

Presentation Abstracts 2014

Soft Skills, Hard Science: A program for STEM students with disabilities: Laura McCullough, UW Stout

“Soft Skills, Hard Science” is an NSF project focusing on giving STEM students with disabilities training in soft skills in order to improve employment rates after graduation. We have had one cohort of students complete the intervention. I will present an overview of the project and data on how students reacted to the training and job placement rates of graduate students.

UWRF NSF STEP Grant: The GREAT (Graduate-Retain-Engage-Advise-Team Learning) Falcon Project: Jamie L Schneider, UW River Falls

Internal studies at UW River Falls (UWRF) showed that fewer than 40% of incoming STEM (Science, Technology, Engineering and Mathematics) students earned a degree in a STEM field and that most of the remaining 60% did not earn a college degree. Typically poor performance in an introductory STEM course led to the student leaving STEM and/or the institution. These numbers are not much better for student in the top quartile of their high school class and/or with ACT composite of 27 or greater.

To address these issues and improve retention and graduation, UWRF has instituted the GREAT (Graduate, Retain, Engage, Advise, Team Learning) Falcon Project, funded by the NSF’s STEP program. Three activities are being implemented to promote student success in STEM:

1. Use of Active Learning pedagogies in introductory STEM courses with grant support for faculty development opportunities
2. Introduction of Peer-Led Team Learning (PLTL) in key Chemistry and Mathematics courses, including General Chemistry, Organic Chemistry, Precalculus and Calculus
3. Implementation of a hybrid advising structure to provide proactive advising to students before they leave STEM or the institution

We will present a summary of our project with the data that lead to the design of our project.

Assessment of Quantitative Reasoning in the Sciences

Jennifer Schuttlefield Christus, UW Oshkosh

As part of the NSF MSP Targeted Partnership project entitled “Culturally relevant ecology, learning progressions and environmental literacy”, we developed assessments and structured interview protocols that informed the creation of a learning progression around Quantitative Reasoning in the Sciences (QRS). Learning progressions can be thought of as learning tracks from novice to expert in a given content area and are research that embodies design-based research methods that are iterative in nature. While the learning progression has been preliminarily established at all levels, continuing to establish data driven lower levels for the progression and determining intermediate steppingstone levels to reaching a desired “expert” status remain important outcomes that yet to be fulfilled. Previously we chose to assess students QRS practices in middle school through high school but are now planning to expand the assessment into the first few critical years of undergraduate education. A revised learning progression with data from core science disciplines at these various grade levels will provide a research-based trajectory for learning targeting concept and also provide a foundation for the development of curricula and professional development for teachers in the future.

Active Learning Strategies in Organic Chemistry: Enhancing Retention in a Gatekeeper Course

Heather Schenck, UW La Crosse

Organic chemistry is a notoriously challenging course that is required for many pre-healthcare majors. Relatively high rates of Ds, Fs and Withdraws are common in many institutions. Aggregate rates of D/F/W exceeding 30% are typical in the first semester of organic chemistry lecture at UW La Crosse (UWLAX). Organic chemistry is the first chemistry course that students encounter at UWLAX that does not include a problem solving Discussion section outside of lecture. In 2013, I modified the pedagogy of my first-semester organic chemistry lecture to include a range of student problem-solving activities during lecture. These activities included exercises in which students developed their own proposals for reaction mechanisms in a coached format. The rate of Withdraws decreased significantly in Fall 2013, from a median of 10% over 10 prior semesters, to 1%. In other words, students who might otherwise have dropped the course, stayed in. Moreover, the final exam scores from Fall 2013 were in accord with those from prior semesters with higher Withdraw rates. The retained students therefore did not add disproportionately to the number of students in the D and F categories. Active learning exercises specific to organic chemistry have significant potential to enhance retention in a course that traditionally weeds out many would-be future health care providers.

Interactive Online Resources Help Students to Improve in General Chemistry Courses: Yijun Tang, UW Oshkosh

McGraw-Hill's Connect is an interactive platform for student to do homework online. It also provides students self-learning modules called LearnSmart. The assessment in one of the General Chemistry courses showed the effectiveness of such interactive online resources. Students who used Connect actively earned better grades than those who used it scarcely. The role of the instructor was also important in helping students to use the online resources.

The Technology (Fear) Factor: Alexandru Tupan, UW River Falls

The author was inspired by Rebecca Cox' essay "The College Fear Factor". In a similar spirit, I will discuss several fear factor aspects related to the presence of technology in the classroom. I will look at how such factors impact the process of student retention (including underrepresented groups). The discussion will be based on my direct experience as well as data collected by other college instructors.

Moving active learning strategies from a lecture hall to an active learning classroom: Anne Loyle-Langholz, U Minnesota and Jamie L Schneider, UW River Falls

Active learning pedagogical strategies have been implemented in a variety of classroom settings and are reported to improve content learning, develop process skills and increase student engagement. Learning environments are being designed that support a variety of cooperative teaching and learning strategies and promote the facilitation of meaningful, active learning where students are able to interact face-to-face with the instructor and each other. Transitioning from a traditional classroom into an Active Learning Classroom (ALC) requires adaptation and refinement of teaching and learning practices. In order to bring the events taking place into deeper focus in two different settings, data was collected in General Chemistry I taught using Process-Oriented Guided Inquiry Learning (POGIL) methodology. The course was held in a tiered lecture hall and an ALC during the 2013-2014 academic year at a mid-western state university. Daily video and audio recordings were captured to allow for analysis of the interactional details, while variables such as the instructor and content delivery methods were held constant. One goal of our project includes analyzing student-student and student-instructor discourse during the various stages of POGIL activities to learn more about the coordination of cognitive and social processes when students grapple with chemistry content.

Recruitment of Post-Doctoral Women in Science to UW System Comprehensive Universities

Erin Winterrowd & Jennifer E. Mihalick, UW Oshkosh

The underrepresentation of faculty women in science is particularly apparent at primarily undergraduate institutions (PUIs) or comprehensive universities. This presentation will focus on one program designed to increase recruitment, retention, and advancement of women in science at PUIs. Funded by a NSF ADVANCE PAID grant, the UW-System Women and Science Postdoctoral Seminar program sends female postdoctoral scholars from UW-Madison and UW-Milwaukee to give research seminars at the comprehensive universities. While visiting campuses, the postdocs meet with faculty to learn about careers at PUIs, and interact with students to share information about preparation for academic careers. In addition to exposing undergraduate students and faculty members to female role models, preliminary results suggest that the program appears to result in a more accurate understanding of academic careers at PUIs (e.g., relative emphasis of teaching vs. research), which may lead to more realistic expectations and subsequently greater job satisfaction for postdoctoral applicants.

Cultivating Community: Using Service Learning in STEM Courses: Penny Lyter, UW Parkside

Service learning (community-based learning) is identified as a high-impact practice according to the National Leadership Council for Liberal Education and America's Promise (LEAP) (AAC&U, 2007). These deep approaches to learning are important because students who participate in these approaches tend to have higher grades and are able to retain, integrate and transfer information at a higher level (Kuh, 2008). This project incorporated service learning into entry-level STEM courses related to nutrition and food. Primary goals of the overall project included: 1) More students retained and succeed in STEM courses and programs, 2) Service learners remain involved with the community partner after completing the course and 3) Kenosha and Racine Counties will see increased availability and consumption of healthy, locally-grown food. A total of 243 students participated in STEM service-learning projects in the surrounding communities during the year-long project. Several evaluation methods were used including a Midwest Campus Compact Citizen Scientist Initiative Student Survey, faculty and community partner surveys, and faculty and community partner telephone interviews. As a whole, students reported enhanced learning and interest in STEM as a result of service-learning. Responses indicated that 87% of students felt the use of service-learning enhanced their understanding of the scientific elements of the course, 64% of students reported increased interest in STEM after participation in the course, and 92% of students felt the use of service-learning enhanced their understanding of food and nutrition. While only 25% of students indicated their intention to enroll in at least one additional STEM course after the current one (54% of students were not sure), 76% of the

students actually did enroll in another STEM course the semester after completing the service-learning course. This presentation will focus primarily on the outcomes related to student retention and success with a discussion on lessons learned.

DI-versity in Math: Gaming to Promote Exposure! A middle school and high school math day for girls at UWEC
Dandrielle Lewis, UW Eau Claire

Sonia Kovalevsky (SK) was the first woman appointed to a full professorship in Northern Europe. SK Days have been organized by the Association of Women in Mathematics to encourage colleges and universities to develop more cooperation with middle schools and high schools in their area. The ultimate goals of our SK Day were to encourage young women to pursue careers in Mathematics and to assist them in transitioning between middle school and high school and high school and college Mathematics. In this talk, I plan to discuss how we achieved our goals by developing engaging student and teacher workshops, a math competition, a diverse panel of professional females, and by creating an atmosphere for middle school and high school students to network with mathematicians and college students. Further plans are to discuss assessments of the impact of our SK Day and strategies that were effective and ineffective.