RESEARCH BRIEF:
SKEW THE SCRIPT AND AP STATISTICS IN TEXAS HIGH SCHOOLS[†]

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This research brief describes preliminary results from our study of Skew The Script (STS), a nonprofit organization working to increase math achievement by creating "genuinely relevant math lessons." STS develops lesson plans, materials, and assignments built around practical applications that match high school students' interests—like online dating, health care, elections, sports, and social media influencers—and offers those materials for free to teachers. STS first developed materials for AP Statistics, which is the focus of our research so far.

What is the causal effect of using Skew The Script (STS) lesson plans, materials, and assignments on student achievement in AP Statistics? Our preliminary results suggest using Skew The Script (STS) materials improved AP Statistics exam pass rates in Texas high schools. Pass rates increased by about 5–6 percentage points in the first year using STS lesson plans and other materials. In subsequent years, pass rates were 10-11 percentage points higher than other Texas high schools not using STS.

Study Design—To estimate the causal effects of using STS lesson plans, we use a quasi-experimental research design known as difference in differences. To begin, we examine AP Statistics outcomes over time, in the years before and after a school begins regularly using STS. Figure 1 is an illustrative example. The solid circles plot exam pass rates year by year for one high school which began using STS in the 2021-22 school year. Just over 40% of students passed in 2022, a noticeable improvement from prior years when roughly 30% passed. However, pass rates might have increased in 2022 for reasons other than STS.

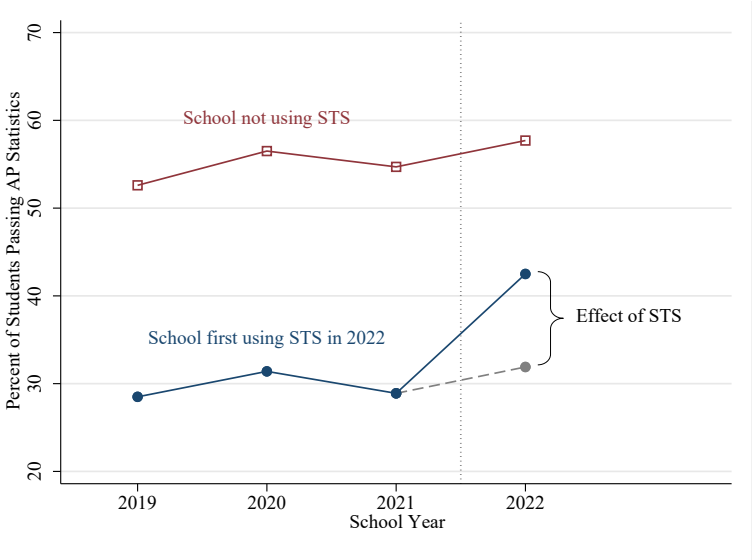

Figure 1—Illustrative Example of Exam Pass Rates Over Time for Two High Schools

To understand what would have happened without STS, we examine pass rates, over the same time period, for schools not using STS materials. Continuing the example in Figure 1, the hollow squares show outcomes for a school not using STS. While the comparison school had higher pass rates generally, the two schools

[†] April 2025. This research brief focuses on Texas high schools. We have carried out the same analysis for Massachusetts high schools, as described in the full research report, and have plans to expand our sample further. In contrast to Texas, for Massachusetts high schools we do not find improvements in AP Statistics exam pass rates, but we do find some evidence suggesting STS increased the number of students taking AP Statistics. The full research brief provides additional details and discussion.

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followed similar trends over time before 2022. Based on the similarity in trends, it seems reasonable to predict that, even without STS materials, the STS school would have seen a small improvement in pass rates in 2022, similar to the 3-point improvement at the comparison school. The dashed gray line in Figure 1 represents our estimate of what would have happened if the school had not adopted STS. The effect of STS is the difference between the school's actual pass rate and our estimate of the counterfactual pass rate.

While Figure 1 illustrates the idea of our difference-in-differences design, several details are beyond the scope of this research brief. In practice, our analysis compares outcomes for many Texas high schools: 55 treated schools which began using STS materials in 2020-21 or 2021-22, and 657 comparison schools. We identify treated and comparison schools using lesson download records. Treated schools downloaded materials equivalent to roughly weekly use of STS. Most comparison schools never downloaded STS materials, but some schools in our comparison sample likely downloaded a few lesson plans. If any comparison schools were using STS, our estimates will understate the benefits of using STS. The Texas Education Agency provided school average AP exam outcomes, for the 2014-15 to 2021-22 school years, covering over 125,000 students who took the AP Statistics exam.

Texas Results—Using Skew The Script (STS) improved AP Statistics pass rates in Texas high schools. Figure 2 shows AP Statistics exam pass rates over time for Texas high schools. Each blue dot is the difference in outcomes between STS schools (treated schools) and all other high schools in Texas (comparison schools). Year 0 is the first school year during which a teacher downloaded STS materials, and thus the first year a school was treated with Skew The Script. Negative numbers represent years before using STS.

AP Statistics pass rates increased after schools began using STS materials. In the first year using STS, year 0 on the graph, pass rates increased by about 5–6 percentage points. In subsequent years, pass rates were 10-11 percentage points higher than other Texas high schools not using STS.

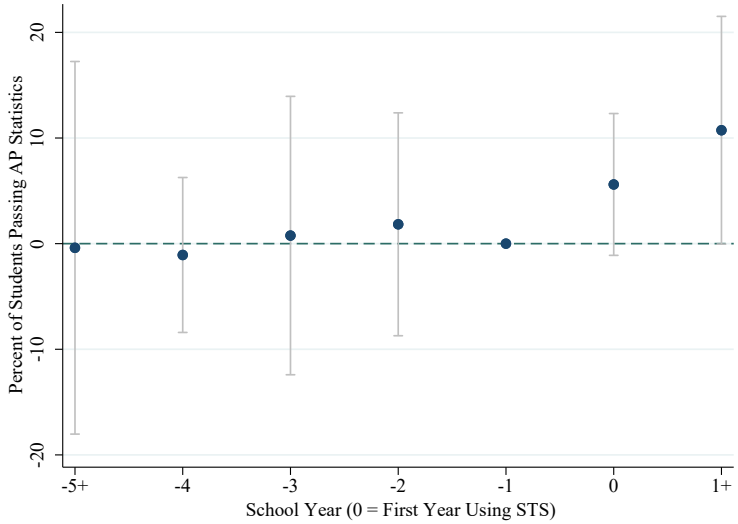

Figure 2—Skew The Script and AP Statistics Pass Rates in Texas High Schools

Note: Each blue dot on the graph is (a) the average pass rate in STS schools, in a given school year, minus (b) the average pass rate in comparison schools in the same year. The y-axis measures that difference, (a) minus (b), but scaled so that the difference is set to equal zero in year –1. Each point estimate is obtained by fitting a difference-in-differences event-study style regression specification, with school-by-year observations. The vertical lines in the graph represent 95% confidence intervals for each point. For details please see the full research brief.

Discussion—Can we interpret these improvements in AP Statistics pass rates as the causal effects of using STS materials? Yes, if we believe the following assumption: If the treated schools had not started using STS materials, then their AP Statistics pass rates would have increased over time by the same amount that scores increased in the comparison schools. (Or decreased by the same amount.)

The pattern of results in Figure 2 does support this causal interpretation. Texas high schools which adopted STS are different from schools not using STS, but our difference-in-differences method accounts for those pre-existing differences. In the school year just before STS, year –1 on the graph, the AP Statistics pass rate in STS schools was about 20 percentage points lower, on average, than the pass rate in other Texas high schools not using STS. Notice, however, that that 20-point gap in pass rates, between STS and other schools, had been stable for several years prior to when treated schools began using STS materials. In Figure 2 there is little to no change in the pass-rate gap for years –1, –2, –3, etc. Only after treated schools begin using STS does that 20-point gap shrink to 14–15 points and then further to 9–10 points. This pattern of results supports interpreting these improvements as the causal effect of STS: both STS schools and comparison schools followed the same trajectory over time for several years, then STS schools began improving faster at the time they adopted STS materials. This pattern is evidence in support of the assumption described in the previous paragraph.

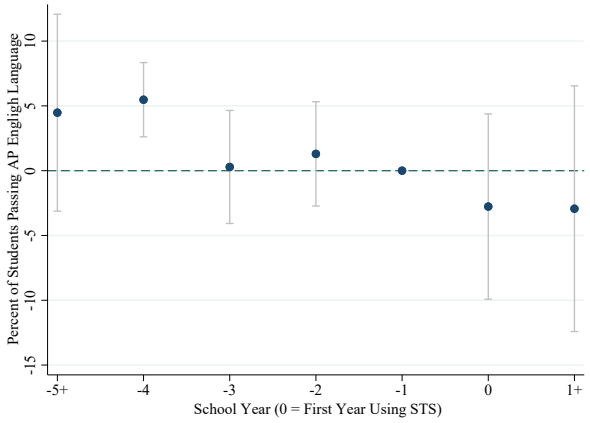

Figure 3—STS and AP English Language Pass Rates in Texas High Schools

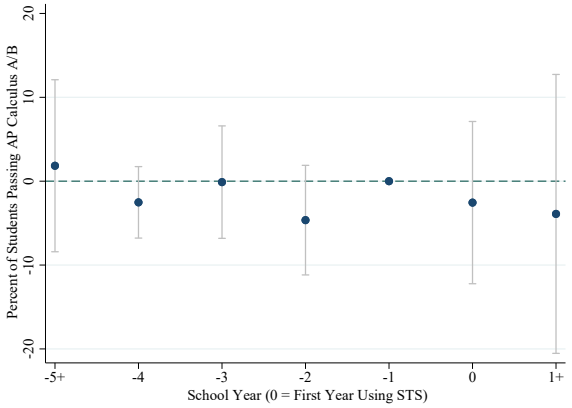

Figure 4—STS and AP Calculus A/B Pass Rates in Texas High Schools

Note: Figures 3 and 4 are created in the same way Figure 2 was created, except that the outcome variable (y-axis) is a different AP exam. Please see the note in Figure 2 for further explanation.

Could these improvements in AP Statistics pass rates be caused by something other than STS? One alternative explanation is that schools which began using STS materials also made some other change at the exact same time, and the other change, not STS, was the true cause of the improvements. That kind of "other change" might affect the school broadly, for example, a change in the school leadership or a new investment in professional development for teachers. If a schoolwide change were the "other change," we would expect to see improvements not just in AP Statistics outcomes but in other student outcomes as well. However, we do not see changes in other outcomes. Figures 3 and 4 show estimates, using the same methods as Figure 2, but for pass rates in AP English Language and AP Calculus A/B. The English and Calculus pass rates do not change in the years before or after STS adoption.

The "other changes" threatening our causal interpretation do not need to be a schoolwide change. The "other changes" could be specific to AP Statistics. For example, the AP Statistics teacher might begin encouraging more students to take her course and, simultaneously, seek out resources from STS. Changes in the students taking AP Statistics might explain changes in AP test outcomes, with or without STS. However, the number of students taking AP Statistics did not change, as shown in Figure 5, making this example unlikely.

While these first results are encouraging, we plan to examine a variety of additional questions and expand our data sources as our research continues. For example, with student-level administrative data, we will study whether the characteristics of students taking AP Statistics change when teachers use STS.

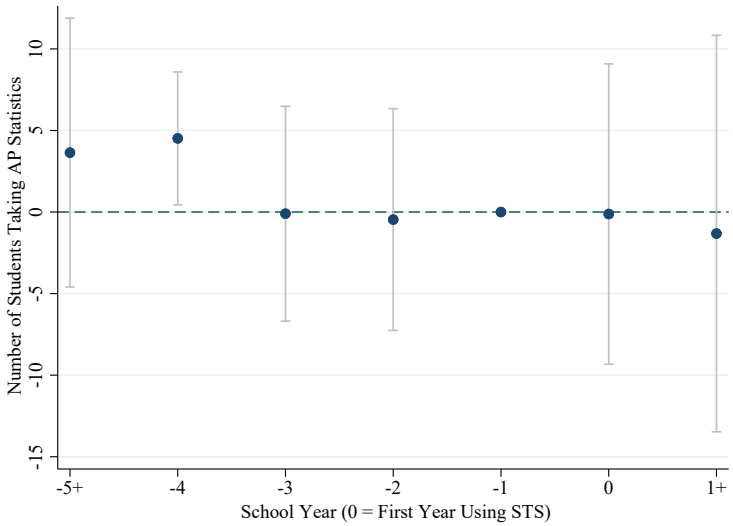

Figure 5—Skew The Script and AP Statistics Test Taking in Texas High Schools

Note: Figure 5 is created in the same way Figure 2 was created, except that the outcome variable (y-axis) is the average number of students per school who took the AP Statistics exam. Please see the note in Figure 2 for further explanation.

We plan to directly measure STS effects on further outcomes—high school completion; college applications, admission, and attendance; and success in the labor market. We also plan to study how changes in a school's student body or teachers influence the adoption of STS materials, aided by student-level administrative data. Answering these additional questions will, in part, help clarify when a causal interpretation of our estimates is warranted and when it may not be. The broader goal of our ongoing research is to understand how Skew The Script's approach—"genuinely relevant math lessons"—might help solve critical challenges: What strategies can we use to increase achievement in high school math? What strategies would get more students to take advanced math courses?