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Want to Be a Good Researcher? Try Teaching

By Dan Berrett

Graduate students in the sciences who both teach and conduct research show greater improvement in their research skills than do those who focus exclusively on laboratory work, says a report to be published in the August 19 issue of *Science*.

The report, "Graduate Students' Teaching Experiences Improve Their Methodological Research Skills," is notable for being among the first to examine gains in the actual research skills of graduate students rather than what they report about themselves.

The findings run counter to the conventional wisdom underlying the training and rewarding of graduate students in the sciences, which tends to view teaching as a distraction from research. And the report arrives amid an intensifying national debate about the proper balance between teaching and research by college faculty.

"Students who both taught and conducted research demonstrate significantly greater improvement in their abilities to generate testable hypotheses and design valid experiments," writes the lead author, David F. Feldon, an assistant professor at the University of Virginia's Curry School of Education. "These results indicate that teaching experience can contribute substantially to the improvement of essential research skills."

To carry out their study, Mr. Feldon and his colleagues gathered two sets of research proposals from 95 beginning graduate students in STEM fields—science, technology, engineering, and math—at three universities in the Northeast from 2007 to 2010. About half of those students taught, on average, one undergraduate course. The other half had no teaching responsibilities.

All of the graduate students submitted research proposals at the beginning of the academic year and provided revised versions at the end of the year.

Mr. Feldon's team used a rubric to rate several various aspects of the students' research skills, including the context of the proposed study, framing of the hypotheses, attention paid to the validity and reliability of study methods, experimental design, and selection and presentation of data for analysis.

The graduate students who both taught and did research scored higher on those measures, the study found. The results suggest that those students exhibited both superior methodological skills and greater improvement in those skills compared with their peers who focused on research alone.

"The findings resonate with people," Mr. Feldon said in an interview. "Of the people I've spoken to about this study, half said, 'Of course that's what you found.' The other half said, 'There's no way that can be true. Your data must be wrong.' Everyone's got an opinion on this, but there's been little data."

Myths and Assumptions

Much of the existing scholarship on the relationship between teaching and research has focused on how research influences teaching, and not the reverse.

While Mr. Feldon, who studies educational psychology and science, technology, engineering, and mathematics education, points in his paper to evidence that research enhances teaching, this conclusion has not always been settled. In 1996, John Hattie and H.W. Marsh, researchers who at the time were at the University of North Carolina at Greensboro and the University of Western Sydney, in Australia, respectively, surveyed the scholarly literature on teaching and research for the *Review of Educational Research* and found no relationship between the two. "The common belief that research and teaching are inextricably entwined is an enduring myth," they wrote.

That "myth" is one of the reasons graduate students in the sciences are often divided into two camps, observes Mr. Feldon. The more-promising scholars starting graduate school tend to receive generous fellowships and grants, which allow them to focus on research without the distraction of teaching undergraduates. The other group is assigned the job of teaching, and their research has long been thought to suffer as a result.

The assumption that teaching diminishes research quality is reflected widely in graduate programs in the sciences, says Mark R. Connolly, a researcher at the Wisconsin Center for Education Research, at the University of Wisconsin at Madison, who heard a preliminary presentation of Mr. Feldon's findings. Science-faculty members are rewarded largely on the basis of their research, notes Mr. Connolly. That reality naturally leads faculty members to place more value on time spent advising their graduate students on research than on teaching.

Mr. Connolly's own research draws on his interviews with graduate students in STEM fields as they start their academic careers. Those students said they feared that they would not get good jobs if they didn't focus enough on research. "Interest in teaching is considered a signal of failure as a researcher," he says they told him.

The most significant aspect of Mr. Feldon's findings, says Mr. Connolly, is that they are based on data that track the development of actual research skills instead of those that are self-reported. "They're looking at demonstrated competency," he says. "It gets away from these assumptions that teaching is inimical to research. In fact, they're complementary."

Mr. Feldon cites two reasons that teaching seems to improve research skills. The first is that a graduate student who teaches, for example, 20 undergraduates how to develop a laboratory study ends up practicing those same skills him or herself. "It's a straight practice effect," he says. "You're getting more opportunities in more situations."

The second reason is that people who have to explain to someone else how to carry out a task are quicker to develop their own abilities to do that same task.

Teaching's benefit to research depends on a certain kind of educational experience, Mr. Feldon continues. The educational experience for both instructor and student must involve what he calls "active inquiry," the investigation of open-ended questions, in which students must figure out which areas deserve exploration and what data to collect.

Teaching and research in the social-science disciplines would probably have a similar dynamic, he says. That assertion finds some support in a paper by William E. Becker, now a professor emeritus of economics at Indiana University at Bloomington, and Peter E. Kennedy, now a professor emeritus of economics at Simon Fraser University in British Columbia, which was presented at the American Economic Association's annual meeting in 2005.

Their paper described the results of a qualitative study of the relationship between teaching and research among economists who were known as accomplished researchers. About 50 percent of the respondents could provide specific examples in which their teaching of undergraduates had led directly to the publication of research. Thirty-five percent could not cite a specific example but said teaching had played a positive role. The remaining 15 percent didn't volunteer a case in which teaching had helped their research.

A Wider Debate

Mr. Feldon's report comes at a time when some policy makers and politicians are questioning the proper relationship of teaching to research, and whether the greater emphasis on research has harmed the teaching of undergraduates.

This debate has been most visible in Texas., where the Texas Public Policy Foundation, a think tank aligned with Gov. Rick Perry, a Republican, has advanced what it calls the Seven Breakthrough Solutions. One of those recommendations is to divide colleges' budgets for research and teaching, with the goal of "increasing transparency and accountability by emphasizing teaching and research as separate efforts in higher education, and making it easier to recognize excellence in each area." To many in academe, that recommendation advocates the severing of the research and teaching functions of faculty members. This was sufficiently alarming to the Association of American Universities that its president at the time, Robert M. Berdahl, sent a letter last year to Texas A&M

University officials warning that adopting the proposed solutions would threaten the American research university. "Separating research from teaching and oversimplifying the evaluation of faculty does violence to the values that have produced the American universities that are envied and emulated across the globe," Mr. Berdahl wrote.

Many of those who support the proposed solutions have backed away from the document or have said it is not intended to be followed in its entirety. The proposal's architect, Jeff Sandefer, a board member of the policy foundation and co-founder of the Acton School of Business, says he never meant to suggest that teaching and research should be separated entirely—just that they should be measured and rewarded individually.

Mr. Sandefer finds the results of Mr. Feldon's research unsurprising. "The great researchers aren't, to me, super narrowly focused on the answers," he said in an interview. "They're excited by great questions. Teaching is really about getting students to struggle with and explore those questions."