

Video games could dramatically streamline educational research

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Richard Lamb, right, discusses artificial neural networks with WSU College of Education colleague Andy Cavagnetto.

"Seeking educational curriculum researchers. Humans need not apply."

A Washington State University [professor](#) has figured out a dramatically easier and more cost-effective way to do research on science curriculum in the [classroom](#) – and it could include playing video games.

Called "[computational modeling](#)," it involves a computer "learning" [student behavior](#) and then "thinking" as students would. Rich Lamb, who teaches science education at WSU's College of Education, said the process could revolutionize the way [educational research](#) is done.

Lamb's research has just been published in *Computers & Education* journal. The article describes how computers examine student responses to science tasks – such as comparing liquid volumes – and thereafter mimic the way students think.

"Traditionally, we'd be confined to a classroom to study student learning for virtually every potential theory we have about [science education](#) and curriculum implementation," Lamb said. "But now, instead of taking a shotgun approach, we can test the initial interventions on a computer and see which ones make the most sense to then study in the classroom."

So in-person research becomes more finely targeted and requires fewer student subjects. It requires less time from researchers and costs less money.

"In the current model of research, we go into a classroom and spend months observing, giving tests and trying to see if changes to a specific model work and how to best implement them," Lamb said. "It will still be necessary for researchers to go into the classroom; hopefully that never goes away. This just gives us more flexibility."

Video games method

An [artificial neural network](#) is basically artificial intelligence that simulates the [human](#) brain. Lamb and his fellow researchers, including college colleagues Tariq Akmal and Kathy Baldwin, use an artificial neural network they named the Student Task and Cognition Model.

Students were given tasks to complete in an electronic game. The tasks were scientific in nature and required students to make a choice. The researchers used statistical techniques to track everything and assign each task as a success or failure.

"The computer is able to see what constitutes success, but it's also able to see how students approach science," Lamb said.

Because the computer is learning an approach to science, rather than just how to do a specific task, it

will later try to solve a different problem the same way a student might.

"I've enjoyed this research in particular because it's opening new understandings of learning and new avenues of teaching and assessment as a result," said David Vallett, one of Lamb's co-researchers from the University of Nevada Las Vegas. "It's a novel yet practical blend of cognitive science and education."

Testing multiple models at once

Lamb said most entertainment video games have the same characteristics as educational videos games. So long as it asks a singular task of the students, any game would suffice – Halo, Call of Duty, Mario Kart and more.

"The computer is learning to solve novel or new problems, which means we can test different educational interventions before ever getting to a classroom," he said.

He said those initial tests will not only tell researchers if a specific educational model will work, but will give a specific percentage of success.

"Even with a large research team, it's usually too difficult to test more than one intervention at a time," he said. "Now we can run multiple interventions, choose the one that looks like it will work the best and then just test that one."

Significant cost savings

And that will help the bottom line.

"For me to get 100,000 students, teachers to administer tests, professors doing research and all the rest, we could easily look at about \$3.5 million," Lamb said. "We can now get those 100,000 [students](#) for the cost of running software off a computer."

It's definitely a novel approach. And it is sure to get a few raised eyebrows. But Vallett said he wouldn't expect any less from Lamb.

"Rich is an enthusiastically creative researcher and

statistician," Vallett said. "That creative spark is what sets him apart from most of the field; he's not satisfied with merely adding a sliver of understanding to our existing knowledge of a topic."

Provided by Washington State University

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