

## **Research Brief No. 8**

### ***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.

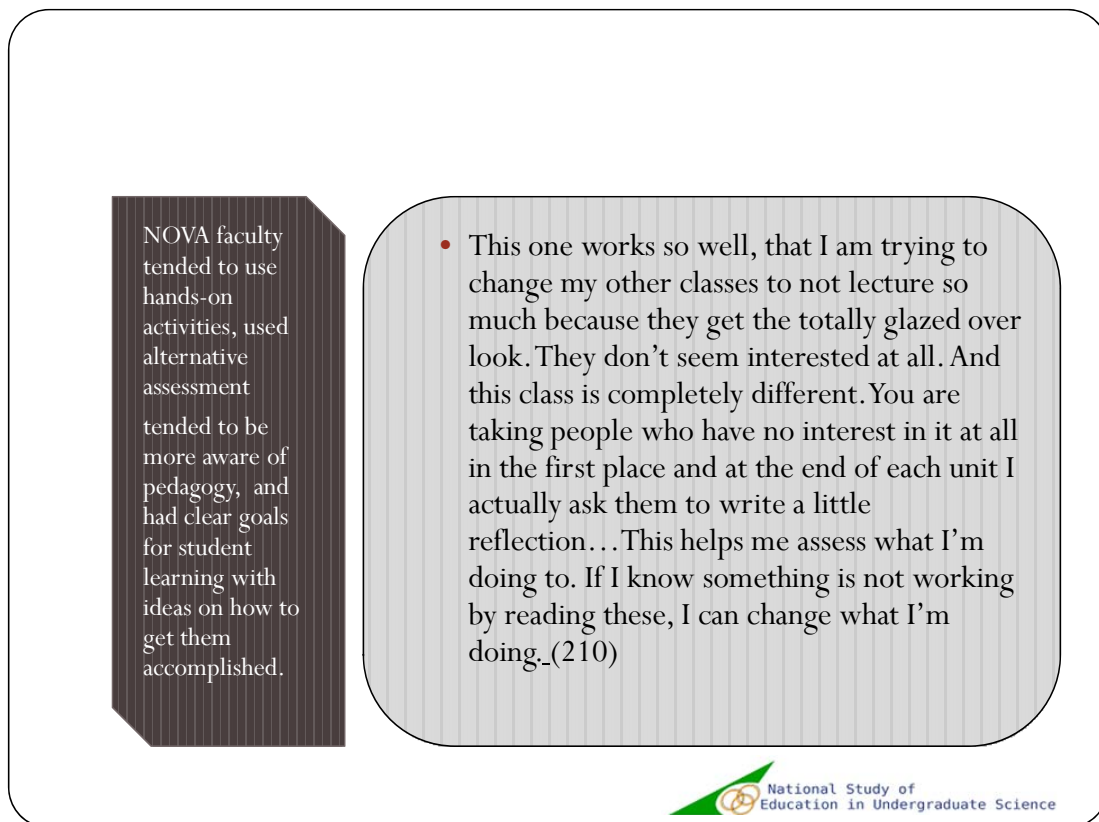
Interviews with course instructors were conducted using an extensive protocol including a specific set of questions and also probes with which to follow-up first responses to questions. The aim was to establish the course instructor's views of teaching including conceptions of effective teaching of undergraduates,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

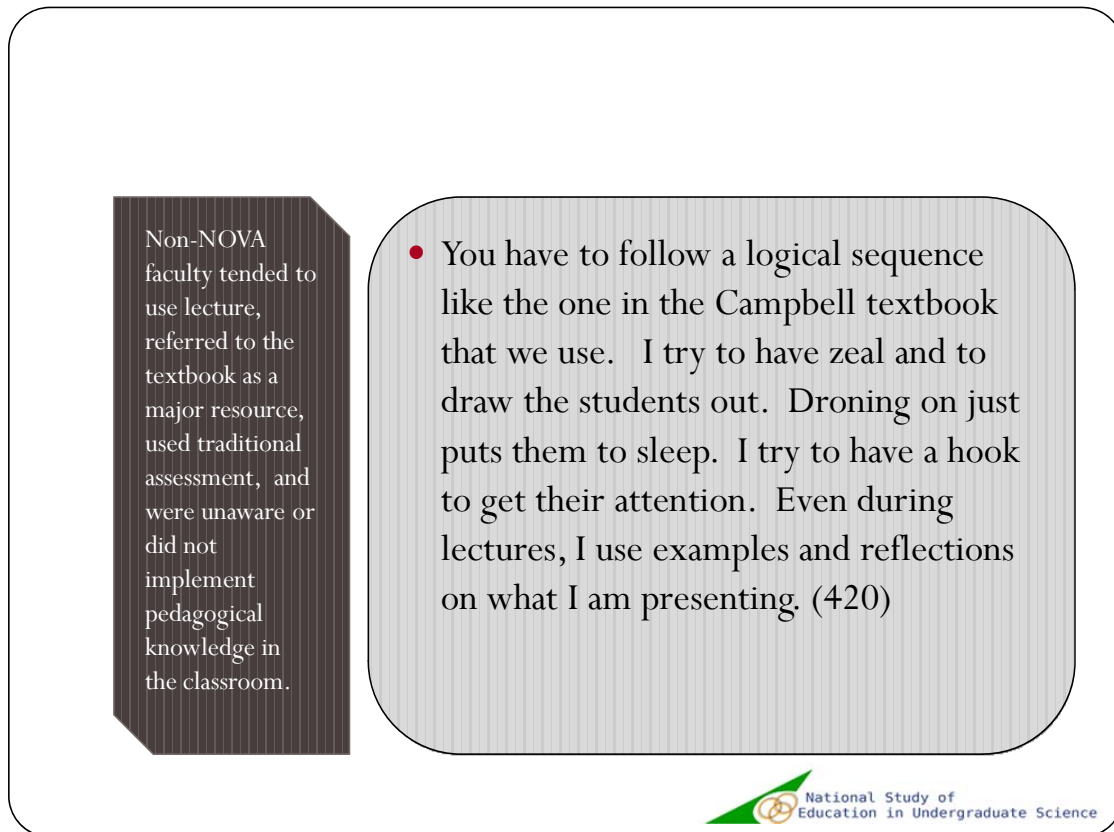
A summary of interviews with two course instructors is presented below. The first instructor was a NOVA faculty member (Reform Course Faculty Member #1) who developed, and still teaches, a reformed course (see Figure 1). This faculty member had been teaching for 19 years at a four year Bachelor's degree 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**



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**



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 less 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:

- Sunal, D. & Sunal, C. (2008). What levels of institutions in a national population are reforming undergraduate science courses? *Research Brief No. 1*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>
- Sunal, C., Sunal, D., Sundberg, C., Mason, C., & Lardy, C. (2008). What criteria can be used to identify the level of implementation of reform in an undergraduate science course? *Research Brief No. 2*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>
- Sunal, D., Sunal, C., Sundberg, C., Mason, C., & Lardy, C., Zollman, D., & Matloob-Haghanikar, M. (2008). What characteristics are found in reformed and non-reformed undergraduate science courses? *Research Brief No. 3*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>
- Sunal, D., Sunal, C., Steele, E., Ogletree, G., Mason, C. and Zollman, D., (2008). What characteristics are found among institutions still offering and no longer offering reformed undergraduate science courses? in reformed and non-reformed undergraduate science courses? *Research Brief No. 4*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>
- Sunal, C., Sunal, D., Zollman, D., & Mason, C. (2008). What are characteristics of a faculty collaborative team at institutions involved in undergraduate science course reform? *Research Brief No. 5*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>
- Sunal, C., Sunal, D., Steele, E., Turner, D., Mason, C., Lardy, C., Zollman, D., Matloob-Haghanikar & Sytil, M. (2009). What characteristics are identified as key reform components among a sample of reformed undergraduate science courses? *Research Brief No. 6*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>
- Sunal, C., Sunal, D., Turner, D., Steele, E., Mason, C., Lardy, C., Zollman, D., Matloob-Haghanikar, M., & Murphy, S. (2009) What perceptions of scientists do undergraduate students in reform and non-reform science courses describe? *Research Brief No. 7*. Tuscaloosa, AL: The Office of Research on Teaching in the Disciplines. <http://nseus.org> and <http://www.teachingdisciplines.ua.edu>



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