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Experiment in Department of Physics is changing the way students are taught

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Every student who takes a physics course at Georgia Southern University gets to conduct experiments in a lab.

At the same time, students who enroll in a particular introductory course are also the subjects of an ongoing experiment that is changing the way physics is taught at the University.

Studio Physics is a relatively new method of teaching in which the lecture and laboratory parts of the course are seamlessly integrated in a specially equipped classroom setting that lets students work together in three-person teams.

Now in its second year at Georgia Southern, the format allows most of the time in class to be devoted to active, inquiry-based learning.

‘In the traditional introductory course, lecture and lab are taught as separate classes with separate instructors,’ said Mark Edwards, the chair of the Department of Physics. ‘With Studio Physics, students have the same teacher for lecture and lab, and most importantly, they are taught in the same room.’

‘To the students, the distinction between lecture and lab disappears because the two are fused into a single experience, and the lab portion of the class makes the theory part that much more understandable.’

‘Meanwhile, our faculty members are excited by the fact that they have ownership of the complete educational process of lecture and lab for each student.’

According to a study of a similar program at another institution, Studio Physics students were better at problem-solving than students in classes that have separate lectures and labs. In addition, Studio Physics students had a better conceptual understanding than their counterparts in traditional courses.

The same study also revealed that the failure rates for female and African-American students were significantly lower in Studio Physics.

‘The material delivered to the students by the Studio Physics method is essentially the same as in the traditional lecture/lab method,’ Edwards said. ‘However, the learning outcomes for the class are enhanced over the traditional method because of the team structure, the problem-solving class environment and the integrated laboratory activities.’

The Studio Physics program at Georgia Southern is based on a concept first implemented in 1994 at the Rensselaer Polytechnic Institute in Connecticut and New York. The program was later adopted and modified by several other schools, including the University of Alabama.

As a graduate student pursuing a Ph.D., Irina Perevalova taught a section of Studio Physics at Alabama. After accepting a position at Georgia Southern, she advocated the program to her colleagues in the Department of Physics.

Edwards and his fellow faculty members became enthusiastic supporters of the concept. They believe that Studio Physics is an ideal complement to the Georgia Partnership for Reform in Science and Mathematics (PRISM).

An initiative of the University System of Georgia, PRISM is designed to increase science and mathematics achievement for all P-12 students in order to improve their readiness for post-secondary education and careers by enhancing teacher quality, raising expectations for all stakeholders, and closing achievement gaps.

‘We hope to help raise student achievement in P-12 schools by improving how physics is taught to future P-12 teachers,’ Edwards said.

In the Studio Physics method of instruction, each team of students has its own work station, which consists of a computer and lab equipment. During a typical class, the lead teacher and two student assistants make a short presentation to the class and then present the teams with a problem to solve.

‘Solving a particular problem usually requires performing an experiment, data acquisition and data analysis where the concept just presented by the instructor must be used,’ Edwards said. ‘The students become engaged, active learners in an environment where technology plays an important part.’

The first Studio Physics course at Georgia Southern was offered in Spring 2006. The program received a big boost with the creation of a Studio Physics Room that opened in Fall 2006 on the second floor of the Math/Physics Building. The \$150,000 facility features 16 Gateway Profile computers, brand-new lab equipment that interfaces with the computers, and ‘smart’ classroom technology.

‘The smart’ technology enables the instructor to project onto the wall anything that is going on at any lab station in the room,’ Edwards said. ‘The instructor also has a tablet PC that communicates wirelessly with the computer built into the front of the room.’

The Department of Physics is offering 12 introductory physics courses during Spring 2007. Two of these courses are Studio Physics while the other 10 are the traditional lecture/lab courses.

Meanwhile, the Studio Physics program is undergoing a continuous evaluation process. During the course of each semester, students are given a couple of nationally recognized standardized tests that are designed to measure their knowledge, and members of the Department of Physics faculty observe the class on a regular basis.

‘These data are compared with similar testing of the traditional classes to determine whether the studio method provides better pedagogy,’ Edwards said.

Faculty from the University’s College of Education and P-12 science teachers from throughout the region also observe the class and provide their own feedback.

‘Based on what we know so far, Studio Physics has been a major success,’ Edwards said. ‘In fact, we hope to be teaching all of our courses by the studio method by 2010.’