



Special Annual Awards

2008 Campus Technology Innovators: Enhanced Learning/ Assessment

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THE USE OF CLICKERS and other tools at WPI has improved efficiency of laboratory teaching, freeing up instructor time for pedagogical interactions with students.

TECHNOLOGY AREA: ENHANCED LEARNING/ASSESSMENT

Innovator: Worcester Polytechnic Institute

Employing a constellation of technologies, technologists and educators take laboratory learning and student performance assessment to new heights, creating a single 'community' of student scientists.

Technology has not only enriched learning in laboratory classes at **Worcester Polytechnic Institute** (MA), it has enabled educators to better assess student performance. As part of a recent overhaul (technically, still underway), WPI technologists turned to Web 2.0 and other tools to enhance the learning environment in science courses, making content more relevant

to the experience and learning modes of students. These technologies also have been used to assess, reinforce, and supplement student learning. Kate Beverage, WPI instructional technology specialist, says the injection of IT has modernized the curriculum so dramatically, many students feel as if the classes are entirely new.

"The electronic nature of the new approach [has] allowed students access to information and pre-demonstrations of lab concepts, procedures, and large data sets for analysis and interpretation," she says. "It truly has changed everything."

The transformation began with a pilot program early this year, when two labs in anatomy and physical biology classes needed a jump-start. According to Beverage, increased student enrollment meant it was becoming more and more difficult for WPI educators to assess the level of student understanding in laboratory science courses. With the majority of lab time devoted to setup and execution of experiments, data collection and analysis were not receiving the same emphasis. Beverage adds that many students did not get the time to focus on whether the data they were collecting reflected their expected outcomes.

At the behest of project lead Jill Rulfs, associate professor and director of the Biology and Biotechnology department, and Laboratory Instructor Michael Buckholt, technology changed everything. Starting in January 2007, technologists applied digital media and communication technologies such as wikis and podcasts from [Learning Objects](#), which were used to enhance the learning environment. Students also were able to log in to the school's [Blackboard](#) course management system to gain access to information, demonstrations, and data sets they couldn't access previously.

WPI students now feel like working scientists, collaborating with colleagues and building concepts based on data.

Later, Camtasia Studio from [TechSmith](#) enabled synchronous and asynchronous exchanges of information among students, creating a veritable community of scientists. Instructors could follow individual contributions to group work and provide feedback and remediation on a basis more immediate than waiting to see lab reports. What's more, instructors say the clicker-style Classroom Performance System from [eInstruction](#) has revolutionized the way they give pre-quizzes.

Other technologies utilized include [Microsoft](#) SharePoint and Office, a [Wacom](#) Graphire Wireless pen tablet, an [HP](#) data video projector and TC4200 tablet PC, and six desktop PCs from [Dell](#).

So far, Rulfs and Buckholt report that early results of these new additions have been positive. For students, the new technology has provided a sense that they are working scientists-- learning procedures, carrying out protocols, collaborating with colleagues, and building concepts based on data. For educators, the capacity to share pre-lab demonstrations has improved efficiency of laboratory teaching, freeing up instructor time that can then be devoted to pedagogical interactions with individual students.

Some of the benefits weren't even expected. Beverage says that delivering pre-lab questions with the Classroom Performance System has provided teachers with several surprise teaching and learning opportunities. In the past, pre-quizzes were given on paper, but not graded until after the lab. Deploying questions with the clicker software allows students to obtain immediate feedback and correct any pre-lab misinterpretations or misunderstandings concerning the lab, prior to conducting the experiment.

During the upcoming school year, Beverage says the methods used in the biology and biotechnology courses will be implemented on a broader scale in other laboratory-based science courses. Rulfs and Buckholt also hope to submit a grant proposal to the [National Science Foundation](#), in order to include podcasts, wikis, and other available technologies in both teaching and project-based laboratories. Furthermore, like all of the best scientists, the educators intend to publish their findings from the project, and share their experiences with colleagues teaching other laboratory-based courses.

Proposals for articles and tips for news stories, as well as questions and comments about this publication, should be submitted to David Nagel, executive editor, at dnagel@1105media.com.