

# Study shows connection between academic direction and student learning

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A Kansas State University professor is helping students improve their confidence and academic performance by creating a map of learning.

Candice Shoemaker, professor of horticulture, has spent more than four years looking at students and self-efficacy. Self-efficacy involves student confidence in understanding topics and is often linked with academic motivation, learning and achievement. Shoemaker's published research appeared in a recent issue of *HortTechnology*.

Shoemaker studied self-efficacy by creating a course map for students in the Principles of [Horticultural Science](#) course, the foundation course for students in Kansas State University's department of horticulture, [forestry](#) and recreation resources. Each semester, Shoemaker had between 80 and 100 students in the class.

Given the large number of students and the importance of topics covered, Shoemaker wanted to teach the course in a way that helped students retain understanding of course topics. She thought about what topics she wanted her students to remember in five years. She called these topics student learning outcomes, or SLOs, and they became the guidelines for the course.

"I decided that since this was a foundation course, it is a prerequisite for many of our classes and there was a stronger need for students to have skills they retain," Shoemaker said. "I wanted to help them understand the expectations for the class by giving them a map of learning."

Rather than base the course on a textbook, Shoemaker created three to five learning outcomes for each unit of the course and then designed lectures, class activities, lab work and tests around these outcomes.

"I was constantly reinforcing these outcomes and what they meant," Shoemaker said. "When we started a new topic, I would tell the students what the outcomes were for that unit and what they should know by the end of the unit. At the end of the unit, I would give them sample test questions that they should be able to answer if the outcomes had been achieved."

Shoemaker also wanted a way to track student progress throughout the course, so she developed a pre- and post-semester assessment. It wasn't for a grade, but she used it as a way to measure and understand student confidence in their knowledge of certain topics before the semester began and at the end of the semester. The assessment asked students to rate their confidence in their ability to understand topics such as identifying the genus in a scientific name, distinguishing between transpiration and respiration and writing a scientific plant name.

"If I was successful in teaching the class, these were topics that the students should be able to do," Shoemaker said.

She had students rate their confidence in understanding topics on a scale of one to five: One being not confident at all and five being very confident. At the end of each semester, Shoemaker had the students take the test again to see how much they had learned and retained throughout the semester.

Through four years of the study, the students' average confidence rated at a two at the beginning of the semester. That improved to an average of four by the semester's end, meaning that [students](#) were more confident in their ability to understand a topic at the end of the course. Additionally,

student confidence at the end of the semester correlated with [academic performance](#) in three of the four years that Shoemaker observed.

"I spent a lot of time thinking about the end of this class rather than just what the class was supposed to be," Shoemaker said. "I knew this topic was important and I wanted to take that extra time and see if this really does make a difference in student learning. It did."

Shoemaker has used the same course design for a new upper level graduate course, Urban Agriculture, that she is co-teaching this fall.

Although her recent work branches into the realm of psychology, Shoemaker still sees the connection with her horticulture research and stresses the important link between teaching and research.

"It doesn't matter what our discipline is as far as teaching or research," Shoemaker said. "If we are teaching, then we must be scholars in our teaching. A lot of times you see this division between teaching and research, but I think there is scholarship in teaching and we need to see that."

Shoemaker also performs research exploring the connections between [horticulture](#) and human health. She has looked into the health benefits of gardening with youth and older adults.

Provided by Kansas State University

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