

Spencer Foundation grant funds physics education research

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When a student cries, “It’s Greek to me!” in a general physics class, University of Wisconsin Oshkosh physics professor Mark Lattery takes them seriously.

In a research study recently published in “Science & Education” — an international, peer-reviewed journal that covers theoretical, curricular and pedagogical issues in science teaching — Lattery uncovers parallels in how physics was once understood and learned by ancient Greek and medieval philosophers and how it is learned by students today.

“The inspiration for this research came from carefully observing UW Oshkosh students enrolled in Physical Science 101,” said Lattery, who recently received a \$37,000 grant from the Spencer Foundation for research on student model formation and development.

“One day, I asked my 101 students to describe the motion and forces on a fan cart, which is just a small rolling cart with an electric fan attached to it,” Lattery said. “In my demonstration, I placed the fan cart on a track, turned the fan on and gave the cart a quick push opposite the fan thrust. After the cart leaves the hand, the cart slows down and then returns, like a boomerang.

“After any demonstration, I like to have my students share and defend their ideas. To my surprise, a somewhat heated discussion broke out about forces and motion, and a serious question popped into my head: Was this discussion similar at all to those that occurred between ancient philosophers and scientists?”

In 2006-2007, Lattery was able to pursue that question as a UW System Wisconsin Teaching Scholar.

“The results have been remarkable. In some cases, my students repeat entire lines of argument from ancient thinkers, such as Hipparchus and Galileo,” he said. “Of course, there are important differences, too, but both the similarities and differences are interesting to me, and they are almost entirely unstudied in my field.”

The focus of Lattery’s research is to break down the learning process. With support from the Spencer Foundation, he will develop a new computer application that catches students in the act of learning about force and motion.

“At times, learning physics is like this slow uphill battle. You’re tearing you hair out trying to learn the next thing. Other times, it’s like ‘pow!’ — you suddenly get it. I want to better understand the details about how all of this happens,” he said. “If we can somehow map these learning processes, we can help teachers anticipate the learning pathways of their students, which can transform how physics is taught.”

Lattery continues to look for ways to integrate his research with his teaching.

“This past semester, I sat down with a student to discuss a paper that she wrote on forces. It was gratifying to open a copy of ‘de Motu,’ written by Galileo more than 500 years ago, compare her words with those of Galileo, line by line, and show how great minds think alike,” Lattery said.

“While her (and Galileo’s) ideas did not survive the Scientific Revolution, she learned the modern view of force deeply because she had a chance to compare multiple points of view,” he said.