

How Teacher Effectiveness Spills Over into Other Classrooms

Having good teachers in the classroom matters, and in recent years better data have helped researchers more accurately measure individual teachers' effects on their pupils. A novel RAND study goes further, finding that teachers' effectiveness (or lack thereof) ripples out beyond their own students and affects the educational experiences of their pupils' future peers. For example, if a middle school math student comes to school well prepared by his or her elementary school math teacher, that student's new middle school teacher may be more free to help other students, thus potentially improving *their* academic performance. In this way, by directly increasing the abilities of their own students, effective teachers may indirectly help a much larger group of students. Importantly, the researcher found that ignoring a teacher's effect on his or her students' future peers can underestimate a good teacher's value by anywhere from 30 to 90 percent, depending on which assumptions are made about the dynamic nature of the comparisons and the precise definition of the peer group.

New Research on "Spillover" Effects

To date, there has been little focus on the potential indirect—or "spillover"—effects that good teachers can have on their students' future peers. Extant studies on peer effects typically looked at other factors (e.g., the effect of a student's peers' test scores or the effect of other aspects of peers' backgrounds, such as parental involvement or socioeconomic status). That made it difficult to separate out any potential spillover attributable to teacher effectiveness. To better understand how a teacher's impact may extend beyond the students in her classroom, a new RAND study, "Does Helping John Help Sue? Evidence of Spillovers in Education," highlights the potential spillover effects of a good teacher by separating out the effect of a student's peers' test scores from the effect of other aspects of peers' backgrounds. This research brief summarizes findings from this study and suggests future research questions that could further broaden our understanding of how good teachers can indirectly have a positive influence on their students' future peers.

Good Teachers Can Have an Impact Beyond Their Own Classrooms

To estimate the spillover effect of teacher effectiveness, a RAND researcher leveraged the fact that multiple elementary

Key findings:

- By increasing the abilities of their own students, effective teachers also increase the abilities of their students' future peers.
- Ignoring these "spillover" effects underestimates a teacher's value by at least 30 percent.
- Spillover effects make high-value teachers more valuable (and low-value teachers more harmful) than previously thought.
- Spillover effects tend to occur within groups of students who share the same race and gender, and also within (not across) subjects.

schools often feed into a single middle school, and he focused specifically on cases in which a new teacher started working at one of the feeder elementary schools. For example, let's say an effective teacher (Teacher X) started teaching at Elementary School A in 2008. While students who attended Elementary School B would not have been directly affected by Teacher X, those who went to the middle school *after* 2008 would have been in a classroom with peers who were well prepared by Teacher X. Because the students who attended Elementary School B and made the transition to middle school after 2008 were presumably quite similar to students who made the transition from the same elementary school to the same middle school in the previous year, differences in their test scores can reasonably be attributed to the change in the quality of their middle school peers. Put another way, comparing the test scores of middle school students in 2009 who attended Elementary School B with the test scores of middle school students who made the same transition from Elementary School B the previous year provides an estimate of Teacher X's *indirect* effect on the test scores of the students who were not taught by Teacher X but who are now peers of students who were.

Looking at Teacher Effectiveness Data

Using administrative data for more than 585,000 students who attended a New York City public middle school from 1990 through 2010, the researcher found that an effective

teacher—defined as a teacher with a high “value-added” (VA) score, based on the teacher’s impact on students’ test results—does have a positive impact on her students’ future peers. That is, the researcher found that the positive effect that a good teacher has on her students does in fact spill over to affect students who later share a class with the teacher’s students. This spillover effect was both statistically and economically significant: The researcher found that an increase in the average quality of a student’s peers’ previous teachers could affect that student’s test scores by about 50 percent as much as a similar increase in the student’s current teacher’s quality would.

Peer Spillover and Teachers’ Value-Added Estimates

Importantly, the researcher found that ignoring a teacher’s effect on her students’ future peers can underestimate a good teacher’s value by anywhere from 30 to 90 percent, depending on multiple factors. The researcher also considered how peer spillover effects might lead to inaccurate VA estimates. For example, if half of a teacher’s students previously had an ineffective teacher, those poorly prepared students could have a negative impact—both in terms of peer-to-peer interactions and the overall classroom dynamic—on the other half of the class.

Since current VA estimates do not take into account spillover effects, this negative impact would be misattributed to the current teacher and would thus affect the teacher’s VA estimate. To address this potential misattribution, the researcher developed an innovative approach that simultaneously estimates each teacher’s VA and the degree to which effects (whether positive or negative) spill over to affect students’ future peers. While accounting for the spillovers did not lead to a large change in the ranking of the teachers in this study—in part because every teacher was impacted by spillovers from past teachers in a similar way—it does suggest that high-VA teachers are more valuable (and low-VA teachers more harmful) than previously thought.

Social Networks Play a Critical Role in Spillover Effects

The findings from this study also shed light on the mechanisms behind peer spillover effects. The researcher noted that spillovers occurred mainly within subjects, rather than across subjects; that is, a student’s English test score depends on the quality of the student’s peers’ previous teachers’ English

VAs, but not on the quality of the student’s peers’ previous teachers’ math VAs. The spillovers also tended to occur mainly within groups of students who were the same race and gender, as opposed to occurring within the entire grade. These findings illustrate the crucial importance of social networks in disseminating spillover effects. They also suggest that peer-to-peer interactions may play a more important role in spillover effects than do classroom dynamics.

Next Steps

The conversation about teacher effectiveness is almost always about how teachers directly affect their own students; this study makes a strong case for expanding the conversation to also include the ways in which teachers can indirectly affect their students’ future peers, and the impact that this can have not only on student test scores but also on teacher VA estimates. Ignoring spillover effects—and potentially underestimating a good teacher’s VA by between 30 and 90 percent—could have important consequences for policymakers, especially when conducting cost-benefit analyses of teacher improvement programs.

Going forward, it will be important to explore how teachers differ in the degree to which the impact they make on their own students spills over to their students’ future peers. One potential approach would be to gain a better sense of what is generating the spillover effects on future peers. This could help researchers identify other non-test score measures of teacher quality that, in turn, could help predict which teachers are most likely to have large indirect effects. Understanding the mechanisms behind peer spillover effects would also help researchers and policymakers predict whether other education interventions could also generate large spillovers—or whether there is something unique about the way that teachers improve their students’ learning. The fact that spillovers occur within groups of students who are the same race and gender also highlights how important it is to understand the social network within a school, and how education interventions affect these relationships. Without a clear understanding of these issues, it is difficult to know which policies will generate spillover effects, and who exactly will be affected.

Yet even without this additional research, the message of this study is clear: Effective teachers are a benefit not just for their own students but also for their students’ future peers.

This brief describes research conducted in RAND Education and Labor and documented in Isaac M. Opper, “Does Helping John Help Sue? Evidence of Spillovers in Education,” *American Economic Review*, Vol. 109, No. 3, March 2019, pp. 1080–1115. To view this brief online, visit www.rand.org/t/RB10066. The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND’s publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark. © RAND 2019

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