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How Do Faculty in Reform and Traditional Undergraduate Science Courses Describe Their Perspectives on Teaching?

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The National Study of Education in Undergraduate Science (NSEUS), funded by the National Science Foundation, investigated the perceptions of course instructors toward their teaching among a sample of undergraduate entry level science classes. An initial sample of six institutions was used.

The institutions were sampled from a population of 103 higher education institutions. These institutions, and one or more of their courses, were involved in the NASA/NOVA Program. The NOVA courses were developed and offered at various times beginning in 1996 in a large professional development effort to create reforms in higher education undergraduate, and mostly entry-level, science courses.

Interviews with course instructors were conducted using an extensive protocol including a specific set of questions and also probes with which to follow-up first responses to questions. The aim was to establish the course instructor’s views of teaching including conceptions of effective teaching of undergraduates, including the pedagogy that was needed to facilitate an understanding of major science concepts.

The initial sample of six institutions used here represented a range of Carnegie types from Research 1 through Bachelor’s degree granting, and from large in size through small, with one primarily native American serving institution among them. Reform courses were implemented in interdisciplinary (e.g. aerospace science, natural science) courses as well as single subject area courses (e.g. biology). All of the reform courses
were available to non-majors, with elementary education majors forming one large student component.

A summary of interviews with two course instructors is presented below. The first instructor was a NOVA faculty member (Reform Course Faculty Member #1) who developed, and still teaches, a reformed course (see Figure 1). This faculty member had been teaching for 19 years at a four year Bachelor’s degree granting university. The faculty member had had no courses in education nor any professional development for improving teaching other than the NOVA workshop when applying for a grant and during a GLOBE workshop. The NOVA workshop was reported as sparking interest in pedagogy and an interest in more professional development to improve teaching. This instructor is the only one in the department using innovative techniques for teaching. This individual believes that science is important for all students. Short lectures are used, and there is a reliance on hands-on experience to teach content. This faculty member was very passionate about teaching and student learning.

**Figure 1: Reform Course Faculty Member #1 Describes Teaching**

- This one works so well, that I am trying to change my other classes to not lecture so much because they get the totally glazed over look. They don’t seem interested at all. And this class is completely different. You are taking people who have no interest in it at all in the first place and at the end of each unit I actually ask them to write a little reflection…This helps me assess what I’m doing to. If I know something is not working by reading these, I can change what I’m doing. (210)
The second faculty member (Traditional Course Faculty Member #1) teaches a traditional course (see figure 2). This instructor had taught 16 years at the same four year Bachelor’s degree granting university as Reform Course Faculty Member #1. Prior to that, the instructor had taught for two years at the high school and community college level. This instructor took education courses in order to be certified as a high school teacher. No other professional development has occurred in regard to teaching, but the faculty member indicated that personal teaching skills were developed while working as a tutor. One comment made by the instructor was “I don’t like ‘eduspeak’”. This instructor indicated that he has not really thought about his teaching or student learning. He believes that science majors are more dedicated to learning than are other majors. The major approach to “covering” subjects that he uses is to have extensive lectures. He reported trying to present a very caring and respectful attitude to students while teaching in the classroom.

**Figure 2: Traditional Course Faculty Member #1 Describes Teaching**

- You have to follow a logical sequence like the one in the Campbell textbook that we use. I try to have zeal and to draw the students out. Droning on just puts them to sleep. I try to have a hook to get their attention. Even during lectures, I use examples and reflections on what I am presenting. (420)

In summary, both reform and traditional course instructors at the six higher education institutions in the initial sample, expressed passion for the subject they were teaching during interviews. They wanted students to leave their course with a better
understanding of the nature of science. All cared about their students’ performance in the class.

Traditional course instructors reported relying heavily on lectures. They collaborated less with others about their pedagogy. Some were aware of other effective teaching practices, but did not implement them in their classrooms. They tended to think undergraduate students were not interested in science.

Reform course instructors reported relying lesson on the textbook and using fewer “cookbook” labs. They collaborated more often with others about their teaching. They expressed more knowledge of pedagogical strategies and greater interest in implementing them.

Further discussion of NSEUS findings is available in:


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