

Essays on Teaching Excellence

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Critical Thinking by Design

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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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