Improving Underrepresented Students' Persistence in STEM Using Undergraduate Research Programs

Marshall Swafford
Eastern New Mexico University
1500 South Avenue K, Station 11
Portales, NM 88130
(575) 562-2526
marshall.swafford@enmu.edu

Darron Smith
Eastern New Mexico University
1500 South Avenue K, Station 11
Portales, NM 88130
(575) 562-2363
darron.smith@enmu.edu

Charles Broz
Eastern New Mexico University
1500 South Avenue K, Station 11
Portales, NM 88130
(575) 562-2526
charles.broz@enmu.edu

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Introduction

While the number of Hispanic students enrolling in STEM fields is on the rise (Crisp & Nora, 2012) disproportionately low numbers of Hispanics persist in STEM majors (Young, 2005). Of the Hispanic students who began college in 2004 as STEM majors, only 16% completed a STEM degree by 2009 (Institute for Higher Education Policy, 2010). Documented environmental factors contributing to Hispanic student attrition in STEM fields include financial instability, family responsibilities, and full-time work commitment (Crisp & Nora). Hispanic students have positive attitudes and aspirations for STEM majors (Crisp & Nora) however, interest in mathematics and science have been shown to weaken as academic achievement in those classes decline (Peng, Wright, & Hill, 1995). Student satisfaction with the quality of instruction along with enjoyable coursework have been cited as leading factors in degree attainment (Barton, 2003; Eimers, 2001).

How it Works

This project, sponsored by the United States Department of Agriculture Hispanic Serving Institution (USDA-HSI) Educational Grant Program sought to increase the persistence of underrepresented students in STEM majors. Engaging underrepresented students in experiential learning opportunities in an undergraduate research program focused on sustainable agriculture, human nutrition, and healthy food preparation served as the foundation. Participating in undergraduate research programs, similar to this project, increase minority students' persistence in STEM majors (Herrera & Hurtado, 2011).

The project was a collaborative effort between the Agricultural Science, Human Nutrition, and Culinary Arts programs at Eastern New Mexico University. Participating undergraduates were employed in a variety of capacities in the greenhouse research facility, aquaculture laboratory, food science and culinary arts laboratories, and the Child Development Center at Eastern New Mexico University. Undergraduate students participated in projects focused on aquaculture and food research and production along with nutrition science and food and meal preparation and presentation.

Through the two-year project, the following steps have been taken to accomplish the three objectives set forth by the project staff:

Objective 1: Provide research assistantships and support to undergraduates enrolled in the Agricultural Science, Human Nutrition, and Culinary Arts programs at Eastern New Mexico University

To accomplish this objective, funding was secured for 10 undergraduate students for on-campus jobs focused on aquaculture and vegetable production, human nutrition science, and farm-to-table meal development and preparation.

Objective 2: Provide students with "hands-on" experiences that train the students to accomplish and master experimental processes from sustainable agriculture, human nutrition, to food preparation. Participating students, under the supervision and mentorship of university faculty, participated in research-based production projects in aquaculture and horticulture, experiments in nutrition science and focus group analysis of food products.

Objective 3: To provide training in laboratory research procedures by engaging underrepresented students in research training programs. To accomplish this objective, participating students enrolled in laboratory-based courses to develop the research and production skills needed for sustainable agriculture and farm-to-table initiatives.

Results to Date

The project was successfully offered and undergraduate students were actively engaged in the research and production components. Undergraduate students completed research projects focused on vegetable production, vegetable acceptance by Pre-K students, and economic impacts of environmentally controlled aquaculture production in educational settings. Participating students presented their research at the Eastern New Mexico University student research symposium and the required USDA-HSI project directors' meetings. To date, all underrepresented students participating in the project are currently enrolled in their major or have successfully completed requirements for graduation. Recently graduated students have either secured employment or have been accepted to post-graduate studies.

Conclusions/Future Plans

This project has provided Eastern New Mexico University with the tools necessary to build the infrastructure to engage underrepresented students in research-based experiential learning programs that support persistence in STEM degrees. This project has proven to be successful in providing underrepresented students the financial support and quality educational experiences that support college persistence. Project participants have clearly stated the positive impact of their experiences and communicated their favorable opinion of the project in supporting their higher education and career goals. Given the success of this project, planning has already begun to seek additional funding in the form of a project extension with the USDA-HSI Educational Grant Program.

Costs

This project was funded by a grant from the United States Department of Agriculture's Hispanic Serving Institutions Educational Grants Program. The grant provided a total budget of $249,980. Budgetary breakdown included specific funds for student employment, travel stipends for students presenting research, and supplies associated with conducting student research.

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