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Low-tech learning

Community college finds success using old-fashioned methods

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STUDENTS CHRIS BAYS, left, Trevor Crowe, Micah Henige and Emily Groenewold monitor a Hofmann voltameter, a device for electrolyzing water, during a science experiment at Estrella Mountain Community College in Avondale Oct. 7. The science labs at the college sometimes use low-tech methods to teach students to think critically.

In these technology-driven times, online courses, Power Point lessons and computers in the classrooms are commonplace.

Many Estrella Mountain Community College science classes are returning to their roots, though.

If you walk into Levi Torrison's Chemistry 130 course, you'll notice there aren't any computers. Torrison won't be found lecturing at a podium either. In order to teach his students to think like scientists, they have to act like scientists, he said.

"The same insight scientists have used for hundreds of years is what we are trying to teach," Torrison said.

Last week, Torrison showed his students how scientists discovered water is made up of two parts hydrogen and one part oxygen. They didn't look it up online, or even read it in a book. They used the same apparatus the scientists used in 1866.

"The idea is, how do we know it's H2O? That was the question that came up in 1860," he said.

Students watched the Hofmann apparatus in the center of their classroom and then discussed it in groups, trying to diagram on white boards an explanation of how it works.

"The whole purpose of this pedagogy is to invite students to use the same experiments that were done historically," he said. "In physics, chemistry and biology on this campus, we are really pushing critical thinking."

Using computer programs and the Internet can certainly help with research and data processing, Torrison said, but students really learn best with the hands-on and group discussion approach.

"All the computer does is give them data faster," he said. "The technology is just another means to an end. It can be a crutch."

Modeling their methods

Dwain Desbian, a physics professor at the Avondale-based community college, agrees.

He has studied the Modeling Method, teaching that science is evolving and dependent on the models studied, which vary in complexity.

"Science is about creating models and we try to get students to understand science as a group of models," Desbian said.

He has traveled around the country and to Mexico and Canada, teaching other instructors to help their students experience science through the Modeling Method, not as absolute facts in textbooks.

"Nobody learned to play basketball by watching Michael Jordan play," he said. "You have to do it. In science, you have to struggle, fail, succeed, argue, be wrong and be right."

After Torrison's students watched the Hofmann apparatus and discussed their thoughts within their groups, they held a "board meeting." All of the students form a circle and share their diagrams and ideas and ask each other questions in the board meetings.

"You let them go and you'd be surprised what they come up with," Torrison said. "It really puts the pressure on them to learn. They take an active role in their education."

After the students worked out their thoughts on the experiment, their professor used flame to show where the oxygen and hydrogen ions were in the apparatus. Oxygen ignites the flame and hydrogen makes a loud squeak when fire is introduced.

The most important part to Torrison, though?

"The students are actively engaged," he said.

As Desbian's students were experimenting with weight on the end of string and stop watches, he said it's important to balance out our high-tech world with plenty of old-fashioned experimentation.

"There are many things you can do low-tech very nicely," Desbian said. "You have to balance both sides, you have to understand the role of each in these classrooms."

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