Critical Thinking by Design

Joanne Gainen Kurfiss, *Santa Clara University*

Students frequently complain when professors require them to think critically about course concepts. Professors, in turn, are often surprised or even offended by these complaints. Yet when we consider the intellectual demands of critical thinking, and the virtual absence of instruction students receive in how to use knowledge, we can see why thinking critically about an unfamiliar subject might be challenging- even threatening-to many students.

Critical thinking is often thought to be a general ability that students either possess or lack, but much of what critical thinking entails is specific to particular fields and can be learned (see Kurfiss, 1988, for a review). However, learning to think rarely enters the educational scene when "covering" a fixed quantity of "content" occupies center stage in teaching. Must acquisition of knowledge precede thinking, as many educators seem to believe?

Critical thinking is the mental work involved when we investigate complex questions. The quality of the outcome depends upon many factors, including:

• How much we know about the subject and how easily we can retrieve relevant information;
• What we know about how to conduct inquiry in a particular subject (which includes the kinds of questions we ask and how we attempt to answer them);
• How well we organize our inquiry (for example, the goals we set and the ways we monitor and revise them);

- Our assumption that knowledge is constructed through human inquiry and must be judged according to criteria of adequacy rather than standards of ultimate truth (a view shared by academics but generally not by undergraduates), and
- How much we care about the work (Kurfiss, 1988).

When courses are designed to emphasize knowledge acquisition, only the first of these facets of critical thinking comes into play. The rest are left to a hypothetical future which materializes, if at all, in graduate school. So when we ask students to think about course content, we should not be surprised if they object. They have not been taught how to think about the subject, and they may have no intrinsic reason to pursue it.

If we believe students cannot think until they "know" a lot, and if teaching for information crowds out learning to think, how and when will critical thinking abilities develop? To escape this impasse, let's explore an alternative proposition: *students' ability and willingness to think critically are most likely to develop when knowledge acquisition and thinking about content are intertwined rather than sequential*.

I have said that critical thinking is the mental work involved in formulating and pursuing complex questions. Questions are powerful motivators of inquiry; what frontiers of knowledge have ever been pushed back without them? Yet questions are disturbingly absent from college classrooms. Less than 4% of class time is spent in questioning, and fewer than one-third of professors' questions invite complex thinking. Students' questions are rarely heard in classrooms (Barnes, 1983).

The absence of questions is the direct consequence of our faith in the content coverage myth. When our goal is to "cover" *the* content, efficiency and accuracy in delivery of information become measures of "effectiveness." If we ask questions, we may have to "waste" time correcting inaccuracies in students' responses. If we permit students to ask questions, we may fail to reach our content goals. Yet students' "inaccurate" answers to our questions, and their "irrelevant" questions to us, reveal the true "effectiveness" of our "delivery system."

In contrast, when courses are designed to get students to ask and answer questions about the subject, our students can practice thinking *while they acquire knowledge*. Courses organized around intriguing open-ended questions arouse curiosity about the subject from the first day of class. Students will try to answer them if their questions connect the topic to something they know, and if they believe their answers will be taken seriously. Of course their initial attempts to answer these questions will be limited, even crude. But *their* attempts lie on the frontier of their knowledge, where all real learning takes place. Textbooks and library materials become resources for that inquiry rather than boring encyclopediae of disembodied information to be memorized for examinations.

Small group work, class discussions, and writing can be used to help students deepen their understanding of the subject, generate new questions, and reflect on the inquiry process. Small groups (4-6 students) can be used with good results even in very large classes (Bouton and Garth, 1983). Groups provide a forum where all students can argue about questions and develop their ideas. Reports from group representatives stimulate lively whole-class discussion since group members become invested in their work and want to test it in the public forum. Differences that inevitably arise lend new impetus to the inquiry. The professor's role is to mediate the discussion, encouraging students to check their facts, listen thoughtfully to divergent views, and evaluate their reasoning.

Frequent, short writing assignments help students clarify concepts, prepare for discussion, and practice critical thinking skills such as interpreting data (Griffith, 1982). Writing short essays in response to analytical questions fosters more learning and thinking than does notetaking or responding to study questions, and students with the least background knowledge gain most (Newell, 1984). For longer assignments, students can exchange drafts of work in progress, gaining multiple benefits of giving and receiving criticism and learning about each others' projects. Sharing their writing helps students to discover that to know a subject involves more than accumulating information about it.

The quality of students' work improves when they have argued their ideas in class and discussed work in progress, which may make

grading less traumatic and even potentially satisfying. You can still test "content." Students learn it because they have been using it to develop their ideas and bolster their arguments.

Courses that use questioning to integrate knowledge acquisition and thinking contradict widely shared assumptions about learning. But the benefits of learning based on questions are being recognized. For example, two major medical schools, McMaster and Harvard, have designed their programs to involve students in active problem-solving rather than memorization. Other examples can be found in Bouton and Garth (1983), Kurfiss (1988) and Weaver (1989).

The Russian psychologist Lev Vygotsky said that what a child can do with assistance today, she can do by herself tomorrow. Conversely, what she does not receive assistance to do today, she is unlikely to do on her own in the future. College professors are the people most qualified to assist students in learning to think critically. The responsibility is as great as the rewards.

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If Learning Involves Risk-taking, Teaching Involves Trust-building

Marilla Svinicki, *University of Texas-Austin*

The premise of this article is that learning, like all other creative acts, will flourish in an atmosphere in which the learner is willing to take risks, and it is the task of the instructor to create such an atmosphere for learning.

If we accept this view of learning as risk-taking, we can begin to confront the factors that discourage students from taking risks and build a class environment where learning becomes less of a risk, or where the risk-taking in learning becomes valued instead of dreaded. Both of these directions require that instructors develop a trusting relationship with students.

When students trust an instructor, they will believe in the instructor's ability to turn any situation into a learning opportunity; they will expect the instructor to value their efforts; they will be willing to take the chances that lead to learning and to view failures as learning opportunities.

What, then, might be the characteristics of an instructor who would support student risk-taking? These four stand out:

Model how to take risks: One way to build student confidence is to be willing to take risks yourself. A great deal of emotion and social

behavior is learned through modeling (Bandura, 1977). By the way you handle errors and wrong turns, you demonstrate to students that even experts make mistakes. For example, being willing to consider non-standard questions and situations or being alert to and bringing in new developments in the field for which there are no "correct" answers both indicate to the students that you also are in the process of learning.

Exude organization and competence: Personally, I never worry about flying unless the pilot starts sounding nervous. The same seems true in classroom learning. When the students are convinced that the instructor is "in control" and knows where the class is going, they will feel more comfortable about taking risks. They will be confident that if they make a mistake or go off on a wrong tangent, the instructor will be able to bring them back on target. Therefore, the instructor must be well-organized and solidly grounded in the content such that he or she can handle any eventuality.

Minimize the pain of making an error: One reason many students are reluctant to take risks is the fact that our classrooms have such a strong evaluation component. They are afraid that if they make an error in class, it will affect their grade. Therefore, it would be useful to separate the learning from the evaluating. Does everything assigned have to be graded? If in-class activities are known to be "preparations" for the evaluation, but not themselves graded, students are just as motivated to use that opportunity to prepare. Evidence from the mastery learning literature has demonstrated the value of letting students check their learning prior to the "real" test (Bloom, 1984).

Another way to separate grading from learning is to allow students to work together on new ideas. That way their initial errors will be tempered by the responses of their colleagues before being seen by the instructor. There is a lot of work being done these days on the benefits of collaborative learning, much of it demonstrating the positive feelings that result when students work together (Johnson and Johnson, 1985).

And when you do manage to separate the learning from the evaluation in the minds of the students, you should work on

separating them in your own mind. How you react to student errors will be an important determinant of how they perceive their own errors. If you look upon them as learning opportunities and encourage the students to explore their own thinking, you will be building trust and encouraging risk-taking (Adams, 1986).

Provide risk-taking opportunities: In order to help students take risks, the instructor must provide opportunities. This means not doing all the talking yourself. Outside observers of classrooms are struck by how much work instructors do in class and how little their students do (Weimer, 1989). Instead, instructors must let the students do some of the work, then stand back and let them doit without interference. Allowing students to struggle and take wrong turns helps them learn something from the process. This requires your not being rigidly tied to your own agenda. You will always have an ultimate goal in mind, but there may be many wrong paths which would be just as instructive and possibly more interesting because they would reflect the students' own struggle with the task rather than your preconceived notion of the "correct way" to do something. In the long run students will learn more from the following their own wrong path than from following the well-worn footsteps of the experts.

In the end we must come to the realization that it is the students who must do the learning. The teacher's task is to make learning possible, not to do it for them. This involves creating a classroom atmosphere of trust and confidence where risk-taking is possible, even exciting, and then giving the students ample opportunity to take those risks by being actively involved in their own learning. It may not be as easy and as comfortable for the instructor as "covering the material," but in the long term, the learning will be better.

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Reforming Undergraduate Education One Class at a Time

* K. Patricia Cross, *University of California-Berkeley*

A continuing question for those of us in education is-What can and should be done to improve the quality of undergraduate instruction? The reports that constitute the higher education reform movement of the 1980's have taken this as their major emphasis. However, while these reports express plenty of dissatisfaction with the quality of instruction, there are few constructive suggestions for what to do about it.

Part of the problem is that there is an unexamined assumption that underlies most of the educational reform movement. It is that educational reform consists of making large highly visible policy decisions, such as installation of statewide testing or intensive systems. There is very little attention given to the potential impact of thousands of small classroom reforms that might add up to real and substantial change. We fail to consider what each teacher acting in his or her own classroom might do to achieve reform.

I propose that the biggest and most long-lasting reform of undergraduate education will come when individual faculty or small groups of instructors adopt the view of themselves as reformers

within their immediate sphere of influence, the classes they teach every day. I believe that it is time for classroom teachers to seize the initiative and begin doing the type of research that will improve the learning of their own students. I call this *Classroom Research*. The purpose of classroom research is to help teachers evaluate their own instructional effectiveness, to explore new solutions to the problems of their own students, and to foster intellectual stimulation and professional renewal for themselves as teachers.

The concept of classroom research springs from six basic assumptions:

1. The quality of student learning is directly related to the quality of instruction.

2. That teachers need to know what their student are learning in their classrooms.

3. That inquiry and intellectual challenge are sources of professional renewal for teachers.

4. That the research most likely to improve instruction is that conducted by classroom teachers formulating and investigating questions that they want answered.

5. That self-improvement is most likely to result from specific feedback relevant to one's own goals and behaviors.

6. That there is nothing so mysterious or esoteric about research on college teaching that it cannot be done by anyone capable of teaching at the college level.

Let me give a concrete example of what classroom research might look like. Let us assume that our classroom teacher is curious about the dropout problem, decides to interview some students who stopped coming to class, and finds out that a certain amount of discouragement sets as the semester's work begins to build. As she reflects on this observation, it occurs to her that she usually hits her stride as a teacher about the fifth week of the semester and feels ready to tackle some of the more difficult units about that time. She

notes that the high dropout rate in her own classes occurs about five weeks into the school year, and she concludes that she might try a number of things in her own classroom to reduce needless dropouts-perhaps give an especially satisfying assignment, maybe rework or reschedule the difficult unit, maybe call in a few students and talk with them about the unit or about the class, perhaps offer special encouragement, make a referral, drop a note, make a call.

Another type of classroom research that might be of interest to individual instructors would involve the use of "feedback devices" to help tell them how students are responding to classroom procedures. We have gathered a collection of such devices into a single sourcebook entitled *Classroom Assessment Techniques: A Hand book for Faculty* (Cross and Angelo, 1988). Such devices could help an instructor discover whether "review session" prior to the mid-term helps in long-term retention or is only useful for immediate test score gains. Or perhaps the teacher is interested in knowing whether a field trip is worth the effort in changing attitudes about a particular social problem-or would reading about it or discussing it or seeing a dramatization or videotape work as well or better? The devices include such simple ideas as focused listing, the one-minute paper, and the teacher-student electronic mail system.

Alternatively, small groups of faculty might band together within or between departments to research such things as what activities promote cross-course integration. Faculty meetings might well be planned around classroom research projects to share data, perceptions, and possible solutions. The emphasis in faculty meetings would be on the use of data and systematic observation; discussion might appropriately range from sharing useful and creative approaches to gathering data, to data analysis, to recommendations for possible changes in policies and practices within the department.

While the examples I have presented do not generally call for complicated methodologies or analyses, there is nothing to prevent interested teachers from studying very complex problems. The projects for classroom research are limited only by the teachers' imagination. The procedure of the classroom researcher is to formulate the question, collect data, reflect on classroom practice, try a solution and evaluate the results. There is nothing especially new

about those methods; they are frequently recommended for huge, well-funded "R and D." The difference is that teacher motivation is enhanced through classroom research because the question for study is framed by the teacher, and implementation is facilitated because there is no gap between "researcher" and "practitioner".

In conclusion, I think it is time for classroom teachers to become directly involved in the study of teaching and learning. They should be intellectually curious about it as well as professionally involved in the improvement of their own teaching practices. It is these teacher-driven changes in the every day life of undergraduate classes which hold the greatest promise for long-term educational reform.

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Rethinking What It Means to be a Scholar*R. Eugene Rice, *Carnegie Foundation for the Advancement of Teaching*

Note: This article was adapted by R. Eugene Rice from work on the Carnegie Foundations special report, *The New American Scholar*, by Ernest Boyer and R. Eugene Rice. The Report is available through the Carnegie Foundation, 5 Ivy Lane, Princeton, N.J. 08540.

The old teaching versus research debate has drawn us into a hopeless quagmire. We have heard all the arguments and find them tiring- minds are closed, not opened. The language and polarities used to frame the present discussion of the relationship of teaching and research need to be set aside. The time is ripe for a basic reassessment. To move beyond the current impasse we need to be willing to take a fresh approach and think more creatively about what it means to be a scholar in the contemporary context.
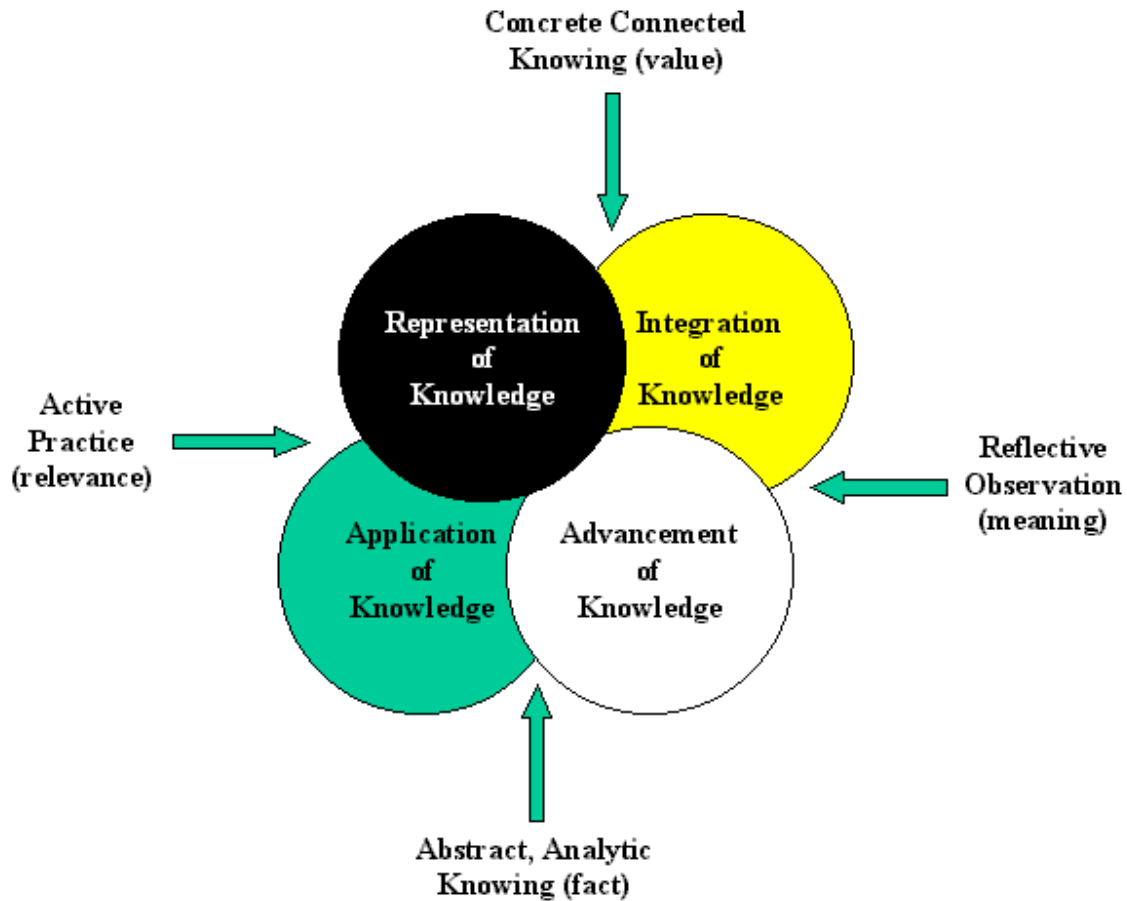
The present conception of scholarship is much too narrow. During the expansionist period in American higher education, what Jenks and Riesman called "The academic revolution" (ca. 1957-1974), scholarship was equated with research on the cutting edge of a discipline (1968). Further, it took on significance only when it was publishable in a refereed journal- one narrow facet of the scholarly enterprise, one way of knowing.

To meet the growing demands of a knowledge-based society and to attract the best of a new generation into the academic profession, we need an enlarged view of scholarship: one congruent with the rich

diversity that is this hallmark of American higher education; one that is more appropriate, more authentic, and more adaptive for both our institutions and the day-to-day working lives of faculty.

Scholarship: An Enlarged View A broader conception of scholarship would have at least four elements, all of them legitimate and, taken in the aggregate, tending to fulfill the scholarly commitments of the college and university to society. According to the conventional view only one way of knowing is fully recognized and honored. Scholarship is narrowly defined as the advancement of knowledge-the discovery and creation of new knowledge in a disciplinary specialization. This is a limited view. We contend that knowledge is utilized in a variety of ways and that these other forms of scholarship-these other ways of knowing-are as legitimate, significant, and needed as the dominant mode. Our broader conception of scholarship would obviously include the advancement of knowledge but extend to also incorporate the integration of knowledge, the application of knowledge, and the kind of scholarship most directly related to teaching, the representation of knowledge.

If we build on the recent inquiry into the structure of knowledge and alternative approaches to learning, a different configuration, a more constructive way of framing the discussion emerges. Borrowing on the polarities established by David Kolb (1984) and others, the forms of scholarship we have identified can be set within a framework representing the different approaches to knowing:

Concrete Connected Knowing (value)

Representation of Knowledge

Integration of Knowledge

Active Practice (relevance)

Reflective Observation (meaning)

Application of Knowledge

Advancement of Knowledge

Abstract, Analytic Knowing (fact)

The advancement of knowledge. The first element in this broader conception of scholarship-still a key element-is the advancement of knowledge. On this we all agree. In 1919, Max Weber, in his famous address on "Science as a Vocation," spoke eloquently about the role of specialization in the modem world, and talked of the sense of ecstasy that could come only to one on the cutting edge of a specialization. The awareness of an enduring achievement is, in his words, "a really definitive and good accomplishment." Scholarship must have, as one anchor point, the discovery of knowledge-original research.

The integration of knowledge. The extension of the frontiers of knowledge is, however, not enough. The second element in scholarship is the, integration of knowledge, an undertaking as critical to the understanding of our world as the discovery of knowledge that is new. In fact, the extension of specialization itself

requires new forms of integration. Without the continual effort at reintegration, we have fragmentation.

The integration of knowledge requires a divergent approach to knowing-a different kind of scholarship- one that reaches across disciplinary boundaries and pulls disparate views and information together in creative ways. Scholars are needed with a capacity to synthesize, to look for new relationships between the parts and the whole, to relate the past and future to the present, and to fetter out patterns of meaning that cannot be seen through traditional disciplinary lenses.

The application of knowledge: The third form of scholarship is the most distinctively American. The great land-grant institutions were established during the nineteenth century precisely for the purpose of applying knowledge to the enormous agricultural and technical problems confronting society. In the academic profession today, however, there is a disturbing gap between what is valued as scholarship and the pragmatic needs of the larger world.

This ironic development in American higher education has multiple roots, but one important strand can be traced back to the emergence of professional education and, specifically, to the impact of the Flexner report on medical education. The major effect of the Flexner report was to move medical education into the research university and greatly increase its scientific component. The other professions followed medicine's lead. Practical competence became professional when grounded in systematic, preferably scientific knowledge. The application of knowledge took on value-rigor and prestige-when derived from original research. In the most pragmatic society in the world, Scholarship was conceptualized as independent of, and prior to, practice.

Professional schools are now beginning to challenge this hierarchical conception of scholarship that makes the application of knowledge derivative, and consequently, second best. Donald Sch6n's work on "the reflective practitioner" calls for a reassessment of the relationship between scholarship and practice-a new "epistemology of practice" (1983). Ernest Lynton and Sandra Elman (1987) are raising a whole range of important questions about the relationship

between scholarship and professional service. Should not the application of knowledge to the problems of society be acknowledged as a scholarly endeavor of the first order?

Scholarship and teaching. This brings us to the fourth dimension: scholarship for teaching. This is the most difficult form of scholarship to discuss because we do not have the appropriate language. In the working lives of individual faculty, scholarship and teaching are often seen as antithetical-competing for one's time and attention. This is a reflection of the way in which we conceptualize both tasks. We want to challenge this understanding and argue that quality teaching requires substantive scholarship that builds on, but is distinct from original research, and that this scholarly effort needs to be honored and rewarded.

This fourth dimension of scholarship has an integrity of its own, but is deeply embedded in the other three forms-the advancement, integration, and application of knowledge. In addition, the scholarship for teaching has three distinct elements: first, the *synoptic capacity,* the ability to draw the strands of a field together in a way that provides both coherence and meaning, to place what is known in context and open the way for connection to be made between the knower and the known; second, what Lee Shulman (1987) calls "*pedagogical content knowledge,*" the capacity to represent a subject in ways that transcend the split between intellectual substance and teaching process, usually having to do with the metaphors, analogies, and experiments used; and third, *what we know about learning,* scholarly inquiry into how students "make meaning"-to use William Perry's phrase-out of what the teacher says and does.

We know that what is being proposed challenges a hierarchical arrangement of monumental proportions-a status system that is firmly fixed in the consciousness of the present faculty and the academy's organizational policies and practices. What is being called for is a broader, more open field where these different forms of scholarship can interact, inform, and enrich one another, and faculty can follow their interests, build on their strengths, and be rewarded for what they spend most of their scholarly energy doing.

Institutionally, we now have a crisis in purpose. Colleges and universities are trying to be what they are not, and they are falling short of what they could be. An enlarged conception of scholarship would bring greater congruence between institutional mission and faculty work.

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Teaching in Action:Criteria for Effective Practice

Ronald Smith, *Concordia University*

& Fred Schwartz, *Vanier College*

When we confront difficulties, surprises, or puzzles in our teaching we skillfully and automatically respond to the situation. Most of the time our actions are successful in producing the outcomes we desire. Increasing our effectiveness as teachers requires us to reflect on the difficult situations in our teaching when we do not achieve our intentions. It is from these situations that we may have the most to learn.

Donald Schon in *The Reflective Practitioner: How Professionals Think in Action* celebrates the knowledge that is implicit in the competent action of professionals. Professionals are constantly making judgments and decisions but cannot state the rules or theories upon which they are based. Schon describes this practical knowledge as "knowing-in-action." Professionals come to know in action through a process Schon calls "reflection-in-action," where their thinking in the midst of action reshapes what they do while they are doing it. Expert practice is more than the application of theories, more than what Schon calls "technical rationality." Practice is characterized by indeterminate situations of ambiguity, uncertainty, uniqueness, and values conflict which must be transformed into determinate ones that the professional knows how to solve. That transformation is not a technical task. Schon argues that technical

rationality and its conception of practice does not adequately describe the form of professional knowledge that distinguishes between the adequate and the excellent practitioner; it does not account for professional "artistry."

Professors know how to teach. Their knowledge is evident in their actions as they teach. "Reflection in action" describes how professionals think and act in the complex and ambiguous situations in their practice. When their usual skilled responses don't work, they impose new meanings on the situation in order to make sense of their difficulties. These meanings become the "frames" within which they act. These frames determine what they attend to and what they ignore; where they focus their attention and what they accept as movement towards a more satisfactory situation. Professionals take action and evaluate the success of their actions in terms of how they have framed the problem or puzzle. Schon call these actions "moves" or "experiments." Each experiment is assessed in terms of the degree to which it has improved the situation, led to the discovery of new meanings, or changed the nature of the questions to be explored. Experimenting in the world of practice continues until the problematic situation which initiated the experiments is resolved.

Reflection-in-action Consider the following situation. A student S comes to your office and says, "I'm having difficulties in your course." As S explains the difficulties, you formulate a hypothesis about the nature of S's problem. You look at S's work and ask questions to gather information to confirm or disconfirm your hunches, then decide that S can't do this work because S doesn't understand the new technique you explained yesterday. You re-explain it, give S another problem, watch S do it, and then discover that S still can't do it. In watching S work you see other behaviors that make you think that there is another gap in S's background, which you take steps to remedy by more teaching on the spot, and then assign extra readings and problems.

S comes back to you a week later and as you watch S try to solve another problem you see that S still can't do it. You ask to see the extra work you had asked S to do. When S hasn't done it, you begin to think that S is not trying hard enough. You decide to apply some pressure in the form of a reprimand for S not keeping up S's end of

the deal by doing what you told S would be helpful. S looks hurt by your statements and says," I wanted to do it. But my boss at the place where I work part-time to earn the extra money to pay for school was short-handed and demanded that I work some extra hours. I was worried that if I didn't put in the extra time I would lose this job and not be able to go to school at all." Your view changes from one of censure to one of admiration for the extraordinary effort S is making. You offer suggestions, a scholarship program, a free tutoring program offered by the senior students in the department; and, on the basis of her responses, arrange an appointment for S with the appropriate person. And it continues.

FRAMES	MOVES	TALKBACK
S misunderstands key idea	You reteach and test	S can't do it
S is missing some basics	You reteach and assign extra work	S can't do it and hasn't done extra work
S is not trying hard enough	You reprimand S	S appears hurt and offers more information
S is overloaded	You offer ideas for money problem and learning	

Analysis The artistry of this professor is in reflecting-in-action as Schon describes it, framing the situation, making moves, listening to the talk back, refraining, and making new moves, a process which continues until the problematic situation is resolved.

Usually our actions produce the outcomes we desire. When they do not we continue to experiment until the problem is resolved. Occasionally we encounter a particularly difficult situation where, even after it is over, we remain unhappy with the way it turned out.

Reflecting on how we were reasoning and acting in those situations, when we were at the fringe of our competence, provides a unique and potentially rich opportunity for learning which will improve our practice.

Reflection in action and reflection on our actions are forms of practice which require that we diagnose the problem, invent a solution, produce that solution and evaluate its effectiveness. Effective practice solves problems so they stay solved and the teacher-student relationships is not harmed. This requires that we behave with our students in ways which create a climate where (1) we are likely to generate valid information appropriate to solving the problem, (2) we are informed of all the relevant and appropriate information and feel free to make choices, and (3) as a result we are internally committed to monitoring the outcomes of our actions.

Productive reflection In order for our reflection to be productive and for our practice to be effective, we must reason and act in ways which are consistent with what Argyris (1985) calls productive reasoning; that is, we must (1) use "hard" data (that is, easily accepted as valid descriptions of reality by individuals with contradictory views), (2) make premises explicit, (3) make inferences explicit, and (4) publicly subject conclusions to tests of disconfirmation.

These criteria are commonly accepted as the canons of scientific thinking in all disciplines, each one encoding them in their own methodologies. They define what we mean by rigor and there is almost no questioning their appropriateness. In spite of the earlier discussion of reflection-on-action, we are proposing that these criteria also apply to the artistry of reflection-in-action and reflection-on-action, particularly in the interpersonal area.

In reflecting on the difficult situations in your teaching practice and in examining how you were reflecting in action, consider the extent to which your experimenting and problem solving were consistent with the rigor of productive reasoning. We suggest you ask yourself the following questions:

• **Did I illustrate and test my evaluations?** If we do not make

explicit and test our observations and reasoning, yet act as if we are correct, we are not likely to discover when we are incorrect. In our example the professor evaluated the student as not understanding the key idea, missing the basics, and unable to do the problem. Did the professor say, "I believe you can't do this problem because you don't understand the concept I taught yesterday. Do you agree?" or "I think you are having trouble with yesterday's concepts because you are missing these basic ideas... What do you think?"

- **Did I illustrate and test my attributions?** The professor in our example attributed to the student "not trying hard enough" to explain her lack of success and acted as if that were true by reprimanding her. the professor might have said, "I see that you haven't done the extra work assigned to makeup for missing background. I'm beginning to think you are not willing to put in the effort required, and you're not trying hard enough. I would like to get your reactions to my interpretation."

- **Did I advocate my position and invite inquiry?** Did the professor say, "I think you should do this extra work to make up for your weak background. Do you think that would work?" or "I think you should find some other sources of money besides part-time work. Do you agree?" Keeping the inquiry going is likely to generate better information and to lead individuals to be more committed to the choices they make.

- **Did I withhold information?** In order not to hurt another person's feelings, to prevent them from getting defensive, or because they care for them, people often withhold their negative attributions and judgements. As a result, important information, relevant and necessary for effective problem solving, is not discussed and errors in interpretation are not detected and corrected.

Consequences

If you do not illustrate, inquire into, and test your attributions and evaluations, you may be wrong and you are not likely to find out. You will generate mistrust and misunderstanding with students. They may feel that they are being unfairly judged, that you have already

made up your mind, and that you are trying to control them unilaterally. They are likely to resent this and act out their resistance in ways which are not productive, either by withdrawing or becoming aggressive. The most essential tool for effective problem solving and learning, the generation of valid information, is lost.

Conclusions

Improving our effectiveness as teachers requires that we reflect on our practice, particularly in those situations where we think we have been least effective. To the extent that we are able to act and to reflect on our action in ways which are consistent with productive reasoning we will be able to generate the valid information necessary for effective problem solving. Without this we may be solving the wrong problem or making the situation worse. If you would like to read more about the approach suggested here, we recommend the following sources:

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The Challenge of Teaching the Introductory-level Course

Delivee L. Wright, *University of Nebraska-Lincoln*

One of the most challenging teaching tasks in college is providing effective instruction in introductory-level courses. Members of the Study Group of the National Institute of Education recognized this challenge when they recommended that "deans and department chairs... assign as many of their finest instructors as possible to classes attracting large numbers of first-year students" (1984). If teaching the introductory course is a special case, what makes it so and how can college teachers meet this challenge?

Subject Matter One major difference in introductory-level courses is the nature of the subject matter itself. While there is usually little question what the focus and need of upper division courses are, the designing of a beginning course for novice learners is not nearly so universally agreed upon. Instead it requires the designer to consider some basic philosophical and practical questions about the context and content of the course.

Who? and Why? Two fundamental questions confronting the introductory instructor are who is taking this course and why are they there? Consider the range of possibilities. **Are the students predominantly 1. majors, 2. possible majors, or 3. general education students?** If the students are majors, then the instructor has a responsibility to the department and the field illustrated by the following additional questions. **Is this course a prerequisite for other courses in the field?** The answer is most likely yes. Therefore, unlike most upper division courses, the instructor in this case must be

much more concerned with tying the content to what will follow. This implies greater communication with colleagues about their expectations for student skills and background.

Of course, the introductory class cannot prepare majors for all the possible content of the discipline, so the instructor faces another question: **What are the *foundational* concepts of the discipline which must be grasped by all majors prior to entry into advanced courses and how are these concepts to be selected?** Once again this implies a lot of communication with colleagues and a significant understanding of the underlying structure of the field. It is essential to identify critical content which cannot be overlooked and separate it from things which are nice to know but would probably be more appropriate for later courses.

A third responsibility of courses which cater to majors is to introduce them to **"ways of knowing" in the discipline.** Each discipline has a unique perspective and set of customs for thinking and investigating. Too often these are assumed to be obvious because they are so automatic to faculty members, but it is in the beginning courses that students must gain the fundamental sense of inquiry appropriate to their new field.

Alternatively, the beginning course may be made up of students who have not yet committed to a particular major, but are exploring alternatives. The questions appropriate for this course are more tentative. **Does the instructor want to attract these prospective majors into the field?** If so, the course needs to take a motivational bent. **What is it about this field that is so attractive or interesting that students should consider making it their life's work?** And the more complex questions as outlined for definite majors about foundational concepts and ways of knowing apply as well, if not as critically, to these courses.

Some beginning classes are populated by students from other fields, fulfilling requirements, pursuing general education interests, or filling time slots. These students might best be characterized as "intelligent laymen." What is the beginning course's responsibility to this group? **Should the course make these Individuals "literate" in the field?** If so, **what are the most important insights for these students?**

What is the course's societal relevance? It is not necessary for these students to delve into the content with the depth and intensity of someone intending to make it their career, yet they need sufficient exposure to be aware of the important issues and modes of inquiry which will enable them to build a foundation for following new developments on their own.

How much? and How far?No matter which group of students is likely to populate the beginning course, the instructor must also face the questions of how much and how far. Whether for majors or general education students**, how broadly should the course survey important elements in the field? What would be the consequences in terms of student learning if fewer topics were taught in greater depth?** Many instructors at all levels complain that there is too much material to cover in their classes, but few seem to question the assumptions which underlie the practice of "covering the field." Collateral questions which impact this issue are: **What kind of thinking should be required of students? To what degree should reasoning or general critical thinking skills be emphasized? Can topics be used to move students into higher cognitive levels of application, analysis, synthesis, and evaluation?** Most beginning students are at a developmental level which emphasizes the accumulation of information and equates that with learning. At the same time, most faculty are more interested in developing thinking and questioning learners. **Can or should beginning courses break the cycle of fact accumulation and encourage students to think independently, even to the point of teaching those skills at the expense of content?**

Content is often thought of only in terms of facts, principles, theories, and other intellectual matters. **What attitudes, values, feelings, or ethical considerations do students need to develop?** Recent attention to ethical issues in all fields suggest that these be addressed in introductory courses as well.

On a more practical note, instructors of beginning courses need to consider **what content background, study skills, or physical skills might be needed to benefit from the course.** Many problems of the beginning student stem from assumptions which instructors make about what students already know or can do. The beginning course

instructor should be sure that such assumptions are warranted before choosing what to teach.

A Sense of Academic Community Regardless of the answers to the above questions, introductory courses have the important common responsibility of giving students a "sense of the academic community." Since introductory courses often represent a student's first experience with academe, it is an important time to establish attitudes about the institution, the academic environment, and learning itself. It is a time to consider **why an "education" is different from "job certification."** Thus the instructor of the beginning-level course needs to look beyond the immediate concerns of the discipline to the long range goals of creating scholars and self-educators.

Professors in these classes are key to providing examples or models of the academic life. Students at this point are not only looking for ways of behaving in the university community, but they are also open to establishing expectations for themselves. **What it means to be an educated person and how this course contributes to that end** can be addressed at this impressionable time.

Beginning courses can also communicate modes of operating as a good student, both in this field and in general. **How does one study this kind of subject matter? How can time be managed to assure adequate study? How can one set priorities among the variety of demands in life? How can one integrate this course's subject matter with other opportunities to learn on campus?**

By demonstrating the methods of the discipline and making its assumptions explicit, by modeling attitudes toward the subject matter and learning, and by personalizing approaches to teaching and learning, college teachers can socialize beginners into the academic community to the end that, even if they don't pursue advanced study, they will retain effective habits of learning and a positive attitude toward academe.

Conclusion Many times introductory courses are assigned to less-experienced teachers. While it is true that the level of subject matter expertise demands breadth instead of depth, the complexity of

decisions about teaching strategies makes this a very difficult assignment. Faculty members who are assigned the task of planning and implementing instruction for beginning students in introductory-level courses need incentive, recognition, support, and resources to teach these students in the best way possible. It is not a task for the fainthearted.

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The Meaning of College Grades

James Eison, *S. E. Missouri State University*

Paul Dressel (1983) has defined a grade as "an inadequate report of an inaccurate judgment by a biased and variable judge of the extent to which a student has attained an undefined level of mastery of an unknown proportion of an indefinite material (p. 12)." In all-too-many instances, experienced instructors have heard anecdotal evidence from honest and forthright students that support the accuracy of Dressel's statement. Is his observation equally true for all course grades? While I think not, I would suggest that a course grade should be viewed as "the alphabetic or numeric symbol representing the end product of an evaluation process used in a specific course, taught by a particular individual, during a specified semester." Though institutional grading systems typically dictate the particular symbols used (e.g., letter grades, letter grades with pluses and minuses, numbers), individual faculty are responsible for creating the evaluation process used in the courses they teach. Thus, grade definitions are only as informative and precise as the evaluation process allows. Further, in most instances, course grades are unidimensional symbols into which multidimensional judgments made by a faculty member have been cast (Milton, Pollio, and Eison, 1986). Daily attendance, active class participation, the timely submission of assignments, completion of extra credit activities, as well as scores on quizzes, tests, papers, and projects are often used by faculty in rational yet idiosyncratic manners; definitional clarity of grade meanings, for students and other audiences, will be enhanced by complete written disclosure of the learning activities and outcomes used in the computation of course grades.

Problems with Grades as Communication Devices

Jedrey (1982) has claimed, "Grading is an important means of communication with our students... The grade conveys a relatively unambiguous message about a student's progress, in a universally understood system of academic notation (p. 104)." While few would argue with the thought expressed in Jedrey's first sentence, objections to Jedrey's second thought should know no bounds. Communication about the specific meaning of a course grade occurs between faculty and students most often in the privacy of the classroom, but seldom, if ever, is this information communicated to others (e.g., parents, business recruiters, graduate school admission committees). For example, the official 1988-1990 Bulletin of my campus states, "Grades are assigned as follows: A excellent; B = superior; C = average; D = inferior; F = failure (p. 33);" in the absence of additional information provided by the instructor, interpretation of these symbols by a transcript reader is as much a "projection" of the reader's personal views and experiences as is the "projective" interpretation of the meaning and significance of an inkblot made by a psychiatric patient.

To improve the communication value of grades, faculty must improve the frequency and quality (e.g., depth, breadth, specificity) of feedback provided to students. It has been my experience that most faculty members describe the assignments and other important expectations used to compute course grades; in fewer instances, however, are students provided with illustrative examples of classroom tests or samples of previously graded written work that illustrate qualitative differences in students' writing. In short, what qualities or characteristics differentiate superior student work from work of average or inferior quality? This information can, and should, be provided to students. It is in this area that individual faculty members can make the most significant improvements and reforms-in the words of K. Patricia Cross (1989), "one class at a time."

Grades as Motivators
Over 5,000 students enrolled at one large research university, four regional state universities, one liberal arts college and two community colleges completed a self-report inventory designed to assess students' orientations towards learning and towards grades (Eison and Pollio, 1989). This questionnaire contains the statement,

"I think grades provide me a good goal to work toward;" between 73% and 90% of the students in each sample agreed or agreed strongly with this belief!

To enhance the motivational impact of course grades, faculty should recognize differences in student orientations towards learning and towards grades and design instructional and evaluative activities that are responsive to these differences.
For instance, approximately one out of every two students surveyed agreed with the statement, "I think that without regularly scheduled exams I would not learn and remember very much;" almost as many students reported that they "get annoyed when lectures or class presentations are only rehashes of easy reading assignments;" and over 85% of the students on each campus reported that they "appreciate the instructor who provides honest and detailed evaluation of my work though such evaluation is sometimes unpleasant." Though student feedback such as this often surprises faculty, its instructional implications are clear. For example, periodic examinations are needed to motivate some but not all, students to study; the vast majority of students, however, desire honest and detailed feedback from instructors. Benjamin DeMott (1988) has asked, "Is not knowing who you're talking to as bad as not knowing what you're talking about?" Faculty members will benefit from efforts to empirically explore the motivational impact grades have upon their students.

Problems with Grades as Predictors of Adult Achievement
Because undergraduate grades often influence post-baccalaureate educational and professional opportunities, one must ask, "To what degree do college grades predict adult achievement?" The best available answer to this question of grade validity is found in the results of a recent meta-analysis (Cohen, 1984) of 108 studies correlating college GPA to various criteria of adult achievement (e.g., ratings of job performance, income, promotions, attainment of a graduate degree). The mean correlation for the 108 studies reported was r .18. While statistically significant, an effect of this magnitude is considered "small." Along similar lines, Samson and colleagues (1984) performed a meta-analysis on 35 studies reporting on the relationship between GPA and occupational performance (e.g., income, job satisfaction, effectiveness ratings) in various fields (e.g.,

teachers, engineers, business, nursing, medicine, military and civil service) .and concluded that "the overall variance accounted for makes grades or test scores nearly useless in predicting occupational effectiveness and satisfaction." Given the consistent and convincing nature of these findings, perhaps faculty members should collectively urge registrars to insert a note of interpretive caution prominently on each students' official transcript for external audiences and should demand that institutions place less reliance on the GPA as the primary measure of student achievement for internal decision making such as the awarding of honors.

Concluding Thoughts

Though grades are an issue that won't go away, the life-force of higher education is good clear thinking followed by good clear decisions (Milton, Pollio and Eison, 1986). Dispelling common myths and misunderstandings about grades, and thinking critically about how to best use grades to promote learning are significant challenges that faculty must face; examination of the works cited below can help guide one's deliberations.

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Why Professors Don't Change

Loren Ekroth, *University of Hawaii at Manoa*

Today's professors are challenged to teach a student population increasingly diverse in age, levels of academic preparation, styles of learning, and cultural background. Professors are now expected not only to "cover the material," but also to help students to think critically, write skillfully, and speak competently. To address the increased demands of evolving circumstances would seem to require changes on the part of college teachers. Yet many appear not to change in how they think about and approach their teaching.

Organizational systems tend to resist change, and academic systems are no exception. Clark Kerr commented on the essentially conservative nature of colleges and universities: "About eighty-five institutions in the Western world established by 1500 still exist in recognizable forms, with similar functions and with unbroken histories, including the Catholic church, the Parliaments of the Isle of Man, of Iceland, and of Great Britain, several Swiss cantons, and seventy universities. Kings that rule, feudal lords with vassals, and guilds with monopolies are all gone. These seventy universities, however, are still in the same locations with some of the same buildings, with professors and students doing much the same things, and with governance carried on in much the same ways." (Kerr, 1982).

Barrier #1: The Stability of the Situation A principal reason why faculty don't change their approaches to teaching is that the professional situations in which they work tend to be stable. For example, the physical settings and seating arrangements in which teaching takes place (some called "lecture halls"), the time schedules

within which courses are structured, the institutional procedures for making curricular decisions, and the reward systems for instructional performance constitute guardians of tradition and barriers against change.

A key stabilizing factor in the professorial situation is the academic discipline within which college teachers have been socialized. By the time faculty enter the professoriate, they have undergone an extensive and largely consistent "apprenticeship of observation" of what teaching in their discipline is supposed to be. In fact, Joan Stark and Malcolm Lowther of NCRIPTAL concluded from their recent study that the specific academic disciplines are the *strongest* influence on how faculty plan courses of instruction. It appears that there will be more similarity between, for example, chemistry professors at quite diverse institutions (such as community colleges and research universities) than between chemistry professors and literature or history professors at their own institutions (Stark, 1988).

Barrier #2:The Self-definition of Professors What does it mean to be a professor in one's special field? The way faculty answer this question will have a determining effect on how they behave in the teaching situation. For example, do they define themselves principally as "transmitters of an organized body of knowledge"? Or perhaps as "facilitators and managers of student learning"? In the course of becoming teachers, academics acquire a definition of their professional selves. As Bakker (1975) says, "It is not too surprising that people like to apply definitions to themselves and to their fellow men, or that once established they try to keep them the same. After all, if people are to play a role relative to each other they need to know how they can predict the other's responses.

Barrier #3:The Feedback Circle in the Classroom The college teacher steps into a teaching situation for which participants are prepared by years of observation and socialization. In all likelihood, the classroom or laboratory situation will confirm the professor's definition of what it means to be a teacher, and the way students act in relation to this teacher will exercise a powerful regulatory function on the teacher's behavior. For example, with rare exceptions, the teacher will control the channels of communication in the classroom. Students come to expect this behavior and may appear

uncomfortable if a professor changes.

Barrier #4:Discomfort and Anxiety Whenever professors take instructional detours from the familiar and expected, they risk encountering some awkwardness or anxiety. Like cyclists on wobbly wheels, they will understandably feel uneasy when trying the new, different, or unfamiliar. "Can I carry this off?" "How will the students react?" "What will my colleagues think?" are questions that may arise at the boundary of their emotional comfort zone. When professors stick to the "tried and true" methods within the traditions of their disciplines, such uncomfortable questions are likely to be much less frequent.

One's familiar methods are, as Kenneth Eble observed, "as persistent as the bad habits of our youth." One of the habitual behaviors Eble noted was the tendency of professors "to be guided in techniques and practices by the routes of least resistance: to favor the lecture, to shun innovations and adjuncts to instruction, to reduce teaching chiefly to class preparation and delivery on as few hours a week as possible and at the most convenient times." (Eble, 1980). Behavior that is familiar feels comfortable, and what feels comfortable resists change.

Barrier #5:One's Most Enchanted Listener The most traditional and revered form of teaching is the lecture. This form serves many functions, not least of which is that of establishing the professor as *an expert,* as *one who knows*. When professors "cover the material" by lecturing, they have an opportunity to demonstrate their mastery of the subject and to explore in public some of the most interesting intellectual issues that attracted them to their fields. They get to wonder aloud. As they listen to themselves think aloud, they may demonstrate the tendency to be their own "most enchanted listeners." (Johnson, 1956). Being the center of attention can be gratifying. Lowman suggests that lectures survive because, like bullfights and 'Masterpiece Theater', they satisfy the need for dramatic spectacle and offer an interpersonal arena in which important psychological needs are met." (Lowman, 1985). Thus, in spite of the fact that the lecture may not be the most effective method to achieve certain kinds of learning objectives, it tends to resist change.

Barrier #6:Faculty See Few Incentives for Changing For a professor to deviate from established teaching methods invites some professional risks and emotional discomforts but offers relatively few rewards. Developing and offering a new course in a traditional and agreed-upon manner may receive some professional recognition; but making significant changes in *how* one instructs an established course is unlikely to receive similar recognition. In addition, although colleges and universities regularly recognize faculty for presenting papers at academic conferences, far fewer recognize faculty for presenting papers at conferences specifically concerned with college teaching. Furthermore, some institutions offer scant professional recognition or funds for faculty who attempt to increase their instructional competence by attending instructional trainings and institutes.

What Can Help Faculty Change? Gaining the cooperation of the students and colleagues involved can reduce resistance to change. For example, instead of surprising students with unexpected methods, professors can explain their rationale and request student collaboration in the process. Change is made easier when a class, academic unit, or entire institution agrees on the value of making certain changes and commits itself to the process. (One example of the success of such collaboration is the group of medical schools that have changed from traditional lecturing methods to small group tutorial methods known as Problem-Based Learning.)

When one is bound by professional definitions and roles, "breaking set" by trying something new maybe helpful. A teaching exchange in a different kind of institution or a stint at cross-disciplinary team-teaching can stimulate and support change. As well, observing classes taught effectively in alternative ways or talking with instructors who approach teaching differently can stimulate creative changes in one's teaching. Modeling provides one of the most effective means of learning new behavior styles.

It may also be helpful to view the feelings that accompany change as signs of vitality and as indicators that you are refusing to be stale in your teaching. You may discover that conscious change can be exciting and renewing and a powerful antidote to professional bore-out or burn-out Even if your approach to instruction is demonstrably

effective, you may decide a change to an alternative method is necessary to keep yourself challenged and fresh.

The changing circumstances of college teaching demand that faculty reflect on how they teach. In many cases professors will need to add new skills and understandings to their repertoires and revise or discard others. A professor' s ability to change will depend on individual desires and actions and also on the institution's willingness to encourage, reward, and assist the process of change.

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