in a four- or five-year full-time experience at a high financial cost, and it is reasonable for them to ask "What am I going to get from this?" and to expect something more concrete than what is outlined by the aims above.

In recent years, the University has made an effort to become more explicit in its goals. In 1989, the University Assessment Committee established a set of "Goals of General Education at KU." These were first included in the 1998-2000 catalogue and have since been distilled to six primary goals. These are:

1. Enhance the skills and knowledge needed to research, organize, evaluate, and apply new information and develop a spirit of critical inquiry and intellectual integrity.
2. Acquire knowledge in the fine arts, the humanities, and the social, natural, and mathematical sciences and be able to integrate that knowledge across disciplines.
3. Improve the core skills of reading, writing, and numeracy, and enhance communication by clear, effective use of language.
4. Understand and appreciate the development, culture, and diversity of the United States and of other societies and nations.
5. Become aware of contemporary issues in society, technology, and the natural world and appreciate their complexity of cause and consequences.
6. Practice an ethic of self-discipline, social responsibility, and citizenship on a local, national, and international level.

One could rightfully argue that the current goals are certainly an improvement over those from the inception of our university, or the vague notions offered in 1976. But, returning to the central problem, do even these specific goals help guide our students?

First, for goals to be useful, the person for whom they apply must be aware of them. Our students are clearly not aware of the stated University goals, or at least none of the hundreds of students I have polled in my classes or before senior exit interviews are aware of them. I believe this problem should not be understated, but it is also one that can be easily solved. For example, when I teach research methods, I make my students aware of these goals and in particular goal number one. I tell them that research methods is perhaps the most important class they will take because they will start to develop the ability to conduct research and evaluate information. Further, it is specifically that skill employers seek college graduates for, and it is that skill they must cultivate during college and they must make clear they possess during job interviews. This approach is too post hoc, however. We need to do more to make students aware of these goals early in their experience if the goals are to be of any real use in helping students get the most from their education.

However, even making students aware of these goals at an early point is not sufficient. For goals to be useful, they must either come from the person for whom they apply or directly relate to existing goals for that person. I admit ignorance about how the current statements were developed, but my read of the goals is that they are very top-down. I think each of the goals is excellent, but I am not sure that students would independently develop goals like these if they were asked to identify their own goals for their university experience. Given the possibility of this disconnect, we must make an effort to bring students to value these goals and/or determine what their goals are and help foster those goals. I think the best answer is both of these. I am not certain that the average freshman has the experience to develop a set of goals that would prepare her or him to take full advantage of the university experience. On the other hand, I do not think we should think we "know what is best" for our students. Though we have all been students and have succeeded in our time, students cannot succeed by simply plagiarizing (with our permission) our past. They have values and goals which may be very different from ours, and we need to consider how to integrate that into goals for higher education. In addition, we need to consider how these top-down goals apply to different approaches to a university education. While all KU students should expect a standard level of betterment no matter which major they pick, choice of major is certainly linked to choosing different goals for the university experience. The six goals listed above should apply for fine arts as well as psychology majors, but students in those majors will have goals specific to that major.

Implementation of a goal-centered approach

The betterment model is an excellent approach to higher education, but it is my belief that students need to know how the experience can help them succeed once they finish. In the Department of Psychology, we are working to improve the role that goals and planning play in education for our students. The department has an excellent cadre of instructors. The approximately 1200 students majoring in psychology at the University of Kansas receive excellent instruction in theories and practice in psychological science. It is less clear whether most of our students receive sufficient formal training to prepare them for opportunities related to their major. A small number of our graduates are well-prepared to meet their future when they leave KU with a degree in psychology. They seek advising, do research, and take initiative to investigate what they need to do as undergraduates to develop and meet career goals. However, with 200 to 300 students per year leaving KU with an undergraduate degree in psychology, there is still a large number that has inadequately formulated professional goals. Too few have prepared themselves to meet those goals, because they do not consider this very important issue until they near graduation. Other students are simply misinformed about careers and what they need to do to achieve them. In my role as Director of the Honors Program in Psychology, I have seen that this problem is not isolated to a few, low-achieving students.

Goals we would like to achieve include the following:

1. Reach students early
2. Put courses in context by providing students with information about psychology course planning
   - What do psychology courses cover?
   - When are courses available and when should courses be taken?
   - What are psychology requirements and why are they required?
   - What are the advanced coursework options?
   - What is the role of mentoring in higher education?

- What are the University goals?

3. Provide students with information about opportunities supported by the psychology major
   - What careers are available with an undergraduate degree?
   - What careers require advanced degrees?
   - What are the facts and myths about psychology careers?
   - Are there careers people do not normally consider?
4. Provide information about other opportunities
   - Service-learning
   - Research and other department activities
5. Require students to engage in career and coursework planning
   - Help students know their own values and their impact on career choices
   - What courses are necessary for a given career choice?
   - How does the graduate school application process work and how can time at KU maximize preparation for graduate school?

The first goal of this course is to reach students early. Goals after the fact are of no use. The course we are implementing, PSYC 102, will provide the basis for further coursework in psychology. It is designed for students to take either concurrently with their introductory psychology course or the semester following, before they take many junior/senior content courses in psychology. Ideally, students would take this course their freshman year or the first semester of their sophomore year. It will be required before taking more than three advanced psychology courses. This will allow non-majors to enroll in psychology core courses but prevent psychology undergraduates from failing to enroll in PSYC 102 until late in their undergraduate coursework. The remaining goals can be met if PSYC 102 is offered as a one credit hour, pass/fail course.

There are numerous models for teaching such a course (taught by one instructor, team-taught by a combination of faculty, staff, students, and outside speakers, etc.). However, this would allow enrollment only three times per year and would require a large amount of time to coordinate. A more appropriate model is to use a distance education approach. PSYC 102 will be an entirely web-based course administered through Continuing Education. An advantage of this approach is that students can enroll on an as-needed basis. Students can take the course at any time they see a need to enhance their formation of goals to guide their educational progress. This might be a student who is exploring different majors, a student who is already planning to become a psychology major but needs to explore options as a prelude to developing more specific goals, or even a student outside the institution (high school or returning student) who wishes to know more about what his or her options are.

Throughout this course the emphasis will be on encouraging students to take an active role in planning their education. The university is about exploration, so it is not designed to force students into a preset series of experiences or to make the liberal arts experience a vocational education experience. Rather, students will be encouraged to consider all aspects of possible futures and how the University can help them to get to that future successfully. The purpose is not to set goals for students, but to provide them with the process for doing so and with examples of successful pathways toward achieving those goals. It is my belief that we have bright students and they can set goals for themselves, but that they do not always understand when they need to do so or how to go about doing so. This is one approach for encouraging student ownership of their coursework, and it is worth reflecting upon how we can continue to improve using goals to further the university experience.

Endnote

[1] For those curious about these statements, they are "No religious sect shall ever control any part of the Common School or University Funds of the State" (p. 8) and "Provided, That not more than three of the Regents to be members of the same religious denomination" (p. 9). As far as I know, the latter is still in place.

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Engaging Students in the Voyage of Learning: Challenging the Prevailing Winds

Sheryle J. Gallant

"The voyage of discovery lies not in finding new landscapes, but in having new eyes."—Marcel Proust

This quote speaks to my deepest yearnings as a teacher—to take students on a journey to "new landscapes" in concepts and ideas, to help them develop "eyes" to see deeply into the material, discover its meanings and some enduring understandings. I am convinced that students find many "new landscapes" here at KU; I am less sure that many leave us with "new eyes."

I teach Theories of Personality and Intimate Relationships to junior and senior undergraduates. About a year ago, I became aware of a new discontent with my teaching. Having just reviewed my evaluations, which remained excellent, I should have been delighted—yet unmistakably, I found myself nagged by the feeling that something critical was missing. What? Clearly I am having an impact—students learn in my courses, what more do I want or expect? Pondering this question, I recognized a core aspect of my experience in the classroom that falls short of what I think it could and really should be. What follows is how I see the problem, what I think the primary contributors are, and my vision of what some approaches to solutions might be.

The problem

What do I see as missing? Students engaged in critical thinking in the classroom. Before coming to KU (11 years ago), for 14 years I taught first-year medical students who routinely questioned nearly everything I said. Although this was frustrating at times, their questions indicated they were thinking about the ideas presented, and their skeptical attitude led to a meaningful dialogue with me and each other—precisely what I have not been able to achieve with students here despite my best efforts. Over the years these efforts have included organizing small group discussions as part of the class (with rare exceptions I observe little originality or depth in these discussions), assigning reaction papers (a few students put some real thought into these, but many produce a summary rather than their own thoughtful responses), making sure students know that my office hours are a good time to talk one-on-one about ideas presented in the class/text, and offering a weekly "chat hour" as a time to get together with me and other students for further discussion (one or two students join me in a semester).

I believe an important part of my job is to keep current in the topic area, present material in an informative and interesting manner, and be accessible to students. I believe that one of the student's major responsibilities is to actively reflect on the material—and not just read the text, listen and take notes in class, and study for tests. I tell students that they should have a reaction to every idea encountered. After all, they have relevant experience—they each have a personality and close relationships. I emphasize that the unique opportunity afforded in the classroom is not learning the content, which they could do by themselves if sufficiently motivated—but the opportunity through inquiry and dialogue to discover what they think and understand. All of these attempts at engagement have essentially failed to draw students into deeper thinking/involvement in the classroom.

Data from the KU goals assessment surveys support my concern.[1] Of the 35 institutional goals, students consistently rate these as most important: stimulating intellectual curiosity and innovative thinking in students, and teaching students to think critically and to integrate knowledge. They rate KU as most successful in maintaining a varied program of extracurricular activities, providing students an in-depth understanding of at least one specialized area of knowledge, and providing opportunities for adults over 25 to earn degrees. Further, the discrepancy between ratings of importance and ratings of success in achieving the goal of stimulating critical thinking were some of the largest.[2]

Contributors to the problem

The consumer model of higher education. From this perspective, it makes sense to think of a university edu-

cation as something the student (or more often the student's parents) purchases with tuition and fees and that I (the professor) am expected to provide as the "product." This model fosters an entitlement mentality that results in an excessive focus on one's rights as opposed to one's responsibilities. I am reminded of the Zen expression "Adding legs to a snake," which means adding a concept that doesn't belong. Snare (1997) takes my concern further, arguing that the student as consumer analogy is not only out of place but harmful:

> "The increasingly common model of higher education that treats students as consumers is harmful to both students and society. The consumer model undermines educational quality because it overemphasizes student satisfaction and encourages grade inflation. It also wastes teaching time by concentrating too heavily on making classes enjoyable and inflating students' self esteem. Additionally, the consumer model encourages passive learning and deceives students about the operation of the real world. Ultimately, it threatens social and democratic values by allowing students to buy degrees instead of earning them."

A consumer model assumes that professors must satisfy students, and such an emphasis is clearly problematic if mastery of content and demonstration of critical thinking take a backseat to keeping students happy, which all too often means lowering standards. Snare believes the consumer model wastes teaching time by concentrating too heavily on making classes enjoyable. I certainly have this as a concern. I spend time not only on how to present material in a logical, clear, and interesting manner but in as entertaining a way as possible. To be honest, I think a hefty portion of the high evaluations I get these days is because I have learned to do a better "dog and pony show"—I use more humor, self-disclose in relevant ways, and do other things that keep my students entertained. Is this bad? No, but it is not necessarily conducive to deeper thinking. Snare argues that having a "fun" class often results in doing more entertaining than educating. There is, after all, only so much time in the classroom. Being a good performer as well as a good teacher takes energy, effort, and time. In the consumer model if the "product" results in a satisfied customer, we are doing a good job—but by emphasizing the fun and entertainment factor are we shying away from approaches that are more challenging?

Another huge problem with the consumer model is the way it has led us to evaluate teaching effectiveness; i.e., with student evaluations. Having one's entire teaching effectiveness (not to mention one's merit evaluation for teaching and one's standing among colleagues for teaching) determined by how much students like the job you are doing in the classroom is ludicrous for a number of reasons, not the least of which is that it serves to dampen professors' motivation to challenge students to engage more deeply. What professor is going to hold students accountable in this way when it is likely to result in lower ratings? Students can and should provide feedback on their experience in the classroom along relevant dimensions, but these should be limited to facets they can accurately evaluate. Further, student evaluations should not be the only or even the major way in which one's teaching effectiveness is evaluated. It's quick and inexpensive, but in the long run it short-changes faculty and students. Why would a professor labor to help students find their authentic voice, a process that invariably involves some struggle and frustration on the student's part, especially for those who are comfortable letting their intellectual vitality languish in the service of getting by?

The economic factor. With the highest tuition increases in 30 years, it is not surprising that students feel pressured to "get done with" college as soon as possible. The ever-rising costs result in a burden on students' families and the students themselves, who often need to work more than in the past to stay in school. The downside of this for student engagement in the classroom is several fold, including that many students are just plain chronically fatigued—not a conducive state to deep thinking. Further, some students feel obligated to take as heavy a course load as they possibly can, even if it greatly reduces the amount of time they can give to courses outside of class in order to finish in a timely manner.

A corollary is that too often students come to class poorly prepared. I find repeatedly that many don't read the assigned material before class. If they did, they would likely come across an idea, issue, or research finding that puzzled or intrigued them or stimulated them in some way, and they would gain some familiarity with the topic and would not be hearing everything I say about it for the first time. With no prior preparation, it is hardly a wonder that students may think (perhaps accurately) that they have nothing significant to ask, or say—they haven't given themselves the chance to digest the material enough to become aware of their questions or reactions.

The Internet factor. This generation of students is the

first to have grown up with the Internet, an easy, almost effort-free vehicle for obtaining information. No critical thinking required; just type a relevant word or two and voila—volumes of information appear at one's fingertips. I wonder if this encourages a "to be told" learning style. A colleague confided that on her recent course evaluations a student wrote, "Don't ask us questions; we don't know the [emphasis added] answers, we are here to learn [emphasis added]." One can interpret this comment in different ways, but to me it reflects too great a need for and comfort with passivity on the part of the student and a lack of appreciation of the dialectical process that is at the core of learning to think critically, creatively, and deeply.

The "PC" factor in the college classroom. Dialoguing with students involves more spontaneity than delivering a prepared lecture. Thus, a subtle but potentially powerful barrier to deep engagement with students in the classroom may arise from a professor's fear of saying something off the cuff that, although on target to the inquiry process, has not been thought through in the politically correct sense. This kind of mistake involves no intention to offend, but if one has followed recent cases of this type, a professor's intentions seem to have little to do with the viability of student complaints. Thinking on one's feet leaves one open to gaffes of this sort—it just too bad that in the atmosphere of today's college classroom mistakes such as these can be dangerous to one's career.

Some approaches to solving the problem

Like the Hydra that could not be eradicated by a single stroke, to challenge the prevailing winds in higher education and shift students from passive information receivers to active constructors of meaning, we will need to make changes on several levels.

On the institutional level. We need to reduce the economic burden of a college degree on students and their families to lessen stress and increase the time and energy students have to devote to learning. Perhaps a consortium of like-minded institutions could effectively lobby Washington to expand the AmeriCorps Program. I see this as having many potential benefits in addition to reducing the economic problems of a university education (which is not going to get cheaper). For students who are not ready for college—emotionally, intellectually, or financially—it would provide the opportunity to gain maturity and an understanding of important social and civic values.

There is also a pressing need to lobby for a fairer allocation of the more than one billion in yearly federal financial aid, the lion's share of which currently goes to wealthier colleges and universities (often private) who have fewer students from low-income families. Logical—no, of long-standing tradition—yes. The magnitude of the disparities is scandalous, and reform is essential.

In the classroom. We need to change the way we evaluate teaching effectiveness. There is a wealth of published literature on the scholarship of teaching that can inform us of better and more appropriate evaluation models, including peer review models and the use of course portfolios. These approaches, if combined with student evaluations, would provide a fairer, more representative picture of the quality of one's teaching.

For some undergraduate courses, we should adopt a model where the course content is delivered in virtual mode and the real-time class meetings are for dialogue and discussion. I came to this idea when I realized that all my words to students about the importance of engagement and critical thinking in the classroom assumed they have the necessary inquiry skills. A few undoubtedly do, but most I now believe need the equivalent of inquiry skills training and experience—which this course format would provide. The way I envision this working is that students would purchase required texts but be given a set of DVDs containing lectures and note versions of PowerPoint™ slides (to be returned at the end of the course for future use). With this format, students can "go to class" when they have the energy, motivation, and interest. Also, any part of the lecture can be re-viewed any number of times; e.g., when a concept is presented that a student finds particularly interesting, perplexing, difficult to understand, etc. This gives more opportunity for thinking about the material and formulating questions and reactions to bring to the discussion sessions. Students would be expected to read the assigned text material, go to class on DVD, and participate in one of two 90-minute weekly discussion sessions. Having two sessions in a class of 30-35 students would mean approximately 15 students in each, which in my experience is about the maximum if the goal is active, full participation. The dialogue sessions would be structured to help students gain experience and confidence in making critical reflection, an essential rather than a chance happening. I think this approach will foster in students a deeper understanding of the material and of themselves—as well as a greater appreciation of other's perspectives.

To initiate this approach and—just as important—to evaluate its impact compared to the more typical classroom lecture format will require considerable investment by the professor plus the willingness of students to try this form of learning. I believe many students and faculty would find this a challenge worth pursuing.

My hopes for this model of teaching bring to mind another favorite quote from Oliver Wendell Holmes, Jr.: "I find the great thing in this world is not so much where we stand, as in what direction we are moving: To reach the port of heaven, we must sail sometimes with the wind and sometimes against it, but we must sail, and not drift, nor lie at anchor."

Endnotes

[1] OIRP Institutional Report, Sept. 2000, covering 1991-1999.

[2] OIRP Assessment of General Education, Institutional Report, Sept. 2002.

Snare, C.E. (1997). Implications of considering students as consumers. College Teaching, 45, (4), 221-222.

Sheryle J. Gallant is an associate professor of psychology. She has taught at KU for 11 years. Currently, she teaches courses in Theories of Personality, Intimate Relationships, Personality Assessment, and Assessment Integration.

Confronting Issues of Student Engagement in Introductory Chemistry

Joseph A. Heppert

Provide students with an experience of scientific inquiry • Induce students to employ problem-solving skills • Help students work together in teams to solve scientific problems • Teach students to employ technology in the collection and visualization of scientific data • Generate student enthusiasm for learning chemical science content • Illustrate connections between chemistry content and the students' chosen field of study • Make connections between chemistry content and national education standards (to meet specific need of preservice majors in secondary science teaching).

Our introductory chemistry sequence is intended to serve all science and engineering majors. We are aware that B.A. and B.S. chemistry majors account for less than five percent of course enrollment in these courses. As a result, the content of the introductory sequence is designed not only to address the needs of students who will continue taking principal courses in chemistry, but also to provide foundations in chemical principles for students in various fields of engineering, as well as biology and the pre-health professional majors. Approximately half of the students enrolled in these courses list either biology or premedicine as their primary major option. For these students, chemistry content forms a critical basis for understanding organismal function at the cellular and biochemical level.

Research also indicates that a significant fraction of the students taking these courses will not persist in a science major. Unlike students who enter universities as social science or humanities majors, nationwide surveys indicate that up to half of the students who matriculate in science majors and go on to receive university degrees will switch into a non-science major track. So, for many of the students in this two-semester sequence, this course may be among the last formal exposures that students will have to the sciences. This indicates that the introductory chemistry sequence does eventually adopt the role of a general education science course for many enrollees.

Like many introductory courses at the university level, the faculty are alarmed at the low level of student engagement in chemistry. One source of evidence for lack of engagement is poor attendance in chemistry lectures, discussion sections, and optional review sessions prior to examinations. Another is the perception of faculty that most students choose to participate in only those learning opportunities that contribute to the course grade. In recent years, fewer than 20 percent of students participated in optional discussion sections associated with these courses, although these sessions are intended to promote understanding of fundamental concepts and develop problem-solving skills. Finally, surveys of students reinforce our impression that they view these courses as academic hurdles and do not consider the content to have high relevance to their future career choices. These observations are all the more troubling because we recognize how central the content in introductory chemistry is for helping students reach a deep understanding of their own major fields.

Many of the initial objectives for the project outlined in the preface were designed, in part, to foster student engagement in these courses. Students were formed into four-member teams which, with a few exceptions, worked together in the laboratory throughout the semester. We also incorporated two additional design features that we felt would foster student connections to the material. The majority of the experiments were structured around a 5-e learning cycle model. This guided inquiry model focuses on fostering learning in the context of problem solving and leaves much control over experimental protocol up to the students. We also incorporated explicit links between chemistry content and the biological sciences into many of the experiments in the new laboratories. Not only did many of the introductions for experiments focus on themes in biochemistry or environmental science, but also the content of many of the experiments was shifted to focus on biologically relevant or explicitly biochemical topics. In-class observations of student interactions showed an increased ten-

dency among student teams to engage in scientific discussions and focus on problem solving issues during the laboratory than were observed in traditional cookbook style laboratories. Janet Bond-Robinson led an extensive study of student perceptions of the team approach to laboratory work, and she found that the average student opinion held that their team had worked extremely well together over the semester.

We were disappointed to learn from focus group studies with students who completed the new experiments that these connections between the chemical content and biology content relevant to their majors failed to foster increased student engagement with the subject matter. This result suggests to us that explicitly identifying the relevance of chemistry content and explaining the scientific and social importance of chemistry concepts is not sufficient to significantly increase student engagement with the material. While the focus group responses provided many positive indications that students preferred the guided inquiry laboratories over traditional cookbook laboratories, only a more extended open-ended research study that acted as the capstone for the second semester laboratory course seemed to dramatically increase student engagement.

What were some of the specific opinions that students expressed about the new laboratory format? During focus groups, students expressed that they enjoyed working in the laboratory and that working in teams was a particularly positive experience. Students expressed a stronger sense of accomplishment in completing the inquiry-based laboratories than they did in working on traditional cookbook style experiments. A four-week capstone water quality laboratory, which provided students with significant freedom in the design and implementation of the experiment, elicited the strongest indications of engagement among the participants. Students identified this capstone experience as the most meaningful activity in the chemistry laboratory. Students did express some frustration at the need for precision in designing and implementing the experiment, but they enjoyed the process of deciding what water sources to examine and what water quality indicators to monitor. One participant suggested that the reason for performing many of the guided inquiry projects earlier in the semester became clear after they completed the water quality study. Students often expressed surprise over the outcomes of their studies. Based on our observations in this study, we believe that providing opportunities for students to take greater responsibility for the design and implementation of investigations in the chemistry laboratory has a far greater chance of fostering student engagement than either incorporating explicit links between course content and themes in their own majors or using guided inquiry models to structure laboratory activities.

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Paradoxical Perspectives: Seeming or Real Contradictions in the Nature of Explanations, Relevance, and Organization

Janet Bond-Robinson

After teaching general chemistry to science majors, I became interested in studying three dilemmas that emerged from my experience:

1. Finding out the student's views of explanations by getting students' input on how explanations help them understand;
2. Discovering what sensitivities on the part of the explainer are necessary for her explanations to be successful in individual students' eyes; and
3. Learning how to palatably fulfill for students my standards for critical thinking and deeper student learning while making the method and organization transparent.

After showing the study and some of its results, I explain my classroom responses to knowing more about my chemistry students and explanations from their student landscape.

Three dilemmas attacked

An undergraduate researcher and I developed an open-ended questionnaire to distribute to CHEM 188 students during the summer. This course is the second semester of a year-long general chemistry sequence. Our questions probed 42 students about their beliefs and experience on the following: What are the pragmatic purposes of explanations? What do students believe needs an explanation? What makes an explanation successful in terms of its "explanatory power" for a student? For example, do explanations fare better if they are physical or hands on, if clear and simple, if repetitive, if a demonstration? Finally, when is an explanation irrelevant to students? We also probed what aspects of explanations and their presentation students desired when they sought explanations. For example, we wondered if good explanations were sensitive to student reasoning in everyday events (commonsensical thinking) and whether domain-specific explanations needed to be sensitive to that particular human everyday kind of reasoning to be effective. Further, we wondered whether students would point out the importance to them of representations that cemented an explanation, such as perceptual or symbolic ones, or physical or three-dimensional models. Were deeper representations that illustrated the connection and distinctions between our readily apparent macroscopic, mechanical world and the world of molecules and their mechanical processes important?

My interest in critical thinking and understanding requires that students be willing, or able to become willing, to take more responsibility for their learning by reasoning and talking in the discipline. The key to student involvement in critical thinking is the issue of relevance that we've all heard about many times: Enough and the right kind of relevance can motivate students to do the extra work of thinking rather than merely receiving knowledge from an authority figure. I wonder sometimes whether we professors realize how science instruction shows science as very similar to other authority-based institutions. For example, if students buy into the authority of the mouthpiece at the podium rather than expect to be guided through scientific reasoning about aspects of the natural world, what viewpoint of science have instructors condoned? We must judge whether facts of the discipline as sole content are important enough to squelch the development of disciplinary reasoning. I believe science professors must weigh the critical-thinking conception together with the content conception of teaching on the bases of attributes of each, a balance of each, and a way to provide opportunities for continuous interplay of disciplinary facts with reasoning.

Results

How students view explanations. The purpose of the initial survey was to see the various connotations and usages of the term, explanation, the issue of relevance in explanations, and student's individual meaning for the goal of understanding. We saw that they mentioned four different aspects of explanation that we organized into quadrants: One axis has (a) what needs explanation (nat-

ural phenomena) versus (b) standards for a good explanation; the other axis has (c) explanations given publicly versus explanations used privately to build understanding. As to what needs explanation, students mentioned explanations about three aspects of knowledge: facts of the discipline that were related to natural phenomena; procedural knowledge such as how, when, or what to do; and a clear desire for applications of the knowledge that we assumed meant how
that knowledge contributed to a natural phenomenon and how this knowledge is used in other applications.

Our results showed generally that the students' responded that they needed explanations related closely to their knowledge which were relevant to them personally. Generally, students expect clear explanations of content they need to know. They want explanations that are simple as opposed to complex or technical, concrete as opposed to abstract, and closely linked to their current knowledge. Private standards for a valued explanation were personal connections to their aptitude, intelligence, and learning style. Overall, reasons made ideas more comprehensible for them. I was happy to notice that a significant number said good explanations helped in comprehension and in remembering, because these inspired confidence that many students might be organizing knowledge for the long

Table 1. General demographics of CHEM 184

Gender	52% female	48% male			
Previous schooling	95% U.S. or Canada	1% Asia	1% Mexico, Central, or South America	1.5% Middle East	0.5% Europe
Year in college	60% freshmen	20% sophomores	12% juniors	6% seniors	1% graduate or professional school
Percent of class:					
36% physical science majors	20% of class engineering	10% of class pharmacy	2.5% of class chemistry	2.5% of class geology	1% of class physics
48% life science majors	23% of class premedicine	13% of class pure biology	5% of class exercise science	4% of class allied health	3% of class biochemistry
16% of class undecided major	8% which science major	8% but *not* science major			
Math preparation: 13% don't meet prerequisite	9% no precalculus	4% enrolled in precalculus	6% completed precalculus	32% enrolled in calculus	47% had some calculus
Chemistry preparation: most recent	10% no high school chemistry	60% 1 year high school chemistry	11% 1 year AP high school chemistry	8% 2 years high school chemistry	10% college chemistry
10% most recent college chemistry	2% repeating CHEM 184	4% 1 semester community college	3% KU's CHEM 124/5	1% 2 semesters community college	
Job time/week	40% 0–5 hours	18% 5-10 hours	30% 10–15 hours	10% 15–20 hours	2% 30+ hours

term rather than for short-term test performance.

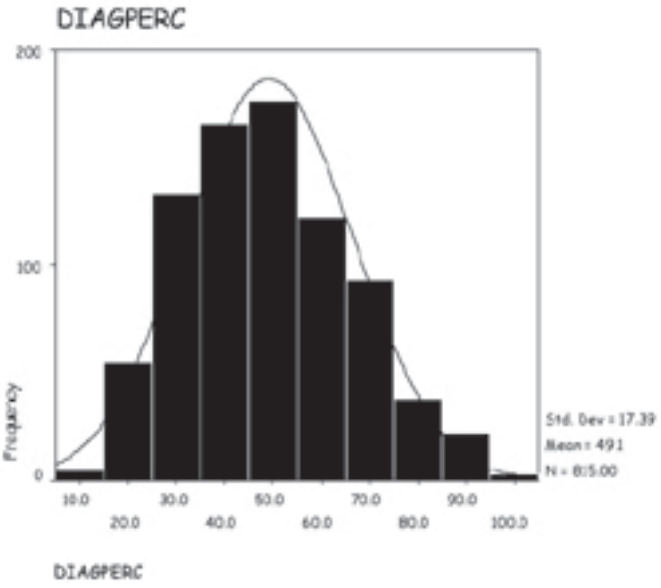
My undergraduate researcher and I constructed a second multiple-choice survey from the data supplied by the initial open-ended response survey. This anonymous survey was given to the CHEM 184 students during the first chemistry lab session with questions on explanations, learning approaches, and demographics, which were given at the start of all large chemistry classes I've taught, just to get a better conception of the student population. Questions about learning approach measured rote and meaningful learning strategies. In this paper, I focus on parts of the database rather than the whole: data from the first survey on explanations, demographic data from the second survey, data on prior knowledge from the diagnostic exam, and student comments during the course and from my evaluations at the end of the semester.

Student demographics in fall general chemistry. The large (over 800) fall semester student population of general chemistry, CHEM 184, which is designed for science and engineering majors, is wildly diverse, both in number of variables important to learning chemistry and the wide range among students on each of these key variables. Completion of prior chemistry classes range from none (10%) to two years (nearly 20%), including AP chemistry; about 60% have had one year of high school chemistry. The prior lab experience ranges from none to a considerable amount. Math preparation is quite variable along a continuum from uncomfortable with algebra to completion of a year of calculus. These majors vary among their areas of study and career plans: engineering, physical sciences, pharmacy, molecular biosciences, zoology, botany, premedicine and allied health sciences, and exercise science. See Table 1 for specific details of diversity distributions on each factor.

Prior chemical knowledge distribution. A diagnostic exam identified students personally and provided insight into their current level of chemical knowledge (as could be measured by a multiple choice, standardized exam). The mean for current knowledge was 49%, but the scores varied from 9% to 95% on a 44-question diagnostic exam, which is a remarkably wide range for background knowledge in a course.

Figure 1 shows the distribution graphically. Since 90% of these students finished a chemistry course(s) in high school or college, I predicted a narrower range than was found. The diagnostic score represents a number of factors; for example:

- Did a student have a strong chemistry course?



- Is the student comfortable using algebra and solving problems?
- Did she or he learn for long-term understanding?

Figure 1. Distribution of diagnostic exam in second week of class.

Our fall honors class, CHEM 185, enrolls 50 well-prepared students. The average diagnostic score for those students is about 75%. Other well-prepared students prefer to enroll in CHEM 184, which they perceive correctly as easier; some drop 185 and enroll in 184 after they realize the workload and math level in 185.

More advanced courses in the chemical curriculum don't have remarkably wide background knowledge diversity, because the background knowledge that students possess beyond general chemistry has generally arisen from common sources. Students have considerably less previous background about topics in the second semester of general chemistry, and little or none in organic, analytical, or physical chemistry. In organic and upper division chemistry, students' knowledge levels vary most often for individual student reasons. The wide range in general chemistry, in contrast, goes beyond individual differences and clearly indicates a wide range of opportunities to enroll in one, two, or advanced placement chemistry. One cause for 10% of students enrolling in CHEM 184 without high school chemistry is lack of career knowledge. Some students, particularly those interested in health occupations, were more likely to take a second year of biology in high school. They got to

KU surprised they needed chemistry.

Changes to the course

My account ends with the story of how I approached CHEM 184 this fall as a result of this new knowledge from students and what has happened concerning the seeming contradictions about the nature of good explanations, good organization, and relevance between me and my students.

The knowledge that students want explanations that are personally relevant to them was illuminating, especially when imagining how to meet the following challenge in a large, diverse undergraduate class: Needed explanations should be closely related to their knowledge, clear about content that students need to know, plus simple, non technical, non-complex, and concrete as opposed to abstract. Furthermore, students wished for personal connections to their aptitude, intelligence, and learning styles.

Since it was impossible to meet individual needs for personal relevance in a large, diverse class, the only strategy that seemed viable was creating personal relevance. Created personal relevance for all students could be a common experience among all motivated class members who planned to do well. I decided to create personal relevance by the kinds of requirements and activities that the course contained. Table 2 illustrates the learning environment, curricular, assignment-oriented, and assessment features that could provide a common sense of relevance. The table gives an over-view of my reasoning.

I noticed several changes that occurred as a result of making problem solving the central feature of lectures. One of them was that lecture time was quite highly focused. I found writing lectures to be remarkably different when organized around problems to be solved in class. Second, the format of the class became predictable; something I hoped would make the organization more transparent (but possibly boring). Another benefit of problems was that the important concepts were clearly identified by me as those needed to solve end-of-the-chapter problems that I modeled during lecture. I hoped that students would come to recognize this fact at "gut-level." I am making the distinction between intellectual knowledge gained when someone tells you information versus realizing the implications of knowing something. Finally, a significant portion of the class was spent at the overhead, where I wrote, spoke, drew pictures, and generally reasoned out loud. I did the problems prior to class in fairly large print. During class I reproduced them for students in real time.

Many students told me they hated to miss class because they missed the kinds of problems done that day. Thinking about the diversity, these students were probably less comfortable with chemistry or with math applications or found that they didn't remember very much from previous chemistry classes. Since 20% of the class had two years of high school chemistry or AP

Table 2. Adjustments made for fall CHEM 184-03

Purpose of adjustments: To create a common personal relevance for all motivated students

Online problem sets
1. Related intrinsically to course text
2. Prompt feedback
3. Significant points: 100 possible out of 1000 for course

Curriculum
1. Increase personal relevance of lectures
   - Explicit relationship between class problem solving and online problems
   - What teacher does in class = What students do on exams
2. Explanations of concepts as those concepts are relevant in problems
   - Combined synchronous use of PowerPoint™ and overhead
   - General overview: outline and definitions on PowerPoint™
   - Reasoning through many problems using an overhead projector

Critical thinking
1. Increase opportunities for students to witness and follow reasoning
2. Increase opportunities for students to reason about chemical content
3. Assess reasoning

chemistry, these students were likely to be bored by the format and the tedium of problems, which they didn't find problematic. Many students told me I talked too fast at 8:30 in the morning; they couldn't get everything down. Other students told me that the class was unbelievably slow for a college-level class. After seeing the multiple diversity spectra, you can believe such dichotomous comments were fairly routine occurrences.

The class was less vague, more focused on problems, and busy for students in terms of weekly or 10-day assignments. More serious difficulties than slowness or boredom lifted their ugly faces; that is, differences in the meanings of understanding, the purpose of reasoning through concepts, and scientific explanations versus personal explanations of science. One example became very common: Understanding as the "right answer," and explanations as procedural explanations about how to get the right answer. One student, let's call her Student A, who did very poorly on an exam (52%) said to me, "But I understood everything perfectly when I went in to take the exam. How could I only get a 52?" (I was puzzled as to what "understanding perfectly" meant because I can't recall ever saying that I understood something perfectly.) So our problem is one of determining what she meant by understanding, particularly if it could be perfect. She told me had a wonderful high school class. During the conversation I looked up her diagnostic score. If you recall the mean of the diagnostic exam was 49%; her score was only 29%. One of her high school friends in our class, who took the same high school course, scored much closer to the mean, 43%. In a case such as this it seemed as if Student A wasn't getting chemistry into long-term memory, which is often the case when students memorize definitions and algorithms rather than attempt to understand how things work. Two consequences of holding a definition of understanding like Student A's are: 1. She didn't do well on a college diagnostic exam; and 2. She wasn't doing well in college chemistry using the same strategies. As we tried to discuss her situation I tried to steer her towards thinking about changing how she studied, but she was very defensive and angry.

Another Student (B), who performed nearly as poorly, explained, "You only do the easy problems in class. I know because I've gotten many of the right answers and then didn't have to listen anymore." Reasoning about problems is the action that explains why we incorporate particular and important concepts, which should increase applicability of concepts to other problems. The purpose of my taking time to reason was lost to Student B. Second, we have to take into account that most of us have experienced how much easier it is to watch someone else do something than it is to do it ourselves after watching. Many students use answer books as study manuals rather than references. The student looks at how the problem was done, thinks "That makes sense," and moves on, without seeming to realize a rather large gap exists between observation and doing. When it comes to solving a problem similar to those read about in the solution manual, she or he may not remember the crucial parts to execute. We usually remember aspects of a problem with which we struggled and may have even required us to look at the solution manual. Without personal struggle and reasoning, students really don't know the essences of solving problems such as those I practice in class and in their homework. I began to notice that many students were treating the online homework problems like a battle of wits with the computer—instead of reasoning, they were getting quick feedback and then trying to figure out what was wrong in their reasoning if the problem was incorrectly done.

Conclusions and comments

The changes were met with mixed results. Some students didn't see organization and complained about it on evaluations. Many still found that my explanations didn't help them and, in fact, confused them so much they had to study the book. A few individuals commented on the reasoning through problems, but mostly to point out that I didn't take all the steps, went too fast, or only solved the most trivial of problems. Many students still saw no relevance of lecture to exams and complained that they had to teach themselves. Generally, many students seemed to hate this approach. Student evaluations are not given to me as a file, so I can't check for statistical correlations between questions so as to group student statements that might enable inferring their background levels. I have a hunch that the most irritated students are those with significant background knowledge, such as several students who said the class needed to be much more challenging. I suspect they would have been eligible for

CHEM 185 but didn't want to risk a lower grade. But these are mere speculations without correlational data.

In conclusion about my study of three dilemmas that emerged from teaching general chemistry to science and engineering majors, I discovered at a much deeper level that many, many students do not have the same

meaning for the terms, understanding, and explanation that I utilize when I lecture, design problem sets, or write exam questions. For students, explanations function as personal tools to successfully do what needs to be done (in their eyes). I discovered that the required sensitivities of me as the explainer were the following: relating to the individual's knowledge level for the sake of clarity, using simple and non-technical explanations in fairly familiar language, and connecting with the individual's learning style, intelligence, and interests. These are necessary for my explanations to be successful in individual student's eyes. I have not yet come close to my goal of mastering how to fulfill standards for critical thinking and deeper student learning, which are palatable to 75-80% of students, and which at the same time give the method and organization transparence. Now what are my scholarly classroom responses to knowing even more from their student landscape? After every course I waver about whether I ought to teach more in the manner in which I was taught science, and after this major scholarly effort, I feel discouragement that students will not buy in to my methods. As a newer professor, perhaps they hope I won't stay around long enough to "get my way."

What about students achieving "gut-level knowledge," referring to the distinction between knowing the implications of knowledge because of work done on those concepts versus intellectual knowledge gained when someone tells you information? I feel discouraged that many university students are so focused on jumping through hoops that they can't slow down to smell the roses, experiencing the beauty of disciplinary thinking. As faculty members we have to consider whether by not pushing and by not modeling disciplinary reasoning we disadvantage our students. Student evaluations will probably seldom complain that students didn't get enough chances to reason scientifically through the course. I would love to be wrong! We all realize, of course, that it will require a change in the professorial role that consistently expects reasoning performance from students in each discipline. It might not even require waiting too long to hear KU faculty say, "Gee, these students sure can think!"

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The Challenge: College Students Seem to Be Getting Younger

C. R. Snyder

In the beginning, when I started teaching KU undergraduates as an assistant professor in 1972, I was 27 years old. Because my undergraduate students were about 21 years old, we basically had shared many of the same life experiences—historical events, recreational interests, music, and so on. All of these age-related similarities contributed to relatively easy communication in teaching my content area, the psychology of individual differences.

The gulf widens …

And then it began to happen. Slowly at first, and then with an accelerating pace as the years rolled by. No longer was I just six years older than my undergraduate students, but the age difference widened. At first, it was 10, then 15, and soon 20 years—by now some of my students were the sons or daughters of my previous students. Of course, this age gulf continued to expand from 25, to 30, to 35 years, all the way to the present 39 years. Imagine my surprise this past fall when one of my undergraduate students came up to me after a lecture and announced that she was the granddaughter of a KU student whom I taught in 1972!

These made it obvious

Along the way, a multitude of classroom events made it clear that this age gulf was increasing. Here are but two examples:

- I often play music in class to help make various points. Eventually, however, the students began telling me, in not so subtle ways, that they didn't like "my" music. In time, they not only didn't like my music, but they hadn't even heard of it (except for a few fans of the oldies).
- The students were incredulous when I would ask a question such as, "Remember where you were when President Kennedy was shot?" They replied, "Well no, I wasn't even born then!" or "My parents weren't even born then!" Perhaps the most puzzled response was, "Which one was President Kennedy?"

Why all this concern about temporal context?

You might be wondering what the point is of these musings about the age gulf. Why, beyond my own personal self-insights, would I be discussing this issue with other instructors? My answer to this question comes in the form of a conundrum, which is, "What is the only minority group that most people will join?" Answer: "The elderly." For the younger instructors who are reading this, therefore, some day (surprisingly soon) you will be an older professor and will need to face this age gulf issue.

Beyond the tautological point that instructors become older, there is a more crucial reason to be concerned about the potential gulf in life experiences that grows between instructors and their students. Namely, I think that the temporal context provides a means of helping to teach content. That is to say, if students can learn new concepts in terms that they can make relevant to their ongoing lives, then the chances are greater that they will understand and use those concepts. When we are young instructors, we use words and events that are familiar to our students. As we get older, however, we no longer can do this naturally.

Forever young?

So, how can we achieve the kind of communications that characterize a lively classroom—one that is filled with learning by an instructor and students who share similar temporal backgrounds? To begin, I can tell you one thing that does not work. Have you ever seen a 50s- or 60s-something professor who is trying everything possible to be as "hip" as his or her 21-year-old students? I do not know what is most pitiful about this specter. Is it the aging professor's youthful clothes that look so wrong? Is it the out-of-place punked hairstyle fashioned on a head with far too few hairs? Or, is it the graying professor's awkward attempts to borrow college students' language? It is folly, in my view, for an older instructor to try to remain "hip" and be part of the young crowd. Indeed, I think that such professors

come across as ludicrous and pandering. Give it up, I say,

for it is only when we are young—for it is who we really are then—that such hipness is appropriate. Additionally, the truth is that our students do not want a hip-hop "pal" as their instructor.

Because of our disparate ages, the distance between my students and me is a reality to be faced in my teaching. What can be done to meet this challenge? This question forms the core of this essay.

The solution: Make concepts come alive

Our ace in the hole as instructors is that we truly know our material. I think that this is what students really want from instructors anyway. The reason that the lack of an age gulf worked to my advantage when I was younger was that this helped to foster student interest in, and understanding of, the material. But, there are other ways to achieve this same goal of engaging student interest and understanding. I discuss some of these strategies in the remainder of this section.

Survey students about important events in their lives. I bridge the age gulf, in part, by calling upon the very best experts on students' lives—the students themselves. There are two ways that I do this. First, early in a semester, I often give a short, anonymous questionnaire in which I ask my students about the most positive (what I call the "highs") and the most negative (the "lows") things that have happened to them in the last five years. When I have done this, the female students report "highs" involving the gratifying aspects of intimate relationships, and "lows" pertaining to the troubling parts of such relationships, including breakups, abuse, and even rape. The male students, on the other hand, report "highs" involving accomplishments in sports, academics, etc., and "lows" involving accidents or deaths of male friends (young males, being high in risk-taking, are extremely accident-prone). Perhaps the worst of the reported "lows" for all students, however, involve the deaths of their parents. Knowing that a fairly high percentage of my students have experienced these particular "highs" or "lows," I can weave the content of specific lectures or exercises around these student-disclosed issues, thereby increasing the likelihood that the students will relate to them.

Second, once I have explained a concept in class, I ask my students for examples from their lives. With a little patience on my part, students typically are willing to share their related experiences. Furthermore, if one student volunteers a personal example, this often unleashes many other students who also want to describe their relevant escapades (for related discussion, see Snyder, 1972).

Doing experiments or demonstrations in class. In teaching psychology, I have the advantage of being able to perform modifications of various classic experiments. This brings the contents to life, and my students can see phenomena unfolding before their very eyes. I have published several of these classroom experiment/demonstrations so as to share them with other instructors (see Snyder, 1997, 1999, 2003).

Perhaps an example may help here. One concept that I teach is "unique invulnerability," which is the propensity of people to believe that the bad things in life are more likely to happen to other people (or conversely, are less likely to happen to them). This is a very strongly held belief. To help demonstrate this belief, I perform a class experiment involving the age at which students believe that they are going to die (see Snyder, 1997, 1999).

This exercise begins with my giving students the latest actuarial information from insurance companies regarding their age cohort; i.e., the projected ages of death for 20-year-old students who presently are in college. After presenting these data, I hand out small white cards, and then I ask each student to write her or his sex, along with the projected age at which she or he will die (their names are not written on these cards). The cards are collected, and my teaching assistant randomly selects 10 from men and 10 from women. Beforehand, I have prepared a transparency showing age span on the left vertical axis, with a separate column for males and females. My teaching assistant then calls out each student's projected age of death, and I mark an "x" at the appropriate point on the vertical age dimension of the transparency chart. One by one, the marked "x's" appear much above actuarially projected ages of death. Both the men and women estimate, on average, that they will live anywhere from 15 to 20 years longer than the averages for their cohorts. By now, the students are very excited. Some are speaking up to strongly defend why they really will live longer, whereas other students are countering their fellow students' rationalizations with intended humor such as, "Oh sure, I bet these insurance companies have set these age points because they are stupid!" The classroom atmosphere is electric at this point, and this is precisely what a good class experiment should accomplish.

Reenacting famous events in psychology. This technique involves developing a "screenplay" for famous

historical events, and then asking class members to play out various parts by dramatically reading from scripts. It is helpful if the instructor also plays a role and, the worse the acting, the better the exercise in the sense of creating interest. When the in-class recreation is completed, students enjoy talking about why the various real people in the scenarios said and did the things that they did. Such discussions lead to more in-depth insights into the concepts being taught.

Spontaneous humor along the way… A quick wit, especially if it is self-deprecating, can help increase students' levels of attention and enjoyment as they learn. In this regard, I share my personal motto with students: "If you don't laugh at yourself, you have missed the biggest joke of all." I practice this motto as a teacher, and in my life more generally. The teaching arena, in whatever small or large forum that it takes, should be a place where the instructor has the freedom to take risks so as to promote student learning. This view, accompanied by a willingness to laugh at oneself, is important because not all educational exercises work. In these latter instances, I use my own gaffes as examples to help make points that are related to whatever I might be teaching (Snyder, 2002). This willingness to find humor in teaching also makes the classroom a more enjoyable place for both instructor and students.

Display your enthusiasm for your subject matter. Make a point to show students how excited you are about your topic (Snyder, 1971). If you are not engaged and enthusiastic about the material, how do you expect your students to be? Enthusiasm is ageless, inviting, and infectious. I firmly believe that whatever their topics, instructors are role models in showing students how science and the humanities are alive, exciting fields that have captivated thinking people for centuries. This instructor enthusiasm also sparks students' motivation to learn (Snyder, in press).

Treat student questions with respect. If a student asks a question, do your best to answer it. If you don't know the answer, say you will try to find it and follow through. Student questions also represent excellent opportunities to help make material "come to life." This follows because a question gives the instructor clues as to how students are interpreting the material.

I think that a good classroom is filled with questions, and a sensitive instructor uses those questions as barometers regarding how material is being absorbed.

Closing reflections on respect: We/me

Older professors have earned their gray hairs, and they deserve respect. Of course, it is important not to go overboard with this respect thing. In my experience, if you respect students, they will reciprocate. Of course, my present students test the limits, but they are no less considerate and civil than those whom I taught four decades ago.

I try to see that my classrooms become "we/me" environments where the students and I join together to explore a particular topic. If we can establish shared goals for the class, then I think that both my students and I will be more likely to learn (Snyder, in press). Moreover, with such shared goals, we both will look forward to the learning process. Learning, when peeled to its core, is an ageless process that involves the reciprocal exchange of information and insights among people. As the title of my essay suggests, it is a verity for aging professors that, "the college students seem to be getting younger…" As long as the students and instructor remain enthralled with the learning process, however, this age gulf is irrelevant.

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Must the Medium Be the Message? Instructional Technology as a Modest Anchor for Undergraduate Instruction

Earle Knowlton

Many of my most embarrassing moments in 25 years of teaching happened early in my career. Chief among these was the time, after assuring my class of grizzled school teachers that it is physiologically impossible for a person having a tonic-clonic (grand mal) seizure to swallow his or her tongue, a woman raised her hand, declared she indeed could swallow her tongue, then graphically demonstrated this feat for our class and their rueful instructor! Another embarrassment occurred during a graduate-level special education survey course when I informed the students that blindness is defined legally as 20/200 acuity, with correction, in the person's best eye. At that pronouncement, one of the students, an English teacher for longer than I had been alive, admonished me that, assuming this visually challenged person had two eyes, proper usage would have been "better eye."

There have been many other embarrassing moments for me as a teacher, but the one most pertinent to this essay occurred only a couple of years ago. I had returned to full-time teaching after a brief stint in administration and had been given the luxury of time to explore better ways to approach a difficult-to-teach undergraduate survey course the Department of Special Education offers to teacher education students in the School of Education. For reasons I discuss in the remainder of this essay, I elected to pay periodic virtual visits to my wife, Suzanne, and her special education pupils at Sunflower Elementary School in Lawrence, and to take my teacher education students with me. Such 21st century field trips are mediated by video conferencing technology, using a small camera and microphone rigged through a computer to the Internet, connecting our classroom in J.R. Pearson Hall and Suzanne's classroom at Sunflower. Our first excursion in the Spring of 2001 was greeted by a glut of glitches occasionally punctuated by, voila, a successful video/audio transmission from time to time! I had 60 students in class that day, and an army of techies puzzling over hundreds of multi-colored wires tumbling out of the back of the "tech cabinet" located front and center of 150 JRP.

Neither I nor those students remember a nit of what was transmitted that day. Surely, as McLuhan and Fiore (1967) once suggested, the medium became the message, and in our case the message was clear: You're a damned fool to try anything but the simple, so-called "safe technologies" to mediate the delivery of your course content. Stick with overhead transparency projectors (the worst that can happen is that a bulb could burn out), or use the white board (maybe you'll faint from the marker fumes). But it's foolhardy to employ exotic gadgetry because you're just asking for grief. The worst-case scenarios are outright embarrassing and even humiliating. After all, I'm the expert, here, right? And, these students will soon be teachers; a teacher of teachers should teach impeccably.

Why, then, would I want to place video conferencing at the center of my instructional delivery to teachers-to-be, of all people? And, how can I ensure that the real message is the course content and not this medium of delivery?

Anchoring instruction

The answer to the first question is an easy one. In introductory, undergraduate survey courses, we tend to organize and present content in separate, self-contained units, each consisting of a lecture, textbook and supplementary readings, and maybe a PowerPoint™ presentation and video clip or two. Consequently, undergraduate curricula, particularly in professional schools such as education, risk bypassing meaningful social contexts in which students need to test for themselves newly acquired knowledge and skills. When we attempt to prepare teacher education students for the inevitable pupil diversity that characterizes schools, we tend to give them a vacuous "take" on the many and varied childhood conditions that can result in learning problems in school contexts. We employ a one-size-fits-all model of instruc-

tion that is decidedly "acontextual." Teachers report that their university preparation was heavy on theory that rarely carried over to the realities of modern schooling. They reflect on their teacher education programs as not properly equipping them to enter this ever more demanding profession; they see university instruction as not anchored in real and relevant professional contexts (Heiserman, 2003; Knowlton, Rowland, & Smith, 2004).

Long before the techno-wizardry of our times, Alfred North Whitehead expressed concerns about the tendency of schools and colleges, and their teachers and professors, to promote the acquisition and mastery of inert knowledge (Whitehead, 1929); that is, knowledge that could be stored and recalled on demand by the learner but not applied to relevant, everyday problem-solving in useful ways (Brown, Collins, & Duguid, 1989). For it to have applied significance, newly acquired knowledge needs to be situated within a meaningful context so that actions related to the specific knowledge base of concern, e.g., what a classroom teacher should do and not do when a pupil experiences a seizure, are grounded in the concrete situations where they occur rather than merely presented as context-free facts, assertions, and/or exemplars (Langone, Malone, & Clinton, 1999). We can read about seizures and how to respond to them, hear a lecture on the topic, and even engage in a role-play exercise. But, only when we see and hear a person experience the seizure, and watch another respond to it appropriately, is the pertinent knowledge situated in a manner that will enable proper practice and application on our part (Knowlton, Rowland, & Smith, 2004; Langone, Malone, & Clinton, 1999).

Ted Hasselbring at Vanderbilt University promotes anchored instruction as a key method of teacher education wherein digitized, interactive video-based technology serves as the mode of instructional delivery. Hasselbring (1994) employed CD-ROM technology to anchor instruction within relevant social contexts, thus creating opportunities for situated learning on the part of teacher education students. For example, teacher education students in the Langone, Malone, and Clinton (1999) study were randomly assigned to an anchored or a traditional instruction group to learn about various augmentative communication devices for pupils with severe, multiple disabilities. For both groups, the instructor presented an organized series of PowerPoint™ slides that students examined and about which they recorded notes. Students in the anchored instruction group also were guided through a series of video disc clips hyperlinked to the PowerPoint™ content. The anchored group interacted with these hyperlinked clips that were between five and 20 seconds in length and supplemented the content with illustrations and demonstrations of various augmentative communication devices. The study's results, in terms of student performance, favored the anchored instruction group.

While such research data compelled me to look closely at video technology, I was less than fully impressed with the contrived nature of the CD-ROM format. I had heard, and now know thanks to Racine and Dilworth (2000) among others, that the corporate world has been conducting live, "virtual meetings" for years now—and quite efficiently. Point-to-point video/ audio connectivity in real-time via the Internet, i.e. video conferencing, has enormous potential to enhance undergraduate curricula in significant ways (Falconer & Craft, 2002; Matthews, 2000). My colleagues and I are finding that video conferencing can enable undergraduate teacher education students to acquire a deeper understanding of children with disabilities and their special needs, given this technology's potential responsiveness to the increasingly diverse backgrounds and cognitive styles of today's undergraduate students (Heiserman, 2003; Knowlton, Rowland, & Smith, 2004; Smith, Knowlton, & Chaffin, 2003). Using a Polycom ViewStation®, a computer, and the Internet, users can see, hear, and converse with one another as if they were interacting face-to-face. Students on campus can unobtrusively observe and interact in real time with pupils, their teachers, parents, principals, and others at remote sites.

Content or medium?

However strong the potential of technology to enhance undergraduate instruction, there are clear challenges involved. This brings me to the matter of the second question: How can I ensure that the message to students is in terms of the course content rather than the medium of delivery?

We've minimized and, in many instances, eliminated some of the challenges during two years of using video conferencing in the introductory special education course. Issues we've confronted include the song-and-dance nature of the equipment and its tendency to upstage our instructional goals. Another daunting risk of course is that techno-glitches can render us out of control in the eyes of our students, many of whom are more tech-savvy than we! We also have tried to take to heart history's lesson that with each new and significant inno-

vation, its effect was more supplemental and preferential than supplanting in nature and form. The printing press never did completely eliminate the oral tradition, nor has e-mail replaced the telephone. Similarly, I think, video conferencing technology will not supplant our need as teachers simply to talk to students, to have them read, think critically, discuss issues in class, and so on. There is, however, a preference, in my view, of using this technology to transmit real and relevant contexts to my students in the comfort of their own classroom when such transmissions will help them learn more effectively. As one student remarked last year, video conferencing "has brought theory to life and life to theory." Therefore, when we use video conferencing, it is with respect to it as a preferred mode of instructional delivery and certainly not the only mode of delivery.

A perfect example comes to mind when our students participate in their student teaching and internships. In this regard, the student is physically present every day, all day in the classroom. Video conferencing is not really a mode of instructional delivery as much as an efficient means for us to observe and communicate with the student and her or his mentor teacher. The technology saves us enormous time and money yet allows us even more time for observation, critique, and garden-variety housekeeping. However, we still visit the student in the classroom. And, heaven forbid, if the student is struggling, video conferencing could never replace the necessity of personal visits.

Now, as to appearing to be out of control from the students' point of view, I ask you, what else is new? Remember that old Crosby, Stills, Nash, and Young song, "Teach Your Children?" In it was a lyric that advised, "Don't you ever ask them why; if they told you, you would cry. So just look at them and sigh and know they love you."[1] The older we get, the goofier we seem to them anyway. What difference does being out of control, or being perceived to be out of control, really make?

I suggest, nonetheless, that the opportunity for a wonderful teachable moment arises when, in the face of a glitch, you call on a techno-wizard or two among your charges either to fix the damned thing outright or fetch someone who can. I have found that, at least in our shop, while we appear to be in good shape insofar as technology hardware is concerned, we need to shore up the trouble-shooting support. I've been quietly advocating that our School pay at least some heed to this issue, or those of us without engineering degrees taking baby steps into technology's tall fescue are bound to be bitten by the chiggers of Murphy's Law. I've suggested to my superiors that any instructor teaching in one of J.R. Pearson Hall's technology-enhanced classrooms be given the name and phone number of one of the tech support staff members at the beginning of the semester, and that this support person be on-call throughout that instructor's class period. This is the least we can do. Until such support is forthcoming, I simply ask our students to help out and, failing that, always come prepared with a Plan B!

This brings us to the final and biggest challenge as I see it: preventing the medium from becoming the message. Recently, a friend of mine bought a Personal Digital Assistant (PDA). He had been existing quite nicely with his calendar book, Rolodex, and Post-its™ . Nonetheless, he felt compelled to have a PDA. He experienced the usual initial awkwardness that most PDA users report. But, some weeks later, not seeing my friend and his PDA conjoined, I finally asked him where it was. "Well, I discovered I didn't really need it after all," he said. Prior to this realization, my friend was emblematic of the rush to high-tech sans raison d'être! None of this stuff makes any difference whatsoever unless the technology can have a significant impact (for the better) on our work.

Related to this notion of careful examination of the potential utility of technology is the need to balance appropriately the Hollywood glitz of a high-tech classroom and our curricular and instructional goals. The J. R. Pearson classrooms are equipped with visual presenters (Elmos). As far as I can tell, Elmo does everything an overhead projector does—and more. It saves you from having to press transparencies since Elmo is the modern equivalent of the old opaque projectors that projected hard copies of books, articles, and the like onto a screen. It also features automatic zoom and focus. I do not see a downside to using Elmo instead of an overhead projector.

On the other hand, many of us use PowerPoint™ slides. Is there a distinct advantage to me in using PowerPoint™? Yes, I can use the web, download all sorts of materials, use sound and video clips, generate a content outline for students, and the list goes on. Thus, for these features, PowerPoint™ is preferable to Elmo. While Elmo doesn't allow me to do those things, if I have a hard copy of material that I can't or won't digitize, Elmo is preferable to the overhead projector. I don't advocate any reader adopting these thoughts of mine, but I am suggesting that you adopt this form of thinking in regard to the utility of technology tools for instruction.

Content can supersede the medium

Finally, and most important (and personal): On that day not too long ago when my 60 students watched all those techies play with all that wire, the real reason for our disaster was not the glitchful equipment at all. The real reason was the fact that the content of the transmission that day was insufficiently compelling to compete in novelty, attractiveness, or import with the medium of the transmission. Just a couple weeks ago, my class and I interacted with Suzanne, one of her pupils, and Peggy Dey, the school psychologist. The child is diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), and our students had prepared questions for him as well as for Suzanne and Peggy in his absence. The week before, we met with Suzanne and another pupil, this one diagnosed with a central auditory processing (CAP) disorder and, hence, a learning disability. We saw him receiving reading instruction, and we engaged in a Q&A with him and Suzanne. With respect to content development for these conferences, we have come a long way, though we still have much more to learn and to do in terms of perfecting them. Regarding the quality of these two transmissions, in plain words, they stunk. They were far more choppy than our first transmission in the spring of 2001, and we were disconnected via the Internet over a dozen times each class period. Though we are working with the school district to improve these transmissions that, until this semester, had at least been of acceptable if not high quality, we will need to live in this clap trap for the rest of the semester, no doubt.

Here's my point: Despite the almost literal disintegration of transmission quality this semester, clearly a setback insofar as our overall goals for video conferencing are concerned, my students were not at all put out. Although a slightly audible groan was heard with each disconnect, we simply redialed Sunflower's Internet Protocol number, and we were reconnected immediately, albeit temporarily. I am now convinced (by perhaps a no-brainer come to think of it) that when you transmit compelling content, the quality of the transmission takes a back seat to the relevance and the applicability of the content.

This then is the keystone of situated learning effectuated by anchored instruction. Suzanne's two pupils indeed were compelling to our students. The child with ADHD explained what school was like when he was and was not on his medication. He brought forth some true wisdom for our teachers-to-be: "Sometimes, all I need is just a little more time to complete my work." He also played right into my hands as I always try to use self-deprecating humor as a teaching tool. Suzanne had asked him if he knew who I was. "Oh yeah, I know," he said. "That old guy there is their janitor, right?" (Funny, I always thought I looked younger than my years in the video conferences.)

The child with CAP demonstrated some classic problems with listening comprehension and dysnomia (word-finding). The students had read about these difficulties that some children with learning disabilities experience. Here, they saw them first hand, led as apprentices by a mentor (Suzanne) who showed them the profession's best practices for accommodating such difficulties. Plus, this kid was cute—really cute. Actually they both were cute. This child, though, despite his disability, had a wonderful repartee with Suzanne and our students. He too thought I was an old man, though not a janitor. "Isn't he the plumber over at KU?," he wondered out loud.

However strong the potential of instructional technology to enhance undergraduate teaching and learning, there are clear risks involved. We've minimized and, in many instances, eliminated several of these risks during the two-plus years we've used video conferencing in the introductory special education course. Issues we've confronted include the song-and-dance nature of the equipment, its threat to upstage our instructional goals, and the daunting possibility that glitches of the high-tech kind will render us foolish in the eyes of our students. We've taken steps to solve and prevent such problems in humble, humorous ways and hope to have offered some gentle guidance to those of you still reticent to take a virtual walk on the wild side.

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Endnote

[1]Lyrics by Graham Nash

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