Chapter 5

Engaging STEM:
Service-Learning, Technology, Science Education and Community Partnerships

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ABSTRACT

To stimulate student interest in science, technology, engineering, and math (STEM) disciplines, the University of Central Florida (UCF) partnered with the Crooms Academy of Information Technology (CAIT), a public magnet high school that emphasizes technology education for a diverse student population. Using digital tools and a service-learning model, UCF chemistry and biology students partnered with CAIT students to debunk science myths, perform laboratory experiments, and engage in an experiential oyster reef restoration project. This chapter provides an overview of project activities, implementation and the value of using technology. Challenges are detailed to offer a model for future community partnerships. The chapter concludes with a set of best practices for future projects.

HISTORY AND CONTEXT

Service-learning is a relatively well-established pedagogical approach in the humanities, social sciences and pre-professional fields, but has only recently begun to gain traction in U.S. physical and life science curricula. At the University of Central Florida (UCF), service-learning has been a commonly accepted pedagogy for several years, but, in keeping with national trends, rarely expanded into the STEM disciplines until recently. In the summer of 2009, UCF secured a small seed grant from Florida Campus Compact
to launch Engaging STEM, an initiative designed to enlist interdisciplinary faculty teams in science, technology, engineering, and math courses to collaborate with instructors at Crooms Academy of Information Technology (CAIT), a local public high school, to support learning for students on both campuses. During the 2009-2010 academic year, UCF and CAIT students in mathematics, chemistry and biology partnered on projects ranging from debunking common science myths to a collaborative oyster reef restoration project. The use of technology in these service-learning partnerships and the challenges that arose as the projects were developed and implemented will be discussed in this case-study.

**Technology to Create a Product**

During Engaging STEM’s first year, some of the science projects consisted of university students using technology to produce a teaching tool that was shared with high school students. One of the projects involved UCF biology students who reached out to CAIT students through video-based lessons. These lessons related to marine biology and included topics such as coral reef diseases, invasive species, harmful algal blooms, open-ocean aquaculture and environmental awareness. UCF students researched the topics, created scripts with age-appropriate, engaging storylines and recorded their video presentations, which were then used to teach content to CAIT students with accompanying interactive discussion.

Rather than adding a new assignment to the course, the professor in this case modified an existing one. Her previous “hot topics in marine biology” class oral presentation assignment became an opportunity for students to use inexpensive digital movie cameras that plugged directly into PC computers (Flip-Cams™) provided through grant funding to create instructional and entertaining videos about the relevant topic of their choice to share with CAIT students. Together the student teams produced six short films that instructors at CAIT and other schools can use to supplement their existing curricular materials.

**Technology to Engage a Dialogue**

Taking Engaging STEM in a different direction, three of the projects utilized technology to engage in live conversation through web conferencing. As part of a discussion section of their required coursework, approximately 100 Chemistry I students at UCF worked on a project called Chem-Mysteries. After collecting information from CAIT students regarding chemistry perceptions and beliefs, UCF students worked in teams to dispel misconceptions through live video conference presentations. CAIT students used their laptops to watch UCF students perform demonstrations and explain the truths behind common chemistry myths.

The following semester, in an effort to make the partnership more interactive, 22 UCF Chemistry II laboratory students worked as virtual lab partners with CAIT students in a real-time, kinetics-based interactive laboratory experiment. Students at both locations were divided into groups, conducted experiments, and shared and analyzed data through web-conferencing software.

Similarly, UCF Marine Biology students partnered with CAIT students on an oyster reef restoration project that began through web-conferencing tools. This project used the technology as a springboard to communication, which culminated in a face-to-face experiential education event at the end of the semester on the National Day of Service. CAIT students volunteered their Saturday to visit the UCF campus, meet the college students and ask them about all aspects of college life while collaboratively participating in the construction of oyster reef mats that will be used to help restore damaged oyster habitats in central Florida.