Preaching About Teaching

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The study of how people learn stems back to the infancy of psychological science, when pioneers such as B.F. Skinner, William James, and Edward Thorndike developed “learning science” with the goal of telling teachers what to do. Nevertheless, true classroom-centered research remains scarce, argues APS Fellow David B. Daniel of James Madison University.

Daniel set the tone for the inaugural International Convention of Psychological Science Teaching Institute with a provocative opening plenary presentation. He began with a question: How can we leverage psychological science to develop usable knowledge for teaching and learning?

He advocates translating science for use in the classroom, noting that while research has uncovered substantial data about how individuals learn, much of that knowledge goes unused in educational settings. Although scientists and teachers have overlapping goals, they differ substantially in training, approaches to research, and practical objectives, to such an extent that neither field is properly structured to translate science into pertinent knowledge for the classroom (Daniel & Chew, 2013). Journals that publish research on the science of learning rarely publish education studies, and vice versa, resulting in two separate bodies of research. Without outlets to disseminate results of translational research, scientists have little professional incentive to consider the individual learner holistically within the context of the classroom.

Scientific method breaks down learners into individual components (e.g., cognition, motivation,

emotion), and investigates them at various levels of analysis (e.g., genes, neurons, behavior). Daniel calls for an effort to synthesize across these components and levels in order to investigate the interactions that occur between teaching and learning. He believes it is not usually possible to generalize from controlled laboratory experiments to the complexity of the classroom (Daniel, 2012).

Scientists need a better model for moving promising findings about learning to educational practice, Daniel said. To accomplish this goal, he proposed a model from the field of medicine: drug discovery. In this model, chemists discover a promising compound in the lab; if the compound has the potential to provide a medical benefit, the chemists hand it over for translation to clinical trials, where the compound is further evaluated for side effects, interactions, and costs versus benefits.

Daniel thinks that education research can function in much the same way: Learning science reveals a promising principle — for example, the principle of distributed practice (i.e., evidence that well-spaced study sessions are superior to "cramming" as a study strategy; Dunlosky et al., 2013). The principle is tested on students in the lab and then in controlled classroom experiments that he called "hot house" experiments. The next step that Daniel proposed would be to design an intervention that can be deployed by teachers who are not necessarily under the direct supervision of psychological scientists. This design then would be tested in classrooms with teachers, with an eye toward fidelity, interactions, side-effects and practical utility.

Without this critical translation step — and without data demonstrating various interventions' effectiveness in typical contexts — educators are left vulnerable to marketing from writers, teachers, and self-professed "experts." In the current educational climate, teaching interventions are often promoted like nutritional supplements, with limited or non-existent supporting data, rather than like medicine, backed by rigorous clinical trials. This missing step in education research is "the difference between evidence-based teaching and evidence-demonstrated teaching," said Daniel.

Real-world learning is messy: What works for some students does not work for others; what does work requires effort; and many students persist in using strategies proven to be ineffective even after they have been taught effective ones. A key consideration for researchers and educators in translating learning science to education is that students' goals are not always the same as teachers' (Daniel & Poole, 2009). Some students value convenience over learning, and they may prefer low-cost, low-effort study methods. An important example of how learning science and education are misaligned is found in textbook pedagogy, much of which actually subverts learning. Bold words, chapter outlines, and other alleged learning aids found in many textbooks have no relationship or even a negative relationship with test scores, yet students continue to report that they use and like them (Gurung & Daniel, 2005).

Developing an effective translational process from science to education is crucial to eliminate these and other ineffective pedagogical strategies and thus improve learning, Daniel concluded. The field of psychological science needs a new area of specialization involving targeted skill sets, incentives, and outlets for disseminating results that will lead to usable knowledge for teaching. He offered the following advice for teachers: There is no one good way to get students to learn, and there may never be such a thing as universal best practices for teaching — only promising principles. Because of this inherent complexity, he said, researchers must understand the limits of their training as scientist and work with others who specialize in translation to identify and adapt those principles that actually work in a less controlled classroom setting.

References

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