Study: AP courses fail to boost success in science

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CHARLOTTESVILLE -- There is little evidence that high school Advanced Placement courses significantly boost college performance in the sciences, according to a study co-authored by a University of Virginia professor.

The survey, released yesterday, of 18,000 college students enrolled in introductory biology, chemistry and physics was conducted by University of Virginia professor Robert H. Tai and Philip M. Sadler of Harvard University.

"The AP classes are designed to be taught to a test," Tai said of the study's findings on the value of AP courses. "And what's on that test? You can't put everything on it.

"The AP test and class is not what they want it to be, which is teaching beyond what you would normally get in high school," Tai said. "Teaching to a test is not what it's all about. It's about learning."

Tai and Sadler found instead that success in college science courses was the result of high school classes that emphasized mathematical fluency, depth of learning and good laboratory teaching.

Jennifer Topiel, a spokeswoman for the nonprofit College Board that oversees the AP program, said Tai and Sadler's study was "very incompatible with other studies on AP.

"There has been a lot of research on AP classes," she said. "They show students who perform well on the AP exam do well in college."

Tai said the best indicator of college performance in biology, chemistry and physics was mathematical fluency, which he described as students who simply get good grades in math classes, take calculus in high school and score well on the SAT math test.

Tai, an assistant professor at U.Va.'s Curry School of Education, said the breadth of study needed in some science AP classes results in less retained learning. "You do better if you look at a subject matter in depth. A high school teacher should focus on a smaller number of fundamental topics."

Laboratory work, which is an integral part of AP high school science classes, should also be less about procedure and more focused on learning.

"It's important to make the lab experience stick, not just do it and move on. You need to have students thinking about what they did," Tai said.

The study found that college students in the sample who had taken AP science courses and scored at the top level on the AP exam averaged a college grade of only 90 after taking an introductory college course in the same discipline.

Students who scored just below the top level on the AP exam averaged 87 in freshman science courses in the same subject.

The College Board's Topiel said she had not yet seen the complete research but noted the study used only a very small sampling of AP students. Of the 18,000 college students surveyed, only 1,000 had taken AP classes and only 500 of those took the AP exam.

Tai said the random sample of students were selected for representation across the country. He said there are only a small number of students who had taken AP science courses compared with the net numbers who take college science courses.

Students take AP classes in order to increase their chances of success in attending academically select colleges. AP classes also allow students in many high schools to earn higher grade-point averages, with an A earning a 5.0 rather than a 4.0 for a conventional class.

"We're interested in understanding the choices a student had and which choices that student is making to challenge himself or herself," said Henry Broadus, dean of admission at the College of William and Mary. "AP has been the conventional forum. But what you have is students taking AP who shouldn't be taking them, because they think college admission offices want to see it."

Lizzie Taylor, a fourth-year student at U.Va., took both AP physics and AP chemistry in high school.

"Yes, it's geared for the test," she said. "But with something like AP physics, you can't get it right unless you understand what you're doing. I think I learned the basics of physics."

Tai and Sadler's four-year study, funded by the National Science Foundation, will hopefully improve science education in high schools, Tai said.

"I don't want to encourage students to not take science classes," he said. "But once you take that AP science class, you shouldn't feel like you can skip that class in college. Take the course again in college is my recommendation."

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