Deciding Whether to Believe:

Ways of Knowing Among College Students

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During the winter and spring quarters of 1993, 15 KSC freshmen did what few college students have ever done — they described how they decide whether to believe what they are taught in the classroom. In doing this, they made possible an unusual collaboration between the undergraduate teaching program at Kennesaw State College and the Ph.D. program at Georgia State University.

Groups such as the American Association for the Advancement of Science have identified scientific literacy as a central yet illusory goal of general education. While most students will study some science, few will achieve scientific literacy although it is an essential component of both personal development and intellectual independence today.

Many misconceptions about the natural world are due simply to factual misunderstandings, but others may arise from the cognitive framework or world view that is markedly different from that which facilitates scientific thought and understanding.

The goal of this study was to learn more about the world views of our students, represented here by KSC freshmen who were taking a general education (core) science course. The study sought to determine the extent to which the world views of these students are compatible with the scientific paradigm that is the basis for most science instruction.

The assumption here is that one aspect of world view, a student's ways of knowing, will influence his or her understanding of the domains and sources of knowledge and will, in turn, direct the student's attempts to understand particular experiences. If, for example, a student's interpretation of a set of scientific experiments differs markedly from that which is inherent in the presentation of those experiments by the science instructor, then the student's learning may be hindered. If we can understand our students' ways of knowing, then we may be able to make science instruction more personally accessible and meaningful to students.

The concept of world view, as used here, is the student's conceptualization of the relationship between Self and Nonself (i.e. between oneself and the external environment). It is based on thinking (the rational process through which one comprehends and interprets phenomena) and knowing (the process through which one assesses the plausibility of that interpretation). If the plausibility of an interpretation is confirmed, the student takes possession of and believes the interpretation, resulting in true or valid knowledge for that student. If plausibility is not confirmed, the interpretation is rejected.

The presuppositions which guide science and science instruction are considered here to include three principal criteria: 1) the universality of patterns in nature, 2) the necessity of empirical observation, experiment and theory, and 3) the existence of causes for all effects (though all causes may not be appropriate for science). What are our students' ways of knowing (plausibility structures) and how compatible are these with scientific ways of knowing?

Why Do I Teach?

Harriet Gustafson, Instructor of Mathematics, Developmental Studies. Twenty years at KSC.

"I teach basic concepts in mathematics and build students' self-confidence because I truly enjoy starting the freshmen out on their voyage through their college careers."

K. Victoria McLain, Assistant Professor, Elementary and Early Childhood Education. Three years at KSC.

"Teaching is a multifaceted experience where my students and I exchange ideas, reflections, discussions, experiences, feelings and even hopes. What a wonderful way to live!"

In-Class Research

This study used a qualitative research methodology in which 15 traditional-aged freshmen were interviewed three times using a semistructured format. The students were asked about 1) how they determine whether or not an explanation is true, 2) the relationships between alternative explanations of the same experience, 3) perceptions of causality, and 4) what factors influence their belief in their preferred explanations. The responses were coded and analyzed according to standard methods for interview interpretation.

Interpretation of the interview data identified more than 40 categories of ways of knowing for these KSC students. The most common of these, in order of frequency, are Authority, Facts, Prior

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Knowledge, Experience, Reasonableness, Testing, Evidence, Trust and Understanding. The students valued these ways of knowing highly, and acknowledged between them various relations of contradiction, complementarity and integration.

How compatible were these with the process of scientific inquiry? These ways of knowing were compared to the three criteria for our operational definition of science and identified as compatible, ambiguous or incompatible with those criteria. This investigation found that three of the categories (Testing, Evidence and Understanding) appear to be compatible, while six of the nine categories have an ambiguous relationship with the presuppositions of science instruction. Thus the world views of these students are characterized by some potential barriers to the learning of science.

Conclusions

If the nine categories of ways of knowing identified here are common to KSC students generally, then what implications may this suggest for educational practice? While this study did not seek to develop implications, it may be useful to consider these categories by grouping them according to four components of the instructional setting. The first is *students' background*, represented by Experience and Prior Knowledge. The second is *didactic instruction*, represented by Authority and Facts. Third is the instructor's *personal relationships and interactive communications* with students, represented by Trust, Understanding and Reasonableness. The implications of these may be considered for instruction in any discipline. Finally, and most directly relevant to science instruction, is *science as a way of knowing*, represented here by Testing, Evidence and Understanding. Because experimentation and evaluation of data or evidence are two of the most essential elements differentiating science from other ways of knowing and are also among the ways of knowing most valued by students, effective instruction should be explicit and focused on these characteristics of science.

When students understand science in this way, they may be better able to view it as one particularly effective way of knowing, distinct from and not necessarily competing with, other ways of making sense of the world.

A First—The Great Kennesaw Teach-In

To renew and deepen its focus on teaching, the Department of English conducted The Great Kennesaw English Department Teach-In, May 2-6.

During the week, neither departmental meetings nor departmental committees convened. Open classes allowed instructors to become students again and enjoy the luxury of sitting in a desk and learning. The open classes also gave those teaching a chance to interact with brightfaces and willing minds. With colleagues as students, teachers had the pleasure of dealing with those neither worried by tests nor obsessed with grades. Individuals on both sides of the desks could reconnect with the essence of teaching and learning.

On the Friday of the Great Kennesaw English Department Teach-In, members of the department gathered for lunch. One rule held there: no one could talk about details of classes. The objective was to lift faculty out of the limited conversation of tests, workload, and the difficulties or complaints of students.

The originator of the Teach-In was Jo Allen Bradham, professor of English, who wanted to return a focus to teaching and to offer fulfillment—if only for a week—to those who say, in the midst of meetings and forms, "If I could only teach and not do all these other things, I'd be happy."

Presidential Innovation Grants Awarded

To stimulate interdisciplinary approaches to teaching, Dr. Betty Siegel challenged faculty members in winter quarter to submit proposals for special Innovations Grants, of which five have been funded.

Totalling $12,500, the five grants have focused on enlivening cross-discipline cooperation, creating opportunities to explore, in greater depth, the systems and content of teaching and learning.

• Service Learning

A group of faculty from student services, sociology, public administration, political science, mathematics, nursing and education have developed a project designed to raise the consciousness of faculty, staff, students and administrators about "service learning"—a new paradigm of teaching and learning that links academic training with community service.

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