

Learner-Centered Education Grants

FINAL REPORT

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1. Project Name and Project Director's Name. Include mailing address, phone and e-mail address.

Project Name: *Learner-Centered Laboratory Course for American Indian Undergraduates*

Director Name: Louise Canfield

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2. Brief Description of Project:

The goals of this project were to develop and implement a laboratory course for Native American undergraduate students at the University of Arizona. Because cancer is a topic of great concern among Native Americans, this course focused on research techniques used in the study of cancer. The class size was intended to be small to allow maximum interaction with the professor. Problems were presented to the students in case study form and were chosen to reflect the health concerns of the Native Americans in Arizona. Students actively participated in selecting the topics and techniques to study. New topics were introduced in case study format, after which students identified "learning issues" - topics or concepts they did not understand about the underlying biology related to the case. Students then researched these issues and reported back to the class, effecting "peer teaching." In the first half of the semester, students studied the link between UV radiation, DNA damage, heredity, and cancer using bacterial models. During the second half of the semester, the students learned several molecular biology techniques; i.e., gel electrophoresis, PCR, and DNA extraction, and designed experiments to examine the effects of DNA damage. Laboratory notebooks, poster presentations and self-reflection on learning were used to assess their learning.

3. Goals, Outcomes and Assessments:

a. Goals and Primary Accomplishments:

The course was developed and approved by the Curriculum Committee at the University of Arizona in the summer of 2003. The course was not offered until spring 2004 due to the instructor's maternity leave. Our targeted course enrollment for the first class was 8 students. In spring 2004, five minority students completed the course, two of whom were Native American. The course received excellent evaluations from the students, based both on the University's TCE evaluation process and on a focus group conducted at the completion of the course by a collaborator at NAU. The course will be offered again in spring 2005 with an enrollment target of 12.

b. Outcomes and Assessment:

Student Teaching Evaluations

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On the University's evaluation scheme, average student ratings for the course ranged from 4.67 (scale of 0-5; 5 most positive) to 5.0. The average student ratings on questions on the instructor's teaching effectiveness, students' perceptions of how much they learned, overall rating for the course, and ratings of the materials used in the course was 4.67. Questions on the usefulness of outside assignments, usefulness of in-class activities, being treated with respect, and instructor's relative rating received a rating of 5.0. Two students rated the course as "more difficult than average" and one rated it "average." Written comments included the suggestion to add an extra class day for completion of experiments. One student wrote, "I liked mostly how we could ask any question about science."

A focus group was conducted for students only on the last class day by an experienced facilitator. A summary of the facilitator's report follows:

Students saw the interactivity of the course as a strength. One student stated that he/she enjoyed the emphasis on identifying, researching, and reporting on individual learning issues because "having to do research ourselves stays with us longer because you have to teach the rest of the class." The students also enjoyed presenting their results in poster format rather than as written lab reports, and one stated that she or he appreciated learning how to write in their science notebook.

Students reported that they valued the use of learning issues process and found that presenting to the class (peer teaching) enhanced their learning process. Several positive comments were made about the use of peer teaching ("People have really helped, especially classmates"). Students also appreciated the relaxed atmosphere and the opportunity to interact "one-on-one" with a professor.

Student outcomes - Two of the students have begun undergraduate research projects, one in the College of Pharmacy and one in the Arizona Cancer Center. One student plans to pursue a Ph.D. in biomedical research and cites participation in this class as his/her motivation.

Summer educational conference

This course led to the acute realization of the impact of cultural challenges on students' progress and the need on the part of faculty for more training in Native culture. To explore solutions to this problem, we invited officials from tribal boards of education, community leaders, students, faculty from American Indian Studies at the University of Arizona as well as Applied Indigenous Studies at NAU to meet with us to discuss further plans for development of curriculum for science education for Native American students. A report of this meeting is attached. A major outcome of this conference was the introduction of a new course, "Science as a Way of Knowing" offered for the first time in fall 2004. This course for freshmen interested in health science careers explores the intersections and dissonances between Western and Native science in an attempt to better prepare Native students for curricula based on Western science while honoring connections to Native science. A copy of the syllabus is attached.

We anticipate that this will become the first of many meetings between our faculty and Southwestern tribal leaders for the purpose of collaborating in improving the quality of instruction of Native American students.

4. Problems or Issues:

It has been difficult to identify a cohort of students with similar background and preparation. Thus our first class consisted of students at varying stages of their academic careers and came with a spectrum of skill levels, understanding of the academic environment, and willingness to be mentored. In

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addition, although this was listed as a class for Native American students, there was a strong response from non-native students. The small class size allowed us to accommodate these students and we discovered that the racial diversity of participants contributed very positively to the course's dynamic.

5. Conclusions, Recommendations and Future Directions:

Students who participated enjoyed this learning experience and profited greatly from the class. Based on our first experience, we are considering the option of broadening our audience to all qualified minority students rather than narrowly focusing on Native American students. As the course matures, this may take the form of additional sections. This was a new class with which students were unfamiliar.

6. Has this project led to sustainable change in your department/college? Describe:

In fall 2004 we will participate in a new program initiated by the Native American Student Affairs (NASA) (<http://nasa.web.arizona.edu>) at the University of Arizona, the First-Year Scholars Program. Our participation in this program is a direct consequence of the development of this course and our resulting interaction with NASA. This program identifies a cohort of scholarship students in their freshman year with the objective of having them progress as a support community through their undergraduate courses. Based on the success of our course, we have been invited to offer two freshman courses in this program based on LCE principles, beginning fall 2004 and spring 2005. Students from these courses will form the population for the spring 2006 offering of the laboratory course developed with the LCE grant.

7. Impact:

a. Have other faculty been affected by this project? Yes No. If so, describe:

Biology (3) and Applied Indigenous Studies (3) faculty at Northern Arizona University (3), and American Indian Studies faculty at U of A (3) participated in the summer conference that resulted from this project. These faculty will work together to develop undergraduate classes that will become part of health science emphasis or minors in American Indian Studies and Applied Indigenous Studies at the two universities, respectively. In addition, we are working with faculty and staff at Native American Student Affairs to further develop the First-Year Scholars Program.

b. Number of courses affected/involved

This course has led to the development of three additional courses in a certificate program to be offered by the Arizona Cancer Center as well as the development of the health science emphasis/minors discussed in (a) above.

c. Number of students affected

Five of 8 targeted in spring 2004 in the laboratory course. Targeted enrollment will increase to 12 in spring 2005.

8. Significant Outcome:

What was the most significant outcome based on learner-centered principles that occurred through your project?

The most significant outcome was the realization of the strength of the learner-centered strategy for science education of Native American and other minority students. Students were actively engaged in their learning processes and as a result experienced a significant boost to their self-esteem and

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confidence. Based on this realization, as described above, we have developed three additional courses, are in the process of creating a health science emphasis in American Indian Studies at the University of Arizona and have developed strong ties with community leaders and tribal boards of education in the Southwest.