Presentation Abstracts 2015

Assessing Student Transformation in a Women's and Gender Studies Class: Women in Science and Engineering (WMSTD2730)

Gretchen Bohnhoff and Tammy Salmon-Stephens, UW Platteville

The Women in Science and Engineering class is a general education course that meets both gender studies and social science requirements. Each semester, the instructors have witnessed several students transforming their attitudes and/or changing their behaviors related to diversity issues. Several writing assignments showed patterns regarding changes in attitude toward and personal behaviors related to diversity.

Additionally, the instructors noticed that young women more easily connected with support services within the WEMS program and they witnessed increased confidence and self-efficacy. Though the evidence related to these changes was anecdotal, the instructors suspected that a more thorough assessment by an external party also would show that the course has significant impacts on the students in class. This project provided the opportunity to investigate these changes through a creation of an assessment rubric included: self-efficacy, awareness of the impact of difference and diversity in STEM, heightened awareness of gender power relations, behavior changes regarding gender and understanding of the purpose of gender studies in STEM. Initial requests indicate that transformation is occurring in students and that female students score high in self-efficacy by the end of the course.

Recruiting Students into Industrial Technology Management: Dr. Jodi McDermott & Dr. Frank Steck, UW Platteville

Industrial Technology Management (ITM) graduates enjoy virtually 100% placement in their field of study with salaries ranging from $35,000-$75,000. Despite these attractive statistics, we struggle to recruit new freshmen, especially women and underrepresented minorities. We have conducted two programs to help promote and inform about ITM. First, we conduct a STEMposium, which is an evening on campus for PLTW students to present their work and experience hands-on activities related to ITM. Our second event was piloted this year and was a hands-on workshop in our labs for local PLTW students and their teachers. We have found that once students experience the major in a hands-on way, they are much more likely to seriously consider pursuing this STEM major. By doing

this as a school field trip, we were able to encourage some potential female students who were in the PLTW courses. We also were able to educate the teachers about the variety of subjects within the major. The teachers in turn can inform current and future students about the opportunities available. We will be surveying the students and teachers about the activity and also assessing to discover if students who participated apply to the major

Internationalizing the Curriculum—Lessons from an International Collaboration between UW Platteville and Windersheim University, Zwolle, Netherlands

Kristina Fields, UW Platteville

In fall 2014, 30 U.S. senior transportation-engineering students and 40 mobility students in the Netherlands collaborated to create trail alignments for four different international sites. This presentation will detail the layout of the project objectives, explain the project logistics and discuss challenges and recommendation for others interested in developing an international collaboration project.

Making a Case for a Faculty Fellows Program

Jamie L Schneider; Bradley J Caskey; Anne Loyle-Langholz; Frances Lawrenz, UW River Falls

In studying five years of institutional research data, we found that 39% of students entering our institution as a science or math major during 2001-2006 actually earned a degree in science and math. Coupled with this data were less than desirable DFW rates in 100 and 200 level science and math courses. As part of a NSF STEP grant, we developed a faculty fellows program to help support a few science and math faculty each year to develop and teach a segment in a 100 or 200 level course that utilized active learning techniques. We will describe this one-year peer-mentoring program along with our short term and long-term evaluation goals. As part of our long-term evaluation goals, we will present on a survey given to science and math faculty that assesses their knowledge and use of a variety of active learning techniques. Specifically, we will summarize the current level of faculty familiarity with some research based teaching strategies. We will also report of the current use of a variety of instructional methods in 100 and 200 level science and math courses.

Engaging Calculus Students with Flipped Learning
Kathy Tomlinson, UW River Falls

Research on the Calculus Concept Inventory (CCI) shows that interactive engagement (IE) teaching techniques defined as “activities that yield immediate feedback through discussion with peers and/or instructors” are seemingly the only factor that improves student understanding of calculus concepts. I implemented IE in a calculus course via flipped learning. Primarily, the term flipped refers to a flip between learning from lectures in class and then practicing at home, to learning from lectures at home and practicing in class with instructor support. A second interpretation of the term flipped is a flip between the classroom activities being centered on the teacher to being centered on student activity. I used video podcasts to deliver some lessons during first semester calculus, freeing up class time for IE activities. How do you get students to listen to and learn from podcast lessons outside of class? How do students perceive their own interactive engagement in a flipped learning setting? Issues that arise in flipped learning in mathematics will be discussed.

Implementing and Assessing the Impact of iPads in the STEM Laboratory: Kitrina Carlson and Maleka Hasmi, UW Stout

Frequently employed as a personal device for email and web browsing, tablets are not an uncommon sight in the STEM laboratory or field environment. However, despite the potential of a mobile device as a tool in a STEM field or laboratory experience, tablets are not typically incorporated into the university level STEM field or laboratory experience. We propose that the inherent mobility of tablets, the largely untapped potential for using educational apps as interactive learning tools to share and disseminate data, offers students at our polytechnic campus a better learning outcome in our STEM field and laboratory courses. We will present the current outcomes of our in-progress study on the impact of iPads in the STEM classroom including: 1) Initial assessment of the practical, logistical and accessibility needs of instructors, technicians and students and how iPads may be employed to address these needs. 2) A pilot laboratory adaptation phase, currently underway, involving comparison of student experience between iPad based human biology labs and traditional lab experiences. 3) Development of new iOS based applications based on needs identified from instructors and students. These results will be used to inform future adoption of iPads in other STEM courses and possibly across campus.

Immediate Feedback in Testing, Worth It?
Jamie Schneider, UW River Falls

Instructors often employ individual assessments (tests and quizzes) with multiple-choice formats to evaluate student content knowledge. Delayed feedback mechanisms are commonly used; some of which are non-corrective (scores on exams) and some of which are corrective (marks next to each question wrong with access to answer keys). More immediate feedback options seem to be reserved for computerized testing. Are there immediate feedback options that are not so technology restricted? Our research aims to gather evidence about the effects of incorporating methods of feedback into multiple-choice exams in general chemistry and to offer suggestions to optimize the feedback to promote student learning. We collected research-testing data using traditional bubble answer forms and Immediate Feedback Assessment Technique (IF-AT) forms both of which are paper-based, classroom-accessible multiple-choice exam response options. We will present our finding of this NSF supported project (DUE 1140914), which includes development of two algorithmically similar general chemistry tests and data on delayed non-corrective versus immediate corrective feedback conditions. Feedback effectiveness will be presented through changes in student performance on repeat testing and changes in the degree of correlation between confidence and performance on repeat testing.

Improvement Methodologies in the Introductory Physics Labs for Non-science Majors: Ozgur Yavuzcetin, UW Whitewater

The challenges of teaching an intro level STEM course aimed for non-science majors are: the diverse background of students and the lack of awareness of the students as to why they are taking or why they are required to take that course. Most STEM courses require a lab section with the expectation to improve the lab skills of students and to learn through experiential methods. However, some students rush through the labs without learning the concepts. And most of them try to fill out the lab reports and follow the experiments like a recipe book. After the lab sessions, some students do not really understand the lab and do not even have an idea about what was going on. After going through a couple of eye-opening workshops in STEM and physics education fields, I paid special attention to the improvements of physics labs in terms of student pedagogical learning. I applied and tested methods in our introductory physics labs:

- PhETs (interactive physics simulations) assisting labs
- Giving extra time to students to test their hypothesis
- Encouraging peer instruction in the labs
- Having lab manuals revised by students

In this presentation, I will talk about the methods tested above and mention the assessment strategies in physics labs.

Effective Implementing Total Differential Calculus to UW Green Bay Thermodynamics Class: Franklin Chen, UW Green Bay

Thermodynamics is a science to study equilibrium and spontaneity. Multivariate calculus is an integral part of the Thermodynamics curriculum that relates experimental variables such as heat capacity to variables such as entropy and free energy for predicting the spontaneity of a chemical reaction. Without those calculus equations, Thermodynamics will be reduced to a useless knowledge that is unrelated to the real world. Students are generally not prepared for the demand of the mathematics required in the course. The Conventional Thermodynamics textbook introduces multivariate calculus to relate heat capacity to entropy only after both the first and the second law of Thermodynamics is introduced, which is about at the 7^{th} week of the semester. This left only seven weeks for intensive mathematical drills to prepare students mastering the subject. I have prepared seven modules of multivariate calculus in physical chemistry context and gradually introduce the module to the students. It was found the approach was successful at the end of the semester.

Communities of practice for implementation evidence-based teaching in the life sciences: Karen Klyczek and Sharon Klavins, UW Platteville

The Partnership for Undergraduate Life Science Education (PULSE) is a community of educators striving to implement the recommendations outlined in the 2011 Vision and Change report by the National Science Foundation and the American Association for the Advancement of Science. These recommendations call for a focus on student-centered teaching strategies that promote inclusion, such as research experience and other active learning approaches, assessment of learning outcomes and institutional support for implementing innovative teaching. PULSE resources include rubrics for evaluating how well life science departments are achieving implementation of these goals, as well as strategic planning tools and faculty development resources. In addition, PULSE is supporting regional communities of practice to facilitate networking and collaboration around Vision and Change goals. We will describe the results of efforts to transform the biology departments at UW Platteville and UW River Falls to align with Vision and Change recommendations and also opportunities to participate in the PULSE regional network in Wisconsin.

The Solar Army: A new paradigm for lab experiments and outreach projects: Jenny Schuttlefield Chrisuts, UW Oshkosh

One of the current grand challenges is meeting the global energy need in a sustainable and environmentally friendly way. As a society, we will need to develop strategies that incorporate renewable energy in a sustainable fashion. Lab experiments provide the perfect platform to introduce the ideas of current renewable energy technology and the idea of sustainability, while providing students with hands-on learning experiences and reinforcing topics currently being covered in class. We have developed real time research experiences aimed at discovering inexpensive, stable oxide semiconductors that can efficiently photoelectrolyze water to a useable fuel, hydrogen. Students create unique metal oxide semiconductors combinations, analyze their creation to determine the potential of the material being a good light absorber or catalysts, and report their findings to a collaborative database. A distinctive feature of the project is its ability to be implemented in a variety of educational levels with a breadth and depth of material covered accordingly. To date, we have recruited hundreds of students at the high school and undergraduate levels to join our “Solar Army” and assessment data collected indicates that all students receive some type of gain from participating in the labs. Non-research oriented students appeared to be the most impacted from the experience with increased gains in understanding how scientists work on real problems, conduct research/analyze data and integrate chemistry theory and practice.