# When The Student Becomes the Master: Learning by Creating Math Tutoring Videos*

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## Extended Abstract

Teaching is anecdotally considered a good way to improve one's own knowledge, but causal evidence of learning by teaching outside of lab settings is sparse. In this study, I conduct a field experiment with 20 middle and high schools in the midwestern United States to test the impact of creating weekly math explanation videos on students' math skills. Teachers were eligible if they taught at least two periods of the same math class. I randomly assigned each teacher's class periods to a "Passive Task" or "Video Creator" condition. In cases where teachers teach more than two periods, one period is also assigned to a "Control" condition. 128 classrooms participated, for a total sample size of 2,523 students.

Students in both the "Passive Task" and "Video Creator" classrooms were asked to solve a weekly PSAT math problem for 8 weeks. With each task, students were also provided with a YouTube link to a "help" video that explained the solution to a similar problem. The only difference is that the "Video Creator" classrooms were additionally asked to create a short video explaining their solution to a hypothetical student. Students submitted their videos directly to their teachers via Flipgrid or Google Drive, based on the teacher's preference. Control periods did not receive any tasks beyond their regular class assignments. Two outcomes I use to estimate math skills are: 1) math

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class grade, and 2) a 15-question post-test, consisting primarily of PSAT and ACT questions, on the topics related to the tasks for that teacher's classes. This 15-question test includes 6 questions that are taken from the exact assigned task questions, and 9 additional questions that are not the exact task questions, but cover the same topics.

I find that relative to the Passive Task treatment, the Video Creation treatment led to a statistically significant 0.07 SD improvement on the end-of-semester math class grade. Additionally, the Video Creation treatment led to a statistically significant 0.17 SD improvement on the PSAT post-test relative to the Passive Task treatment.

When we analyze the impact of both the Passive Task and Video Creation treatments on the "exact task" questions versus "similar topic" questions in the post-test, we find that relative to the control group, the Passive Task treatment leads to a significant improvement for "exact test" post-test questions, but not for other similar topic questions. However, the Video Creation treatment led to a significant improvement on both the exact task questions and the similar topic questions. This shows that the video creation treatment might be particularly effective at helping students generalize what they learn.

An analysis of the student effort, as proxied by the likelihood of clicking on the YouTube "help" videos, shows that the students assigned to the Video Creation treatment were twice as likely as the Passive Task students to click on the help videos. This tells us that one potential mechanism driving the treatment effect is the increased amount of student study effort, in addition to "more efficient" effort found in related lab studies.

*JEL* Codes: D83, D91, I20, J10.
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