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What Perceptions of Undergraduate Science Teaching Do Students in Reform and Non-Reform Science Courses Describe?

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The National Study of Education in Undergraduate Science (NSEUS), funded by the National Science Foundation, investigated the perceptions of undergraduate science teaching held by undergraduate students in entry-level science courses at an initial sample of six institutions. These institutions were sampled from a population of 103 higher education institutions. All of the 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.

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. The DAST was administered to students in the reform course and to students in a matched traditional course at the beginning and the end of each course.

Students within the reform and matched traditional courses participated in focus group interviews of about six students each. Each set of focus group interviews followed an identical protocol. Students responded to questions that enabled them to describe their college science experiences, their experiences in the current course with specific reference to a lesson just taught and also observed by project staff, and their conceptions of science teaching.

Examples of focus group interview questions relating to students’ college science experiences are “How would you define science or the nature of science?” and “How has your definition of science changed due to the science courses you have taken in college?” “Which course(s) had the most influence?” “The least influence?” Experiences in the current science course were addressed using questions such as “What is a typical lesson like for this course; i.e. what normally happens during your classes?” “What were the main ideas or concepts for this class session?” “What science concepts did you learn?” and “Why is it important for you to understand these concepts?” Sample interview questions relating to students’ conceptions of science teaching are “Have your ideas of science teaching changed as a result of taking this class or others at the college level? (How do you think science should be taught?)” and, for Education majors, “Do you think that you can become an effective science teacher? (Do you think that you could be an effective science teacher? Why or why not?)” Questions had specific alternatives that could be used to probe students thinking such as those identified in parentheses in this paragraph.

Figures 1 and 2 below present some of the focus group interview findings. Figure 1 describes common student focus group interview comments. This figure displays comments from students in the traditional course and in the reform course with which it was matched.

Figure 2 describes themes commonly expressed by students in the focus group interviews.
Student Interviews

Traditional Course
- Material is presented over my head.
- Purpose of the lesson is unclear.
- Lesson has no applicability to my future career.
- Teacher doesn’t explain well.
- I need help with the problems.
- I don’t like science and this course does not make me like science.
- Material is only presented one way.

Reform Course
- I didn’t like science before, but I like science now.
- Class material is presented in a way I can understand.
- Lesson can be used when I teach elementary school, even if I have to modify some of the material.
- I can learn the material.
- I can teach science.
- Material is presented in several ways.

Figure 1: Common Student Focus Interview Comments

Student Interviews: Common Themes
- Hands-on is the best way to present material.
- Make the content relevant.
- Make the content practical and connect to students’ lives.
- Experiences in elementary and high school were generally dismal: read the book and answer the questions at the back of the book; know the definitions.
- I’m not a math person.

Figure 2: Common Student Focus Group Interview Themes
Further discussion of NSEUS findings is available in:


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