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Can Early Exposure to the Teaching Profession Increase Teacher Supply and Diversity? New Evidence on the Teacher Pipeline

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Can Early Exposure to the Teaching Profession Increase Teacher Supply and Diversity? New Evidence on the Teacher Pipeline

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Abstract

We examine whether early exposure to the teaching career has the potential to expand the size and diversity of new teacher supply. Exploiting the staggered expansion of high school education courses across Texas, we find little evidence that these courses increased new teacher supply or diversity despite course takers being substantially more diverse than the teacher workforce. High school education course takers who become teachers are similarly effective and more likely to be retained than their peers. Most course takers drop out of the teacher pipeline prior to college enrollment where racial gaps in 4-year college going serve as major barriers. Our findings suggest that early exposure without support to increase college going is unlikely to increase teacher supply or diversity.

JEL: I2, J21, J24

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Introduction

Interest in the teaching profession among adolescents and young adults has declined steadily in recent decades (Bartanen & Kwok, 2023; Croft et al., 2018; Kraft & Lyon, 2024). Declining interest in teaching is a cause for concern for the size, composition, and quality of the teacher workforce. Adolescents' career interests are highly predictive of their future careers and change little after childhood (Hanna & Rounds, 2020; Low et al., 2005). Career interests also predict job satisfaction, commitment, and performance (Hoff et al., 2022; Nye et al., 2012), such that waning interest in teaching among adolescents likely results in fewer new teachers. This can exacerbate localized teacher shortages, late hiring, and turnover, negatively affecting student achievement (James et al., 2023; Papay & Kraft, 2016; Ronfeldt et al., 2013).

Large racial and gender gaps in adolescent interest in the teaching profession also likely contribute to existing inequities in access to teachers of color and male teachers. Some studies find that students of color are up to 66% less likely to be interested in teaching than White students and male students are up to 73% less likely to be interested in teaching than female students (Bartanen et al., 2025), with racial gaps appearing as early as 9th grade (Cooc & Kim, 2023). These early gaps are concerning given that a large literature has documented the benefits of having a teacher of the same race (Dee, 2005; Egalite et al., 2015; Gershenson et al., 2022; Lindsay & Hart, 2017) and, to a lesser extent, the same gender (Dee, 2007; Egalite & Kisida, 2018).

In response to declining interest in teaching and increased attention to diversifying the profession, states and districts have increased their investments in the early teacher pipeline. At least 17 states have statewide "grow your own" (GYO) teacher initiatives that aim to increase the number and diversity of high school students entering teaching (Edwards & Kraft, 2025). While

individual initiatives vary widely in their programming design and intensity, they most commonly include coursework that trains high school students to enter teaching, hereafter referred to as HS education courses (Edwards & Kraft, 2025). These courses aim to increase interest in teaching by providing knowledge about, and offering opportunities to practice, the skills of teaching. Such investments are predicated on the idea that early exposure will lead to increased entry into the profession and higher levels of commitment to teaching. However, increased interest may not lead to changes in the teacher supply if adolescents interested in teaching do not successfully complete the steps required for entry into the profession such as enrolling and completing college and passing certification exams.

In this paper, we examine the role of the early teacher pipeline in creating a larger, more diverse, and committed teacher workforce. First, we estimate the extent to which offering HS education courses, an intervention aimed at growing interest in teaching among adolescents, increases teacher supply and diversity. We then trace the trajectories of students who express early interest in teaching, as proxied by enrollment in HS education courses, through the teacher pipeline: who they are, where they exit, and whether those who do become teachers are more effective and more likely to be retained. We organize the paper around four research questions:

1) How does access to HS education courses affect teacher supply and diversity?
2) Who enrolls in HS education courses?
3) Where do HS education course takers exit the teacher pipeline?
4) Are teachers who take HS education courses more effective and more likely to be retained than non-HS education course taking teachers?

We draw on rich administrative data from the state of Texas to explore these questions. Our 18-year panel allows us to determine which students took HS education courses, follow

them through college and into the teacher workforce (in Texas public schools), and, for those who do become teachers, link them to the courses and students they taught. We leverage the incremental expansion of these courses across Texas high schools between 2005 and 2015 to estimate the causal effects of offering HS education courses on students' probability of becoming a teacher overall, as well as separately by race and gender, using a difference-in-differences (DiD) design. We also estimate the effects of exposure to these courses on actions necessary to enter teaching including high school graduation, 4-year college enrollment, college graduation, and teacher certification to understand how barriers to entry may limit the effects of HS education courses.

Although students who enroll in HS education courses are four times as likely to become a public school teacher in Texas, our results provide little evidence that exposure to HS education courses induces students to enter teaching. This suggests that differential selection into these courses among students likely already interested in teaching may explain descriptive differences in their propensity to teach. Our results further show that access to these courses does not improve the probability a student will successfully complete earlier milestones along the teacher pipeline such as enrolling and graduating from a four-year college or completing a teacher certification (hereafter four-year is implied when we reference college enrollment and graduation).

We then contextualize our null findings by mapping where HS education course takers, a population who is likely interested in teaching at a young age, exit the teacher pipeline. These analyses not only allow us to explore potential explanations for the results of our causal analyses, they also provide new evidence on where attrition from the teacher pipeline occurs for individuals who express early interest in teaching as well as where racial gaps emerge.

These analyses reveal high levels of attrition prior to college; 64% of HS education course takers do not enroll in a public, in-state four-year college within seven years of 9th grade. Our results also suggest that racial gaps in the teacher pipeline emerge after high school whereas gender gaps exist early in the teacher pipeline. White, Black, and Hispanic students enroll in HS education courses at the same rate, suggesting similar interest levels. However, Black and Hispanic students disproportionately exit the teacher pipeline prior to college enrollment. Nearly 70% of Black and Hispanic HS education course takers don't enroll in a public, four-year college, compared to 57% of White students. In contrast, male students disproportionately do not enroll in HS education courses, suggesting lower levels of teaching interest prior to 9th grade.

Finally, we examine whether teachers who took HS education courses contribute more to students' achievement and are more likely to be retained than other teachers. Teachers who took these courses may be more effective and more likely to persist because the courses improved their quality and commitment to teaching (effect of the course) or their early interest led them to be more committed and higher performing (selection into the course). Understanding the relationships between HS education courses and teacher outcomes may inform their potential to help alleviate teacher staffing challenges, regardless of their direct effects on teacher supply.

We find that teachers who took HS education courses are similarly effective to other novice teachers, have higher retention rates, and disproportionately teach core elementary subjects. These results suggest that it is unlikely that merely increasing early interest will improve teacher quality or reduce subject-specific shortages. They do suggest that students who express interest in a career in adolescence are more committed to that career than other individuals.

This paper contributes to the literature in two primary ways. First, we provide some of the first evidence of the effectiveness of HS education courses, the most common component of GYO teacher recruitment initiatives. Prior research describes longitudinal patterns in HS education course taking and course-taker characteristics in Tennessee (Ellison et al., 2025) and analyzes the effects of a four-course sequence of college-level education courses in Maryland (Blazar et al., 2026). We complement this work by evaluating the effect of access to Texas HS education courses which do not include other interventions commonly found in high school GYO programs. This provides evidence concerning the extent to which increasing adolescent interest, without reducing barriers to entry, is an effective teacher recruitment strategy.

We also build on a broader literature that examines the dynamics of the teacher pipeline by studying where HS students potentially interested in a career in teaching leave the pipeline, where racial and gender gaps emerge, and whether early interest is associated with better teacher outcomes. Prior literature has identified key stages where students drop out along the pathway to becoming a K-12 public school teacher and reveals differences in exit rates across both race and gender that contribute to the current workforce's underrepresentation of teachers of color and male teachers. However, most research on the "leaky" teacher pipeline tracks undergraduate students into teaching using state-specific longitudinal data, omitting students who do not enroll in higher education (Bardelli et al., 2024; Goldhaber et al., 2022; Greenberg Motamedi et al., 2021; Kilbride et al., 2023; Wan et al., 2021). Other studies use nationally representative samples of HS students that cannot always track students into their careers, have limited power to conduct subgroup analyses, and cannot distinguish early interest from career expectations (Cooc & Kim, 2023; Hanushek & Pace, 1995; Vegas et al., 2001).

Our data combine the advantages of past research approaches by allowing us to use enrollment in HS education classes as a proxy for possible interest in the teaching profession and track HS freshmen through career entry. Measuring interest rather than career expectations serves to decouple students' openness to a career in teaching from their early perceptions of the likelihood they will succeed in completing the steps necessary to enter teaching. Starting with 9th graders also reveals how high school completion and college enrollment play a central role in shaping the overall supply and diversity of the teacher pipeline. Furthermore, our study is among the first to connect early interest in teaching to performance and persistence in the profession.

Our findings help to inform ongoing efforts to expand and diversify the pipeline of new teachers. While our results do not suggest that HS education courses, by themselves, are an effective strategy to increase teacher supply or improve its diversity, they do suggest that increasing supports to overcome barriers to entering teaching among those who take these courses or show early interest may help create a larger, more diverse and more committed teacher workforce. We find that the racial composition of (Texas) HS students potentially interested in teaching is quite diverse, but there are many individuals likely interested in teaching who do not enroll in college. Thus, interventions that increase college enrollment among HS education course takers who graduate high school hold considerable promise for growing and diversifying the teacher workforce. Additionally, our results can be used to improve teacher hiring, HS education coursework, and other teacher recruitment strategies.

Background Literature

The Teacher Pipeline

Research on the teacher pipeline – the set of steps that prospective teachers must complete to enter the profession – reveals that attrition among potential teachers is high at

multiple stages of the preparation pipeline. Studies typically highlight key stages of attrition such as earning a bachelor's degree, completing a teacher preparation program, passing licensure exams, obtaining licensure to teach, and securing a job as a teacher. For example, only 15.5% of undergraduates in Indiana who start education degrees became public school teachers (Wan et al., 2021). Even among those who complete student teaching, only two-thirds are ever observed as a public school teacher in Washington State up to five years later (Goldhaber et al., 2022).

Several studies seek to identify where in the teacher pipeline racial and gender gaps begin to emerge and grow. Using the nationally representative High School Longitudinal Study of 2009, Cooc and Kim (2023) find that high school freshmen of color are roughly half as likely to report expecting a career as a K-12 teacher at age 30 than White students. In contrast, Bartanen & Kwok (2023) show that among high school students applying to a large state university in Texas, Black and Hispanic applicants are slightly more likely than White applicants to indicate an interest in obtaining a teacher certification, while female applicants are more than twice as likely to do so than male applicants. However, racial gaps in the completion rate of key steps in the teacher pipeline, such as graduating high school and enrolling in college (Vegas et al., 2001), passing licensure exams (Greenberg Motamedi et al., 2021), and earning licensure (Bardelli et al., 2024), may explain the underrepresentation of individuals of color in the teacher workforce.

Interventions to Expand the Pipeline and Plug Leaks

Most teacher recruitment programs aim to increase teacher supply and diversity by reducing barriers to teaching and/or increasing interest in the profession (Loeb & Myung, 2020). Programs that reduce barriers to entry accomplish this by offering more flexible pathways into teaching, providing financial or programmatic supports to overcome barriers, or removing them altogether. Programs that increase interest aim to influence individuals' job preferences through

early exposure to the profession, information, and incentives. We discuss the effectiveness of each of these types of teacher recruitment programs at improving the size, composition, quality, and commitment of the teacher workforce below.

Most research on teacher recruitment programs evaluates efforts to reduce barriers to entry. Alternative certification programs reduce the academic, economic, and opportunity costs of pre-service requirements and allow individuals to complete their training while serving as a teacher (Kane et al., 2008). Although these programs increase the proportion of teachers of color (Redding, 2022), the effectiveness of alternatively certified teachers varies. Teachers from more selective programs, such as Teach for America, have higher contributions to student test scores than lower quality pathways such as emergency certified teachers and those that enroll in fully online preparation programs (Kane et al., 2008; Kirksey & Gottlieb, 2026; Lovison, 2025). Teacher residencies, programs where individuals complete a one-year teaching apprenticeship while completing certification coursework, not only produce more racially diverse teachers, but their graduates also have higher retention rates and are more likely to teach hard-to-staff subjects (Papay et al., 2012). Graduates of teacher residencies improve more rapidly than their peers as well, having larger contributions to test scores after four years (Papay et al., 2012).

Other recruitment programs reduce barriers to entry by providing financial assistance, typically conditional scholarships or loan forgiveness, to individuals to complete teaching degrees, earn certification, and become teachers. Upfront grants and loans to prospective teachers early in the teacher pipeline appear to be particularly effective approaches. Providing a small degree of financial support or liquidity to Teach for America (TFA) applicants increased the likelihood they joined TFA as opposed to entering the private sector (Coffman et al., 2019). Scholarship programs that target high-achieving high school seniors and required them to teach

after graduating college produce more effective teachers with higher retention rates (Henry et al., 2012). Federal loan forgiveness programs for teachers, such as the Teacher Loan Forgiveness program, appear to have little impact on prospective teachers' career choices given their back-ended relief, program complexity, and administrative bureaucracy (Jacob et al., 2024).

School staff members, especially paraprofessionals, are a common target for teacher recruitment programs that reduce barriers to entry, including "grow your own" programs. Participants in programs that support school staff to become certified teachers are more racially diverse (Clewell & Villegas, 2001; Lau et al., 2007). When they enter the classroom, they have higher evaluation scores and retention rates as well (Clewell & Villegas, 2001). Removing licensure exam requirements for paraprofessionals to enter the classroom has also been an effective strategy for increasing access to effective and committed teachers. Teachers who were former paraprofessionals and benefited from the removal of this requirement have substantially higher contributions to students' math achievement and classroom observation scores, positive effects on student attendance, and lower turnover rates (Laski, 2024).

Teacher recruitment programs aimed at increasing interest in teaching commonly include teacher education coursework or extracurricular activities for adolescents (Edwards & Kraft, 2025). However, they vary widely in program duration, intensity, and supports provided (Gist et al., 2019). A handful of studies have examined programs intentionally designed to both increase interest and reduce barriers to entry. Programs such as Pathways2Teaching, Paterson Teachers for Tomorrow, and Teacher Academy of Maryland pair structured high school coursework with scholarships, dual-enrollment opportunities, and/or university partnerships to improve teacher supply (Bianco et al., 2011; Blazar et al., 2026; Hill & Gillette, 2005). Only one study (Blazar et al., 2026) estimates the effects of these comprehensive teacher recruitment programs on entry

into teaching. Blazar et al. (2026) finds that the Teacher Academy of Maryland increases entry into teaching among women, particularly Black women, by 45 percent, on average. We add to this nascent literature by isolating the effect of HS education courses, the main intervention aiming to increase interest in teaching, from supports that reduce barriers to entry that are commonly found in more intensive early teacher recruitment programs.

Conceptual Framework: How HS Education Courses Affect Career Interest and Entry

HS education courses aim to provide students with greater exposure to, and experience with, a career in education. This early exposure to the work of teaching may be particularly impactful because career interests begin to form early in adolescence and are highly predictive of future careers (Hanna & Rounds, 2020; Low et al., 2005). We adapt social cognitive career theory (Lent et al., 1994) to conceptualize *how* HS education courses can increase interest in teaching and, ultimately, teacher supply.

HS education courses may attract students already interested in a career in education, those who are curious to learn more, and those who take the class without an initial interest. As shown in Figure 1, the learning experience the class offers may reinforce existing interest or generate new interest among curious or even uninterested students. Classes provide students the opportunity to practice the skills of teaching and gain knowledge about the profession. These experiences help students develop their perceptions of their abilities to perform teaching-related tasks (their teaching self-efficacy), as well as the potential rewards, intrinsic and extrinsic, they will likely receive from pursuing teaching as a career (outcome expectations). Students who perceive themselves to be efficacious teachers and who anticipate positive experiences and outcomes from a career in teaching will likely develop an interest in the profession. Students

interested in teaching may then develop intentions to act on this interest (Lent et al., 1994), taking steps to become a teacher, such as enrolling in college and earning a teaching certificate.

HS education courses also have the potential to improve the diversity of the teaching profession if they raise interest in or intentions to become a teacher among students of color and male students. Taking a HS education course can provide students of color and male students with personal experience to inform their sense of potential self-efficacy and satisfaction with a career in education rather than relying on preconceived racialized or gendered norms and stereotypes. The teachers of HS education courses may also become role models, increasing their likelihood of entering teaching (Böhle et al., 2025). These role model effects could be particularly salient if students share a common background with the instructor.

The potential positive effects of HS education courses on teacher supply and diversity may not be realized because either: a) the courses do not increase interest, b) increased interest in teaching does not result in increased intent to teach, or c) students for whom the class increases interest and intent are unable to successfully complete the steps required to enter teaching. HS education courses may not be as effective in increasing interest as other career courses because students have greater exposure to teachers during childhood than other professions. Others may become interested but be dissuaded from pursuing teaching by conditions such as familial support, economic need, and academic requirements. Individuals interested in teaching may receive less support and encouragement to enter teaching from their social networks due to its low levels of prestige (Kraft & Lyon, 2024). Expected wages in the education sector may not be sufficient to meet individual financial needs as well. Academic requirements may be a deterrent for students who do not expect to attend college, especially those that come from backgrounds with traditionally lower college enrollment rates such as students of color, low-income students,

and low achieving students. Finally, some students who are not dissuaded by these factors and attempt to become teachers simply may not be able to overcome the barriers to entry associated with teaching (e.g., bachelor's degree and teacher certification).

Regardless of whether HS education courses increase interest in teaching or induce individuals to become teachers, those who take them may be more effective and committed teachers. Many of the students who enroll in HS education courses likely do so because they have some initial interest in teaching. Individuals whose careers align with their adolescent vocational interests are more satisfied and committed to their careers, and, in some cases, experience increased wages and professional prestige (Hoff et al., 2022; Nye et al., 2012). Further, the coursework itself may improve students' teaching abilities and their confidence as a teacher, increasing their future performance as a teacher and commitment to the profession.

Data

Our conceptual framework describes how HS education courses can increase teacher supply and diversity as well as the role of early interest in shaping the size, composition, quality, and commitment of the teacher workforce. We use detailed statewide data for Texas K-12 students, K-12 teachers, and postsecondary students for the 2004-05 to the 2021-22 school years to assess the ability of HS education courses to accomplish these goals and describe teacher pipeline outcomes for HS education course takers, a group of individuals potentially interested in teaching. These data include K-12 student demographic, course enrollment, achievement (test scores on Texas Assessment of Knowledge and Skills-TAKS from 2004-05 to 2010-11; State of Texas Assessments of Academic Readiness-STAAR from 2011-12 to present), and graduation data; K-12 teacher employment and certification records; and postsecondary enrollment records from public institutions. We connect K-12 public school enrollment data to Texas public four-

year university records, teacher certification records, and teacher employment records, allowing us to determine which students become K-12 teachers in Texas public schools and where other individuals exit the teacher pipeline. Also, we are able to link teachers to their students to estimate teachers' contributions to student achievement.

Pipeline Outcomes

We examine employment as a K-12 public school teacher in Texas within 11 years of starting 9th grade as our main outcome for our first three research questions. Eleven years allows four years for on-time graduation from high school, four years for on-time graduation from college, and an additional three years to complete these milestones and enter the classroom. While teaching candidates may take multiple years to find a position, most enter within three years of graduation (Goldhaber et al., 2014).

We also examine intermediate teacher pipeline outcomes. They include graduating high school within five years of starting 9th grade (on-time graduation plus one year), enrolling in a Texas public four-year college within seven years (allowing for community college completion), enrolling in an undergraduate certification program at a Texas public four-year college within seven years, graduating from a Texas public four-year college within nine years, and earning a Texas teacher certification within 11 years. We focus on graduation from Texas public four-year colleges for multiple reasons. First, a bachelor's degree is required for teacher certification. Second, less than 10% of Texas HS students attended private or out-of-state colleges during our study period (Decker, 2025). Third, these data allow us to observe enrollment in an undergraduate teacher certification program regardless of major. In fact, education majors were prohibited at Texas public higher education institutions from 1991 until 2019 (Texas A&M University College of Education & Human Development, 2020).

Defining Treated Schools

We define our samples and treatments based on access to and enrollment in HS education courses. According to current state standards, Texas students in HS education courses learn about the roles and responsibilities of teachers; philosophy and history of education; the learning process; state K-12 grade-level standards; and effective assessment, instructional, and classroom management practices (Texas Education Agency, 2022). Course activities may include observing and interviewing teachers, developing lesson plans and assessments, and, in some cases, field instructional experiences. However, HS education courses vary in their names and curricula across years and districts in our data. Prior to 2011, there existed a variety of different education course codes and names across the state. In 2011, the Texas Education Agency instituted specific career and technical education course codes and career clusters as a part of Texas's implementation of the Perkins Act (Texas Education Agency, 2016). Since then, the three courses specific to K-12 teacher training have been: Principles of Education and Training, Instructional Practices, and Practicum in Education and Training. Further, there were no official state standards (Texas Essential Knowledge and Skills) for these courses until 2021 (Texas Education Agency, n.d.). Given this variation, we use course subject codes and names to determine HS education courses. We list the names of the courses we identified as HS education courses in Appendix Table A1. We use students' high school course enrollment records to determine which schools offered HS education courses and which students took them across our full panel.

Table 1 compares school characteristics by when they started offering HS education courses during our main analytic sample. Schools that added HS education courses during our panel are substantially larger, on average, serve lower proportions of Black and economically

disadvantaged students, and are more likely to be located in suburban districts than schools that never offered a HS education course.

Samples

We focus our analysis for our first three research questions on the over 2.5 million Texas 9th graders who were first observed in 9th grade between 2004-05 and 2011-12, 69,750 (2.75%) of whom passed at least one HS education course.[1] We restrict our sample to the first eight freshman cohorts of the panel to observe students' workforce outcomes 11 years later. We further restrict our sample for RQ1 to exclude "always treated" units as they contribute no identifying variation to the treatment estimate, can contaminate the comparison group and bias estimates, and lack a pre-treatment period to evaluate the parallel trends assumption (Callaway & Sant'Anna, 2021). We define treatment as the offer or opportunity to enroll in a HS education course and code schools as first treated in year *t* if one student passed a HS education course at their school in year *t*.[2] We focus on offering one course as our main treatment because over 80% of HS education course takers in our panel only take one course. We exclude 1,148,640 students (45.2%) whose 9th grade school offered HS education courses to their first cohort in our sample.[3] Figure 2 displays the percent of schools that offered at least one HS education course in each year of our full panel. In the first year of our panel, 2004-05, about 13% of Texas high schools offer a HS education course. This more than doubles to 28% by 2014-15, the last year that students in our analytic sample could have been exposed to treatment and reaches 41% by 2020-21.

We conduct parallel analyses in a sample restricted to 695,731 students who have an above median propensity to enroll in a HS education course given the low HS education course enrollment rate described in our findings. We create these propensities by estimating logistic

regressions where enrollment in HS education courses is a function of 9th grade students' observable characteristics (race, gender, and economic, English learner, and disability statuses) and 8th grade math and reading test scores standardized within subject, grade, and year.[4]

To answer our second research question, we compare demographic characteristics, 8th grade achievement, and teacher pipeline outcomes of students who took at least one HS education course to all other first-time 9th graders in our sample. We also restrict our comparisons to the over 1.5 million students who attended schools that offered HS education courses to understand how access to these courses may shape who enrolls in them. Then, we describe the teacher pipeline attrition patterns for the 69,750 students (2.7%) in our sample who took a HS education course to answer our third research question.

Teacher Effectiveness and Retention Samples

We answer our fourth research question by estimating the differential effectiveness and retention of teachers who took HS education courses while they were in high school for the 2012-13 to the 2020-21 school years. 2012-13, eight years after the start of our panel, is plausibly the first year individuals who were in 9th grade at the beginning of our panel (2004-05) could be teachers, assuming on-time high school and a four year time to graduation in college. We combine teacher employment records with HS education course enrollment data to determine which teachers took HS education courses when they were in high school.[5]

We examine teacher effectiveness by estimating differential contributions of teachers who took HS education courses to 4th through 8th grade student math and reading STAAR assessment scores during the 2012-13 to 2018-19 years. We focus on pre-pandemic achievement due to the large amount of missing test score data during the COVID-19 pandemic.[6] We estimate contributions to reading and math achievement separately. Our samples include all 4th-8th grade

students with a valid test score for that subject and prior test scores in both subjects, 10,109,703 and 9,574,276 student-year observations for reading and math respectively.[7] We standardize student test scores within grade, test, subject, and year. We link our student panel to their math and reading teacher's employment records to determine which students had teachers who took at least one HS education course.

We then examine differences in retention in the profession, in the same district, and in the same school for teachers who took HS education courses using the sample of 184,673 teachers who first taught from 2012-13 to 2020-21. We describe this sample by comparing the demographic and placement characteristics of teachers who took HS education courses to other first year teachers in Table 2. About 3.5% of new teachers in our panel ever took a HS education course. Teachers who took HS education courses are more likely to be female (91.9% vs. 74.1%), complete standard certification programs (71.8% vs. 37.0%), and teach core elementary grades and subjects (66% vs. 44%). A higher percentage are White (61.4% vs. 55.1%) and teach in suburban districts (36.3% vs. 29.3%).

Methods

RQ1: Effects of Access to HS Education Courses on Teacher Supply and Diversity

We leverage the staggered rollout of HS education courses across the state of Texas during our study period, depicted in Figure 2, using a DiD design to analyze how access to HS education courses affects teacher supply and diversity. This approach exploits variation in the timing of schools offering HS education courses by comparing changes in outcomes of students who attended schools that started offering HS education courses before and after gaining access to a HS education class, relative to students in schools that never had access to HS education courses. Specifically, we estimate the effect of having access to at least one HS education course

during their high school career on the probability of becoming a teacher within 11 years of starting 9th grade. We consider a student treated if the school they attended in 9th grade offered at least one HS education course during our panel by their 9th grade year or within the next three years. This allows students to be exposed to treatment as late as their senior year of high school.

We use the stacked regression DiD design popularized by Cengiz et al. (2019) and verified by Baker et al. (2022) ensure our treatment estimates are not biased by heterogeneous effects across our treatment cohorts. This flexible approach is well-suited for our data structure: repeated student-level cross-sections with school-level treatment. It allows us to include school fixed effects that account for time-invariant differences between schools that choose to offer HS education courses and those who do not, while also modeling outcomes at the student-level.

Specifically, we construct separate estimation samples for each treatment cohort *c* that consist only of 9th graders whose high school was first treated in year *c* and students who attended never treated schools, an uncontaminated comparison group. Then, we stack these estimation samples into a single dataset and estimate the following event study model:

$$Y_{istc} = \sum_{r=-7}^{6} \beta_r 1(t - c = r) + \mu_{sc} + \pi_{tc} + \varepsilon_{istc} \quad (1)$$

Where Y_{istc} equals one if student *i* who started 9th grade in year *t* at a high school *s* and belongs to cohort sample *c* became a teacher within 11 years of year *t.* Our treatment estimates, β_r, capture the effect of exposure to HS education courses *r* years relative to the school's first year of treatment (when $t = c$) aggregated across cohorts. μ_{sc} and π_{tc} are school-by-cohort and year-by-cohort fixed effects respectively. They ensure estimates are created from within-cohort comparisons only and account for school and year trends. We cluster our standard errors at the school level, the level of treatment.

We report the effect aggregated across all post-treatment estimates as our primary estimate. In the Online Appendix, we also report the effects from the Calllaway and Sant'Anna (2021) repeated cross-sectional estimator and a standard two-way fixed effects estimator to ensure our results are robust to our choice of specification.

Our model identifies the effects of having access to HS education courses, an intent-to-treat (ITT) effect.[8] While this estimand does not capture the effect of taking a HS education course, it answers the more relevant policy question of what impacts we can expect from adding these courses to high school course catalogues. States can offer incentives to expand these course offerings, and schools and districts can decide to offer them, but schools can rarely require students to enroll in them, especially career and technical education courses that are electives.

We also estimate the effects of access to HS education courses on course enrollment (treatment take-up) and the teacher pipeline milestones we describe above. We restrict the samples by race and gender to determine the extent to which HS education courses differentially induce individuals of color and men to become teachers providing evidence of these courses' ability to increase teacher diversity. Given the 49 treatment effects we estimate, we adjust our tests of statistical significance for multiple hypothesis tests using the Bonferroni procedure.

A key assumption of our research design is that in the absence of HS education courses, the change in outcomes for students who attended schools that began offering HS education courses would have been similar to the change in outcomes for students who attend schools that never offered HS education courses (the parallel trends assumption). We provide visual evidence of the parallel trends assumption by presenting the results of our analyses disaggregated by time relative to exposure to HS education classes. Additionally, we empirically examine robustness to potential parallel trends violations of our statistically significant results using the sensitivity

analysis proposed by Rambachan and Roth (2023). This test constructs confidence intervals for treatment estimates under parallel trends violations that are multiples of the magnitude of largest observed deviation in pre-trends between the treatment and comparison groups.

Event studies also allow us to explore dynamic treatment effects over time related to variation by the number of years a student had access to HS education courses. Our treatment is constructed in such a way that students who were in the first exposed 9th grade cohort only received one year of exposure (12th grade) whereas the fourth 9th grade cohort (and all cohorts after) was exposed to four years of access to the courses.

RQs 2 & 3: Teacher Pipeline Analyses

We examine the career trajectories of the students in our sample who take HS education courses to answer our second and third research questions. Specifically, we compare the demographic characteristics by HS education course enrollment and examine the proportion of HS education course takers that exit the teacher pipeline at important junctures: high school graduation, college enrollment, college graduation, and teacher certification. We also describe differences in teacher pipeline exit patterns by race, gender, socioeconomic status, and 8th grade achievement levels. These analyses explore potential explanations for our causal results, shed new light on the key juncture at which individuals interested in teaching exit the pipeline, and illustrate where racial gaps emerge in the teacher pipeline.

RQ4: Teacher Effectiveness and Retention Analyses

We next estimate the differential effectiveness and retention of teachers that we observe taking HS education courses as students during our panel, answering our fourth research question. We estimate a set of value-added models on STAAR test scores standardized within

grade, test, subject, and year following Papay et al.'s (2012) evaluation of the Boston Urban Teacher Residency program, a similar type of intervention. Our preferred model is as follows:

$$Y_{ijhgst} = \alpha f(Y_{ijhgs,t-1}) + \beta EdCourse_{ht} + X_{it}\gamma + \overline{X_{jst}}\delta + \overline{X_{st}}\rho + \sigma f(EXPER_{ht}) + \theta_{gt} + \varepsilon_{ijhgst} \quad (2)$$

We separately model math and reading test scores for student *i* in classroom *j* with teacher *h* in school *s* in grade *g* in year *t* as a function of cubic polynomials of their previous test scores in both subjects, a rich set of covariates, and grade-year fixed effects, θ_{gt}.

Our vector of student covariates, X_{it}, includes indicators for student gender and race and their economic, English learner, and disability statuses. $\overline{X_{jst}}$, includes average test score and demographic characteristics of student's classroom peers as well as the class size. $\overline{X_{st}}$ includes average school test scores and demographic characteristics as well as school locale and the logarithm of total enrollment. We model teacher experience, $EXPER_{ht}$, as a quadratic polynomial to allow for diminishing marginal returns to experience. We also estimate any differences in teacher effectiveness based on having taken a HS education course for teachers within specific ranges of experience, by replacing $f(EXPER_{ht})$ with indicators for first year teacher, 2-3 years experience, 4-5 years experience, and 6-8 years experience as well as interactions of each of these indicators with $EdCourse_{ht}$. We estimate cluster robust standard errors at the student level. We report results from models where we include school fixed effects, student fixed effects, or teacher covariates to ensure they are robust to our specification choices.

Finally, we examine differences in retention in the profession, in the same district, and in the same school for teachers who took HS education courses. We first examine descriptive differences in teacher mobility after each of the first three years of teaching by HS education course taking. Then, we estimate a set of linear probability models where we successively add school characteristics, teacher characteristics, indicators for courses taught, and school fixed

effects to understand what may explain differences in retention. We perform these separately for each of our mobility outcomes. Our fullest specification is as follows:

$$Mobility_{isct} = \beta EdCourse_i + X_{it}\gamma + S_{it}\delta + C_{it} + \rho_s + \tau_{ct} + \varepsilon_{it} \quad (3)$$

Where $Mobility_{isct}$ is an indicator for one of four outcomes for teacher *i* who teaches in school *s* in year *t* and is in cohort *c* of first year teachers: teaching in the same school at *t+1;* teaching in a different school in the same district at *t+1;* teaching in a school in a different district at *t+1*; exiting public school teaching in Texas. All models include a calendar-year-by-first-year-cohort fixed effect to ensure comparisons are between teachers who enter the profession in the same year and control for idiosyncratic year-specific shocks, τ_{ct}. Our teacher covariates, X_{it}, include indicators for gender, race, teacher certification, completion of a standard teacher certification program, and teaching in the same school district that the teacher attended in high school as well as quadratic polynomials of age and experience.[9] School characteristics, S_{it}, include the percentages of students who are Black, Hispanic, and economically disadvantaged, the logarithm of total enrollment, charter status, and locale. Indicators for teaching course assignments, C_{it}, include core elementary subjects and grades, secondary English language arts, secondary math, secondary science, secondary social studies, special education, foreign language, English as a second language, PE/health, art, computers, career and technical education, and other subjects. We cluster standard errors at the teacher level.

Results

RQ1: Effects on Teacher Supply and Diversity

Increasing access to HS education courses increases enrollment in them, the intended treatment, as seen in Column 1 of Table 3. We find that enrollment increased by three percentage points in our full sample and over five percentage points among those with a high propensity to

enroll in the course as well as among women. These estimates align with HS education course enrollment rates but are not identical because a small number of students enroll in HS education courses by transferring high schools after their freshman year.

Although access to HS education courses increased enrollment, our results provide little evidence that it increased the probability of becoming a teacher in a Texas public school. The estimates displayed in Column 2 of Table 3 show small, negative point estimates that are indistinguishable from zero for the effect of offering HS education courses on entry into teaching. Our estimates allow us to reject a null hypothesis that access to HS education courses increases the probability of entering teaching by more than 7%. This suggests that offering HS education courses, by itself, is unlikely to increase teacher supply. Our results also provide little support that HS education courses alone can increase the diversity of the teaching profession. We find small and statistically insignificant effects for each of our race and gender subsamples as well as shown in Table 3.

We display the aggregated effects from the Callaway and Sant'Anna and two-way fixed effects estimators in Appendix Tables A3 and A4 respectively. Our take-up and treatment estimates are nearly identical. We also present the event study estimates for our full and high propensity samples for all three estimators in Appendix Figures A1 and A2. The results consistent with our aggregated findings and provide supporting evidence for our parallel trends assumption. Our take-up estimates are also robust to parallel trends violations 1.5 times the size of the largest deviation in pre-trends in the full sample. Additionally, the event study results show that enrollment in education courses increases as time from initial course rollout passes, suggesting that longer exposure has larger effects on enrollment. This makes sense as later cohorts have access to the courses earlier in their high school careers.

The limited impact of expanding HS education courses on teacher supply or diversity does not necessarily mean that the courses are ineffective at increasing students' initial interest and early intentions to become a teacher. To examine this, we explore effects on more proximal steps students must take to become a teacher. We display the effects of access to HS education courses on the probability of taking various actions towards teaching including graduating from high school, enrolling in, and graduating from a Texas public four-year college, enrolling in an undergraduate teacher certification program there, and earning a Texas teacher certification in Table 3.

Again, we find little evidence that access to HS education courses increases the probability of completing any of these outcomes. In our full sample, all estimated effects are negative, but small in magnitude. Only the estimate of a 0.9 percentage point decrease in probability of graduating from a Texas public four-year college is statistically significant and robust across estimators. However, this result is not robust to a potential parallel trends violation that is half the size of the largest observed deviation in pre-trends. For this reason, we do not interpret the detected effect of access to HS education courses on the probability of graduating from a Texas public four-year college as credibly causal.

RQ2: Who Enrolls in HS Education Courses?

Our causal results provide little evidence that exposure to HS education courses induces students to enter the teaching profession or take actions towards becoming a teacher. This could be because HS education courses do not increase interest in teaching or they do not equip students interested in teaching with the skills and support to complete the steps necessary to become a teacher. We explore the plausibility of each of these explanations by describing the characteristics of HS education course takers and their career trajectories. We focus on HS

education course takers because effects should be concentrated in this group, and they are the group most likely to have early interest in teaching.

First, we compare observable characteristics of 9th graders that did and did not take HS education courses during their high school career to examine the amount of pre-existing interest in teaching and how it varies across demographic groups. Results are displayed in Table 4. Although 61% of students in our sample had access to HS education courses, only 2.7% of our sample ever took one. This rate increases to 4.2% among students who attended high schools where HS education courses were ever offered.

Students who enroll in HS education courses are predominantly female. Over three quarters of HS education course takers are female. This suggests that gender gaps in interest in teaching start before high school. On the other hand, we find few differences in HS education course enrollment by race. Asian students disproportionately do not enroll in these courses, but Black, Hispanic, and White students enroll in them at similar rates. 2.40%, 2.82%, and 2.91% of all Black, Hispanic, and White students in our sample enroll in a HS education course respectively. Although these differences are small, we conducted Kitagawa-Oaxaca-Blinder decompositions to examine whether these differences were due to differential selection into courses within schools or between schools. Almost all the racial gaps in course enrollment can be explained by differential selection into courses within schools. HS course enrollees also have higher 8th grade reading achievement than their counterparts, on average. We attribute this to gender differences in average reading test scores and HS education course enrollment.

In terms of outcomes, the percent of students that become teachers is over four times higher (8.7% vs. 1.9%) for HS education course takers than other individuals in our sample. Analogously, students who take these courses complete actions towards teaching at a higher rate.

When combined with the null findings from our causal analyses, these results suggest that the higher propensity to become a teacher among HS education course takers is due to selection rather than the courses increasing interest.

RQ3: HS Education Students' Teacher Pipeline Trajectories

Although HS education course takers become teachers at four times the rate of other students, less than 10% do so. This suggests that many students initially interested in teaching exit the teacher pipeline. We explore the extent to which degree attainment and certification requirements may act as barriers to entry for individuals potentially interested in teaching by examining where HS education course takers exit the teacher pipeline. We plot the teacher pipeline trajectories of students who took HS education courses in Figure 3. Of the nearly 70,000 students who take HS education courses in our sample, 95% graduate high school within five years of starting 9th grade. This is higher than the state average, but some of this difference may be because much of the selection into HS education courses is conditional on persistence through high school. Students who drop out in 9th grade have fewer chances to take them.

However, only 31% of HS education course takers enroll in a Texas public four-year college within seven years of starting 9th grade. This suggests that a substantial proportion of HS education course takers, a group likely interested in teaching, may not be able to complete the steps necessary to enter teaching. We note that a small fraction of HS education course takers, 1.5%, earn a teacher certification in Texas but do not enroll in a Texas public university within seven years of entering high school. They likely complete a degree at a private or out-of-state college.

A quarter of HS education course takers who enroll in a Texas public four-year university enter an undergraduate teacher certification program (7.7% of all HS education course takers).

College dropout rates are lower for those who enter a teacher certification program, but, again, this might be mechanical because students who persist have more opportunities to enroll in a certification program. About one third of HS education course takers that graduate from a Texas four-year college go on to earn a teacher certification (7.3% of all HS education course takers). While some students stay in the teacher pipeline without completing a certification program during their undergraduate career, a sizable portion of students exit the teacher pipeline by pursuing non-teaching degrees in college. Exiting the pipeline to pursue a non-teaching degree likely signals students' career choices rather than difficulties completing a certification program. Students who may have initially been interested in teaching may have become more interested in other career paths. Finally, 92% of HS education course takers who earn a teacher certification teach in Texas public schools (8.2% of all HS education course takers).

We examine differences in teacher pipeline exit point and completion by demographic characteristics among HS education course takers in Figure 4. First, only 3.2% of male HS education course takers become teachers, compared to 10% of female course takers. Higher HS dropout rates and lower college enrollment rates appear to be primary drivers of these gender gaps. Second, over twice as many White HS education course takers become teachers (13.3%) relative to Black (4.9%) and Hispanic (5.5%) HS education course takers. Nearly 70% of Black and Hispanic HS education course takers leave the teacher pipeline because they do not enroll in a Texas four-year public college compared to less than 60% of White and Asian students. Similar gaps in college enrollment emerge between economically advantaged and disadvantaged and low and high achieving HS education course takers. Black and Hispanic students are also more likely to leave the pipeline than White and Asian students once they have graduated college. Taken

together, this suggests that racial gaps as well as gender gaps in the teacher pipeline emerge by the time of college enrollment and continue to grow.

RQ4: Teacher Effectiveness and Retention

Our results, displayed in Table 5, suggest that teachers who took HS education courses when they were in high school are similarly effective, if not slightly more effective, than other teachers. We find that teachers who took HS education courses contribute, on average, 0.003 S.D. and 0.004 S.D. more to students' reading and math achievement respectively. Only our math estimate is statistically significant. Results from models that test for any dynamic patterns of differential effectiveness by teacher experience show that teachers who took HS education courses contribute 0.01 to 0.02 S.D. to their students' math achievement in their 2nd and 3rd years of teaching but these effects do not appear consistent across the experience profile.

Although teachers who took HS education courses may not be more effective than other teachers, they may be more committed to the profession. Figure 5 plots differences in retention rates after each of the first three years of teaching by HS education course taking for the cohorts of first year teachers in our sample who could have plausibly taught four years (2012-13 to 2018-19). HS education course takers have higher three-year retention rates within the profession than other novice teachers. After the first year, 93% of HS education course takers teach in Texas public schools the next year, compared to 86% of other first year teachers. This gap grows to 12 percentage points after teachers' third year in the profession. Less than 20% of teachers who took HS education courses leave the profession by the beginning of their fourth year compared to over 30% of other teachers. A higher percentage of HS education course takers remain in the same school as well. Almost three-quarters of teachers who took HS education courses return to the same school after their first year, relative to 69% of other teachers.

Our regression adjusted results also show that HS education course takers are more likely to stay in the profession and in the same school. When only accounting for cohort-specific time trends, teachers who took HS education courses have a probability of staying in the same school that is 3.23 percentage points higher and a probability of leaving the profession that is 3.17 percentage points lower than other novice teachers. Teachers who took HS education courses have a 0.5 to 0.9 percentage point lower probability of switching schools within the same district.

However, much of these differences can be explained by observable differences in the schools where they work, their own background characteristics, and the subjects they teach. The relationships between HS education courses and staying in the same school or leaving the profession begin to shrink once these covariates are added to the model. Differences in same school retention rates decrease by 0.78 of a percentage point when we include school-level covariates. This suggests that teachers who took HS education courses are more likely to teach at schools that have characteristics associated with higher teacher retention. The difference in the probability of exiting the profession decreases by 1.6 percentage points once teacher characteristics are added to the model. In supplemental analyses, we added each teacher covariate to the model one by one to investigate what specific variables explain this change. We find that differences in standard certification program completion between HS education course takers and other teachers may explain some of the differences in retention rates. In our full sample, 72% of first year teachers who took HS education courses complete a standard certification program compared to 37% of other first year teachers. Taken together, this shows that teachers who took HS education courses are more committed to teaching, on average. They commit to earning a standard certification and, on top of that, they still have slightly higher retention rates.

Discussion

HS Education Courses as Experiential Interventions to Increase Interest in Teaching

Our results suggest that merely offering HS education courses is likely not enough to improve the size or diversity of the teacher pipeline. We do not find any impacts, on average, of access to these courses on entry into teaching. We do not detect differential effects by race or gender either. This contrasts with the fairly large, positive impacts of Teacher Academy of Maryland (TAM)—a comprehensive "grow your own" teacher program whose defining feature is HS education courses—on entry into the teaching profession (Blazar et al., 2026). Possible explanations include differences in 1) intentional program design, 2) treatment intensity and variation, and 3) program size.

First, the HS education courses we studied may not improve teacher supply because their programming does not explicitly help interested individuals overcome barriers to entering the profession even if they increase interest in teaching. To our knowledge, students who completed HS education coursework did not receive college credit or compensation during our analysis period. It was not until 2020 that the Texas Education Agency offered an Educational Aide certification for students who completed a sequence of HS education courses (19 TAC Chapter 230, 2022). This hypothesis is substantiated by the lack of effects on taking actions toward teaching, such as college enrollment, and the fact that most HS education course takers exit the teacher pipeline after high school. We last observe 64% of all individuals who take HS education courses in the teacher pipeline at the time of high school graduation. This proportion is even larger for male, Black, and Hispanic students. In comparison, TAM, a program intentionally designed to improve teacher supply, offered college credit for HS education courses and, in some

cases, small scholarships which may have made it easier to enroll in four-year colleges as evidenced by its positive impact on four-year college enrollment (Blazar et al., 2026).

Second, variation in quality and quantity of HS education courses in Texas may explain the weaker effects. Students in our sample took nearly 20 different HS education courses. It is only near the end of our analysis period (2011) that Texas standardized HS education courses with statewide scopes and sequences for them only available after the COVID-19 pandemic. Additionally, over 80% of Texas HS education course enrollees took only one HS education course, a fairly weak treatment. In contrast, nearly a third of TAM enrollees completed a singular structured, college-level four course sequence (Blazar et al., 2026). Third, the scale of the implementation of HS education courses in Texas may attenuate effects. HS education courses were expanded to over 400 additional Texas high schools during our analysis period compared to 20 Maryland high schools (Blazar et al., 2026). Larger programs may have smaller effect sizes due to heterogeneity in population and treatment (Slavin & Smith, 2009).

Initial Interest in the Teaching Profession

Although HS education courses, by themselves, may not directly increase teacher diversity or supply, our descriptive results suggest that there may be a larger supply of students potentially interested in teaching than is generally perceived. Most students who enroll in HS education courses are likely interested in teaching. We find that 4.2% of Texas high school students who ever had the opportunity to take a HS education course at their high school did so, an estimate similar to enrollment in the TAM course in Maryland (Blazar et al., 2026) and a "teaching as a profession" course in Tennessee (Ellison et al., 2025). However, we find that most of these course takers exit the teacher pipeline at the time of high school graduation. Thus, reports of college student or applicant interest in teaching may understate the total number of

students interested in teaching. Bartanen et al. (2025) find that roughly 3.6% of high schoolers indicated an interest in a teaching career on the Common Application in 2015, which has steadily declined to 2.9% in 2025. Further, interpreting reported career expectations as career interest may also understate overall teaching interest because career expectations also reflect students' perceptions about their ability to complete entry requirements, such as degree attainment.

Our results also suggest that early interest in teaching may be more broadly held than previously perceived. We find little difference in HS education course enrollment by race, similar to results for Tennessee and Maryland HS students (Blazar et al., 2026; Ellison et al., 2025). Rather, racial gaps in the teacher pipeline emerge due to differences in educational attainment, a finding supported by previous research (Lindsay et al., 2017). Prior studies that find large racial gaps in initial interest in the profession may reflect differences in career expectations (Cooc & Kim, 2023) or college going expectations among applicants (Bartanen et al., 2025). Our results affirm that gender gaps likely form prior to high school and may be exacerbated through the teacher pipeline. Few men enroll in HS education courses, and teacher workforce entry rates among those that do are small (3% vs. 10% of female HS education course takers).

Finally, our results suggest that teachers who express early interest in teaching are more committed to the profession as evidenced by the higher retention rates among teachers who took HS education courses. HS education course takers who become teachers were likely interested in teaching during adolescence whether the coursework increased their interest in teaching or they chose to enroll in the course because of their preexisting interest. This finding aligns with prior research that shows that individuals who have careers that match their adolescent career interest are more committed to and satisfied with their profession (Nye et al., 2012).

Insights for Policy and Practice

Taken together, our results suggest that there exists an underdeveloped source of racially diverse students who are likely interested in teaching and potentially more committed to the profession: individuals who took HS education courses but do not become teachers, particularly those who do not enroll in or graduate from a four-year college. However, these candidates may need additional supports to successfully complete the steps along the teacher pipeline required for entry into the profession. This suggests that early teacher pipeline initiatives are likely to be more successful when they offer intentional supports to improve teacher supply.

Where along the teacher pipeline increasing supports may be the most effective remains an open question. We explore this by simulating the effects of policies that result in one percentage point increase in 1) high school graduation among HS education course takers, 2) college enrollment among HS education course takers that graduate high school, 3) college graduation among HS education course takers that enroll in college, and 4) teacher certification among HS education course takers that graduate college. We describe how we conducted our simulations and display the results in Appendix B. Fundamentally, these simulations compare the tradeoffs of intervening earlier when the potential pool of teacher candidates is larger, but the yield is low versus later in the pipeline when the pool is smaller, but the yield is much higher.

We find that increasing college enrollment among HS education course takers who graduate high school or increasing teacher certification among HS education course takers who graduate from a Texas public four-year institution would increase teacher supply similarly. For each of these interventions, a one percentage point increase results in about two additional teachers per 1,000 HS education course takers. When we simulate these effects separately by race, we find that increasing teacher certification among college graduates would have slightly larger effects on Black and White teacher supply than increasing college enrollment among HS

graduates (1.6 vs. 1.2 additional Black teachers per 1,000 Black course enrollees and 2.8 vs. 2.6 additional White teachers per 1,000 White enrollees). The projected effects of both interventions are twice as large as increasing high school or college graduation across all samples.

The mechanisms of how increasing college enrollment and teacher certification affect new teacher supply differ in important ways. Increasing college enrollment results in a larger number of students enrolling in college, but only a fraction enter teaching. Increasing teacher certification among college graduates does not expand the teacher pipeline, but it helps to increase the yield of those who do persist through college. However, it may be easier to increase college enrollment among high school graduates than to change college graduates' career preferences. There are many known policy interventions to induce students to enroll in college (see Dynarski, Nurshatayeva, et al., 2023; Dynarski, Page, et al., 2023), but few teacher recruitment programs targeting college students that are known to be effective (Fleck et al., 2025). In particular, research on career and technical education finds that career academies with multi-year coursework and outside learning opportunities increase college-going, suggesting that more intensive early teacher recruitment programs may be most effective (Hemelt et al., 2019). One potential strategy that may be effective at both increasing college-going and entry into teaching is conditional college scholarships that require recipients to teach for a certain period of time after earning their certification. Such scholarships and loan forgiveness programs have attracted higher achieving individuals, who are more effective and more likely to be retained, to teach in lower performing schools (Henry et al., 2012; Steele et al., 2010).

The results from our teacher analyses also have several important implications for practitioners. First, information concerning HS education course taking may be informative for school leaders aiming to hire teachers who are more likely to be retained. Teachers who took

these courses when they were in high school have higher retention rates. The predictive value of this information can help principals hire teachers who will remain in their school when selecting from teachers with other similar observable characteristics regardless of the root cause of this higher commitment being taking HS education courses or selection into the classes.

Finally, HS education course takers in our setting disproportionately teach in general education elementary classrooms. Shifting the focus of HS education coursework to be more on teaching grades and subjects such as secondary math, secondary science, special education, foreign languages, and English as a second language where teacher supply is more limited may also be a better strategic use of HS education courses as a GYO program (Edwards et al., 2025).

Conclusion

Developing a robust teacher pipeline is imperative to ensuring that there is a sufficiently large supply of diverse and effective teachers. Our results suggest that initial interest in teaching among adolescents may be higher than previously reported, especially among students of color. Many high school students who may have low expectations of being able to attend college likely aspire to teach. Thus, efforts to increase interest in teaching may not be successful without intentionally providing supports to overcome barriers associated with entry into the teaching profession, as our results suggest. Increasing college enrollment and incentivizing teacher certification, especially among students of color and students from low-income families, has the potential to mitigate attrition from the teacher pipeline and increase teacher supply by better capitalizing on existing interest in the profession.

Endnotes

1. Our sample includes 2,540,102 first-time 9th graders with a valid deidentified social security number attending a school in a traditional public school district or a charter school. We exclude students attending juvenile detention centers and other alternative campuses.

2. Our treatment definition is constructed to be time invariant at the school level. Once a school starts offering an education course during our panel, all students who attend that school after that are considered treated, even if HS education courses are not offered during their tenure. Schools' choices to stop offering HS education courses or offering them intermittently may be endogenous (e.g., low enrollment). Our approach ensures that our comparison group does not include contaminated observations that could induce bias into our estimates.
3. We consider a student treated if their 9th grade school ever offers a HS education course during their 9th grade year, or in the three school years after 9th grade. We acknowledge that students may transfer schools and gain access to HS education courses. However, we assign students to treatment based on their 9th grade school because transfer behaviors may be endogenous with treatment. This choice likely attenuates the effect of access to HS education courses towards zero.
4. We report the coefficients of the explanatory variables in the model used to create our propensity scores in Appendix Table A2.
5. We only observe high school course taking for teachers who entered 9th grade in 2004-05 or later and attended a Texas public high school. It is likely that some teachers in our sample who took HS education courses are not considered treated in our analyses because they took these courses prior to 2004-05 or at a private or out-of-state high school. While this exclusion likely attenuates our estimates towards zero, we do the following to account for potential bias. First, we include an indicator for having missing high school data in regression analyses that include covariates. We also estimate our descriptive statistics and regressions concerning teacher placements and retention on the sample restricted to teachers we observe in high school as a robustness check. Results are similar.

6. Texas did not administer STAAR tests in Spring 2020 due to the COVID-19 pandemic. Additionally, test scores from 2015-16 are missing from most 3rd, 4th, 6th, and 7th grade students due to statewide test administration issues.
7. For students with missing test scores for the prior school year, we replace them with test scores from two years ago and include indicators for missing math or reading test score from the prior year.
8. We do not use the staggered rollout of HS education courses as an instrument to estimate the effect of enrollment in HS education courses because our instrument does not meet the exclusion restriction. There may be spillover effects of offering the courses on students who do not enroll in them that contribute to our estimates. For example, a student who takes these classes may inform and influence their peers' interest in a teaching career.
9. We exclude teacher-year observations that do not report teacher's age from these regressions.

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Tables

Table 1. School Characteristics by Treatment Status

	Always Offers HS Education Courses	Starts Offering HS Education Courses	Never Offers HS Education Courses
Avg. Total Enrollment	1,257	828	288
Avg. Prop. Asian/Pacific Islander	0.024	0.015	0.014
Avg. Prop. Black	0.127	0.131	0.158
Avg. Prop. Hispanic	0.372	0.300	0.387
Avg. Prop. White	0.472	0.549	0.435
Avg. Prop. Female	0.491	0.492	0.467
Avg. Prop. Econ. Dis.	0.418	0.417	0.544
Avg. Prop. Students with Disabilities	0.126	0.147	0.200
Avg. Prop. English Learners	0.037	0.027	0.051
Prop. City District	0.357	0.216	0.386
Prop. Suburb District	0.258	0.197	0.104
Prop. Town District	0.146	0.192	0.149
Prop. Rural District	0.240	0.396	0.361
N Schools	446	402	1506

Note. School characteristics used are from the school's initial year in the data. A school is considered treated if it offers a HS education course. Schools that always offer HS education courses are ones where all 9th grade cohorts in our sample are exposed to HS education courses. Schools that start offering HS education courses are schools where the first 9th grade cohort in our panel is not exposed to HS education courses, but other 9th grade cohorts are. Schools that never offered HS education courses are schools where no 9th grade cohorts are exposed to HS education courses.

Table 2. 1st Year Teacher Characteristics by HS Education Course Taking Status, 2012-13 to 2020-21

	Did not Take a HS Education Course	Took HS Education Course(s)
Teacher Characteristics		
Female	74.1%	91.9%
White	55.1%	61.4%
Black	13.1%	7.4%
Hispanic	27.4%	28.1%
Asian	2.5%	1.4%
Other Race	1.9%	1.7%
Certified	87.0%	93.8%
Completed Standard Certification Program	37.0%	71.8%
School Characteristics		
City	46.4%	39.9%
Suburb	29.3%	36.3%
Town	11.2%	10.9%
Rural	13.0%	12.9%
Charter	13.0%	7.0%
Avg Sch. Pct. Econ. Dis. Students	65.6%	62.0%
Avg. Sch. Pct. White Students	24.3%	27.8%
Avg. Sch. Pct. Black Students	15.8%	13.8%
Avg. Sch. Pct. Hispanic Students	54.1%	50.9%
Teaches in District Attended in 9th Grade	27.0%	29.7%
Subjects Taught		
Teaches Elementary (Core)	44.3%	66.4%
Secondary ELA	11.6%	7.9%
Secondary Math	9.0%	7.4%
Secondary Science	8.3%	4.1%
Secondary Social Studies	8.1%	5.2%
Special Education	3.1%	3.0%
English as a Second Language	1.7%	1.6%
Secondary Foreign Language	4.2%	2.8%
PE/Health	9.0%	6.0%
Art	7.1%	3.4%
Other	10.9%	5.2%
Pct. Sample	96.5%	3.5%
N Teachers	178,248	6,425

Note. The percent of teachers who teach in the district that they attended in 9th grade is only constructed from the 61,906 teachers that appear in our high school student sample.

Table 3. Difference-in-Differences Treatment Estimates of Access to HS Education Courses on Teacher Pipeline Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
	Outcome								
	Takes an Education Course	Becomes Teacher	Graduates from HS	Enrolls in TX Public 4 Yr. College	Enrolls in Tch. Cert.	Graduates from TX Public 4 Yr.	Becomes Certified	Student Obs.	Total Obs.
Sample									
All Students	0.0342***	-0.0013	-0.0005	-0.0026	-0.0009	-0.0086***	-0.0016	1,391,389	5,859,510
	(0.0025)	(0.0007)	(0.0040)	(0.0030)	(0.0005)	(0.0022)	(0.0007)		
Above Median Propensity	0.0517***	-0.0023	-0.0010	-0.0022	-0.0015	-0.0086	-0.0027	695,646	2,924,901
	(0.0037)	(0.0012)	(0.0044)	(0.0037)	(0.0010)	(0.0028)	(0.0012)		
Female	0.0536***	-0.0020	0.0003	-0.0024	-0.0016	-0.0091*	-0.0022	678,865	2,859,099
	(0.0038)	(0.0011)	(0.0044)	(0.0038)	(0.0010)	(0.0030)	(0.0012)		
Male	0.0158***	-0.0004	-0.0009	-0.0026	0.0000	-0.0079*	-0.0007	712,415	2,999,539
	(0.0016)	(0.0006)	(0.0043)	(0.0032)	(0.0005)	(0.0024)	(0.0006)		
White	0.0383***	-0.0029	0.0009	-0.0043	-0.0016	-0.0083	-0.0036	553,894	2,325,034
	(0.0030)	(0.0013)	(0.0037)	(0.0044)	(0.0010)	(0.0031)	(0.0013)		
Hispanic	0.0318***	0.0007	0.0025	0.0043	0.0004	-0.0030	0.0009	561,617	2,422,399
	(0.0035)	(0.0010)	(0.0051)	(0.0044)	(0.0008)	(0.0025)	(0.0009)		
Black	0.0323***	0.0006	-0.0098	0.0024	0.0002	-0.0046	0.0005	222,104	891,857
	(0.0035)	(0.0012)	(0.0058)	(0.0057)	(0.0010)	(0.0041)	(0.0011)		

Note. Estimated using a stacked difference-in-differences design. Robust standard errors clustered at the school level in parentheses. Significance levels are adjusted using a Bonferroni correction (49 tests) *** Family-Wise Error Rate (FWER)<0.01, ** FWER<0.05, * FWER<0.1. Treatment, defined as access to high school education courses, equals one if student attended a high school in 9th grade that offered at least one HS education course in the year or within 3 years of their 9th grade year.

Table 4. Student Characteristics by HS Education Course Taking Status

	Full Analytic Sample		Attended Sch. Offering Ed Course	
	Never took Education Courses	Ever took Ed Courses	Never took Education Courses	Ever took Ed Courses
Pre-Treatment Characteristics				
Pct. Female	47.9%	79.2%	47.4%	79.1%
Pct. Asian	3.1%	1.5%	3.4%	1.5%
Pct. Black	15.0%	13.1%	14.7%	12.9%
Pct. Hispanic	42.2%	43.3%	42.6%	43.0%
Pct. White	38.7%	41.1%	38.1%	41.4%
Pct. English Learner	4.8%	3.8%	4.7%	3.7%
Pct. Student w/ Disability	11.5%	8.0%	11.1%	8.0%
Pct. Econ. Dis.	49.2%	49.0%	47.7%	48.7%
Avg. 8th Grade Reading Test Score	0.037	0.075	0.045	0.077
Avg. 8th Grade Math Test Score	0.031	0.024	0.045	0.027
Outcomes				
Pct. Graduates HS	77.1%	95.0%	78.5%	95.1%
Pct. Enrolls in TX Public 4 Yr College	23.8%	31.4%	24.4%	31.7%
Pct. Enrolls in Teacher Cert. Prog.	1.4%	7.7%	1.3%	7.7%
Pct. Graduates TX Public 4 Yr College	17.1%	23.5%	17.7%	23.8%
Pct. Certified	1.9%	8.9%	1.8%	9.0%
Pct. Teacher	1.9%	8.7%	1.8%	8.7%
Pct. Of Sample	97.3%	2.7%	96.8%	4.2%
N Students	2,470,352	69,750	1,473,730	64,255

Note. Sample includes all Texas public school 9th graders 2004-05 to 2011-12. Average 8th grade reading and math scores are constructed from 1,917,300 and 1,913,803 students respectively.

Table 5. Average Differences in Teacher Contributions to Student Math and Reading Achievement by HS Education Course Taking

	(1)	(2)	(3)	(4)
Reading Achievement				
Model 1: Continuous controls for experience				
Teacher took ed courses	0.0032	0.0004	0.0032	0.0061**
	(0.0022)	(0.0023)	(0.0028)	(0.0024)
Model 2: Interval controls for experience with interactions				
Ed Courses*1st Yr.	0.0047	0.0026	0.0042	-0.0056
	(0.0042)	(0.0043)	(0.0043)	(0.0049)
Ed Courses*2-3 Yr	0.0028	0.0006	0.0032	0.0055
	(0.0035)	(0.0036)	(0.0036)	(0.0042)
Ed Courses*4-5 Yr	0.0096**	0.0065	0.0103**	0.0053
	(0.0045)	(0.0047)	(0.0046)	(0.0053)
Ed Courses*6-8 Yr	0.0120	-0.0029	0.0128	0.0260**
	(0.0088)	(0.0091)	(0.0089)	(0.0106)
Effective Observations	10,109,703	10,109,679	9,202,421	10,109,703
Math Achievement				
Model 1: Continuous controls for experience				
Teacher took ed courses	0.0043**	0.0048**	0.0104***	0.0020
	(0.0021)	(0.0022)	(0.0025)	(0.0022)
Model 2: Interval controls for experience with interactions				
Ed Courses*1st Yr.	-0.0044	0.0012	-0.0082*	-0.0119***
	(0.0040)	(0.0040)	(0.0047)	(0.0040)
Ed Courses*2-3 Yr	0.0187***	0.0152***	0.0191***	0.0107***
	(0.0031)	(0.0032)	(0.0036)	(0.0032)
Ed Courses*4-5 Yr	0.0063	0.0076*	0.0177***	-0.0021
	(0.0045)	(0.0046)	(0.0053)	(0.0046)
Ed Courses*6-8 Yr	0.0078	0.0068	0.0023	0.0002
	(0.0074)	(0.0076)	(0.0093)	(0.0074)
Effective Observations	9,574,276	9,574,250	8,678,209	9,574,276
Grade-Year Fixed Effects	X	X	X	X
School FEs		X		
Student FEs			X	
Teacher Covariates				X

Note. Robust standard errors clustered at the student level in parentheses. ***p<0.01, **p<0.05, * p<0.1. All models include the following: cubic polynomials of previous test score in reading and math; indicators that equal one if the math or reading test score from a year other than the previous year is used; indicators for students' gender and race and their economic, English learner, and disability statuses; average test score and demographic characteristics of student's classroom peers and their class size; average school test scores, average school demographic characteristics, district locale, and the logarithm of school enrollment. Models with teacher covariates also include teacher gender, race, quadratic polynomial of years of experience, teacher certification, and completion of a standard teacher certification program.

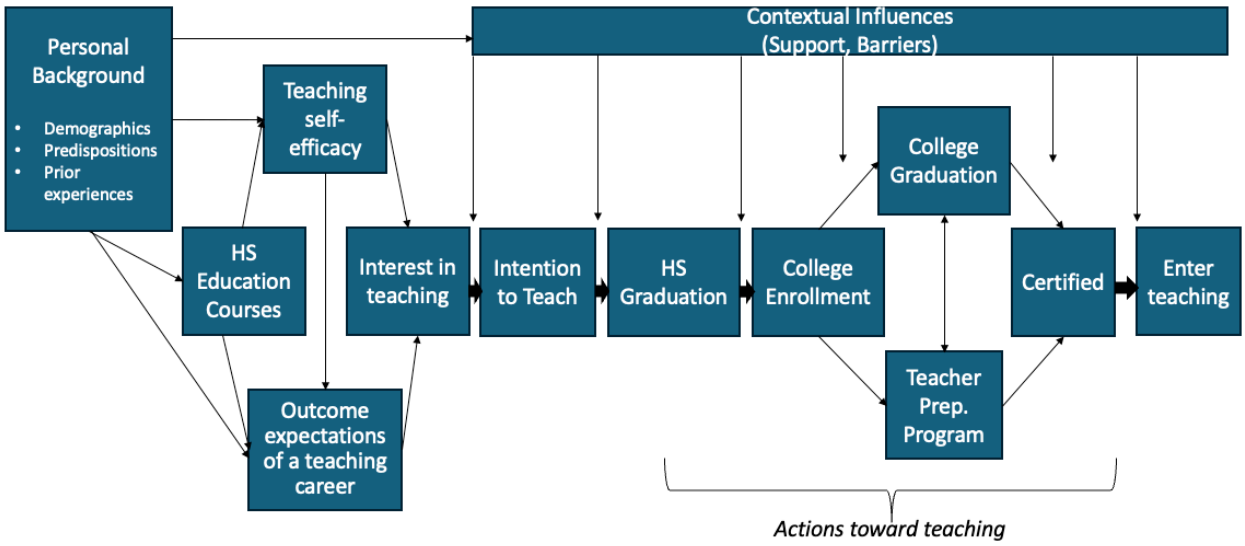
Table 6. Estimated Relationships between Taking HS Education Courses and Teacher Retention Outcomes: Linear Probability Models.

	(1)	(2)	(3)	(4)	(5)
Outcome: Same School	0.0323***	0.0245***	0.0203***	0.0156***	0.0126***
	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Outcome: Switches Schools, Same District	-0.0061***	-0.0084***	-0.0085***	-0.0049**	-0.0045**
	(0.0019)	(0.0019)	(0.0020)	(0.0019)	(0.0019)
Outcome: Switches Districts	0.0055**	0.0110***	-0.0009	0.0005	0.0028
	(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Outcome: Leaves Teaching in TX Public Schools	-0.0317***	-0.0271***	-0.0110***	-0.0111***	-0.0109***
	(0.0017)	(0.0017)	(0.0017)	(0.0018)	(0.0018)
Effective Observations	737,433	737,433	737,433	737,433	737,336
School Year by Start Year FEs	X	X	X	X	X
School Covariates		X	X	X	X
Teacher Demographics Covariates			X	X	X
Subjects Taught Covariates				X	X
School FEs					X

Note. Each reported estimate is from an individual model. Robust standard errors clustered at the teacher level in parentheses. ***p<0.01, **p<0.05, * p<0.1. Sample includes all teachers who were in their first year between 2012-13 and 2020-21. School covariates include the percentages of students who are Black, Hispanic, and economically disadvantaged, the logarithm of total enrollment, charter status, and locale. Our teacher demographics covariates include indicators for gender, race, teacher certification, completion of a standard teacher certification program, and teaching in the same school district that the teacher attended in high school as well as quadratic polynomials of age and experience. Indicators for teaching course assignments include core elementary subjects and grades, secondary English language arts, secondary math, secondary science, secondary social studies, special education, foreign language, English as a second language, PE/health, art, computers, career and technical education, and other subjects.

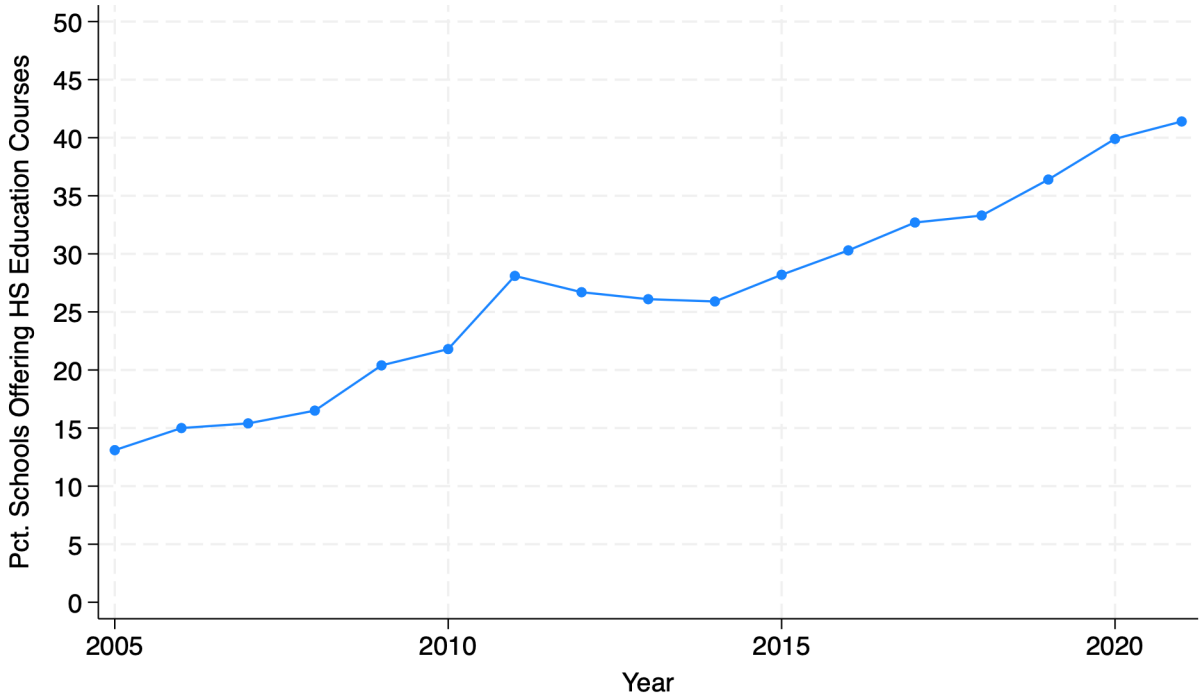
Figures

Figure 1. Conceptual Framework



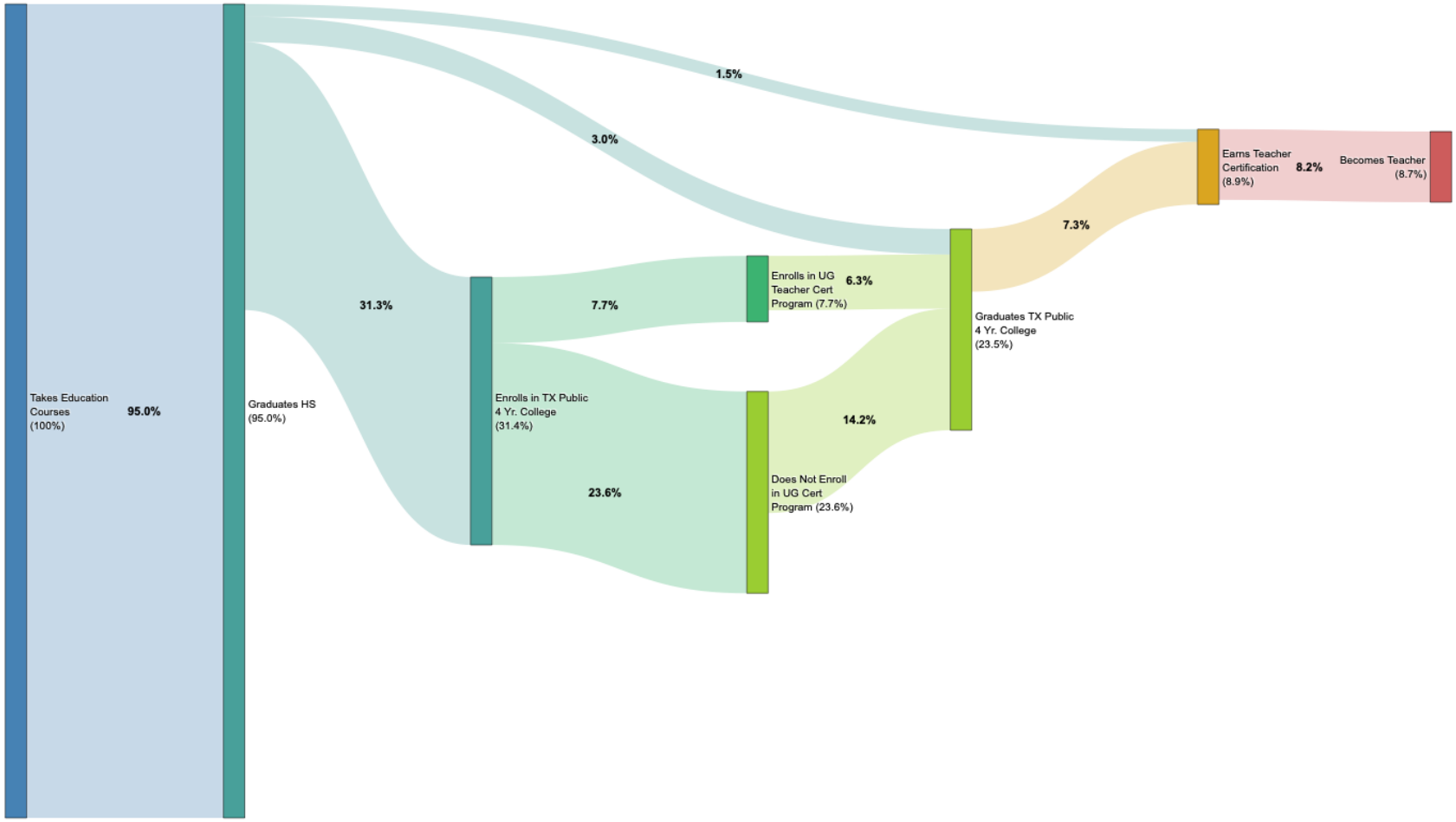
Note. Adapted from Social Cognitive Career Theory Lent et al. (1994).

Figure 2. Percent of Texas Public High Schools Offering Education Courses 2005-2021



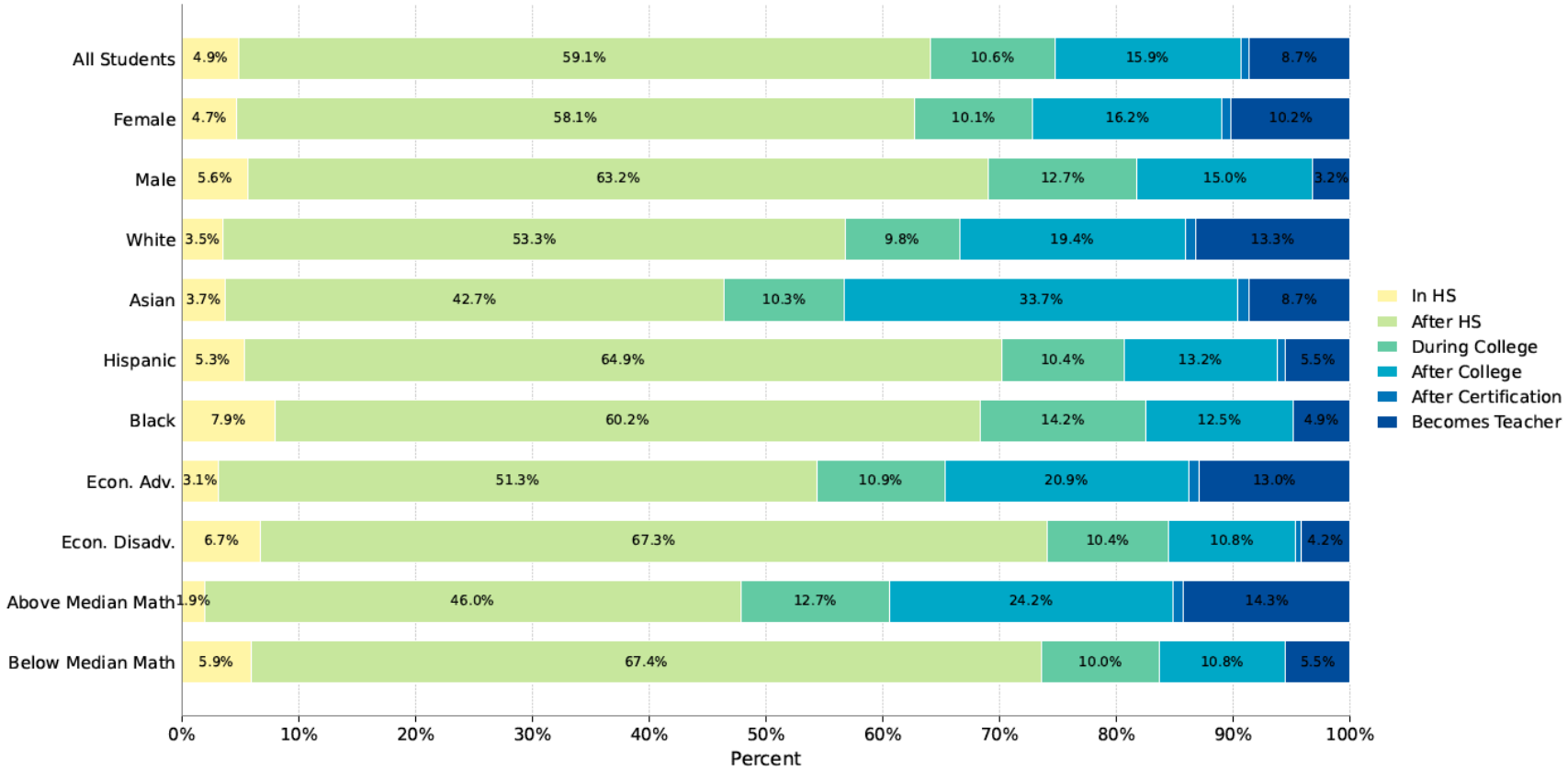
Note. Year represents the spring year of the school year. E.g., 2005=2004-05 school year.

Figure 3. Teacher Pipeline Trajectories of HS Education Course Takers



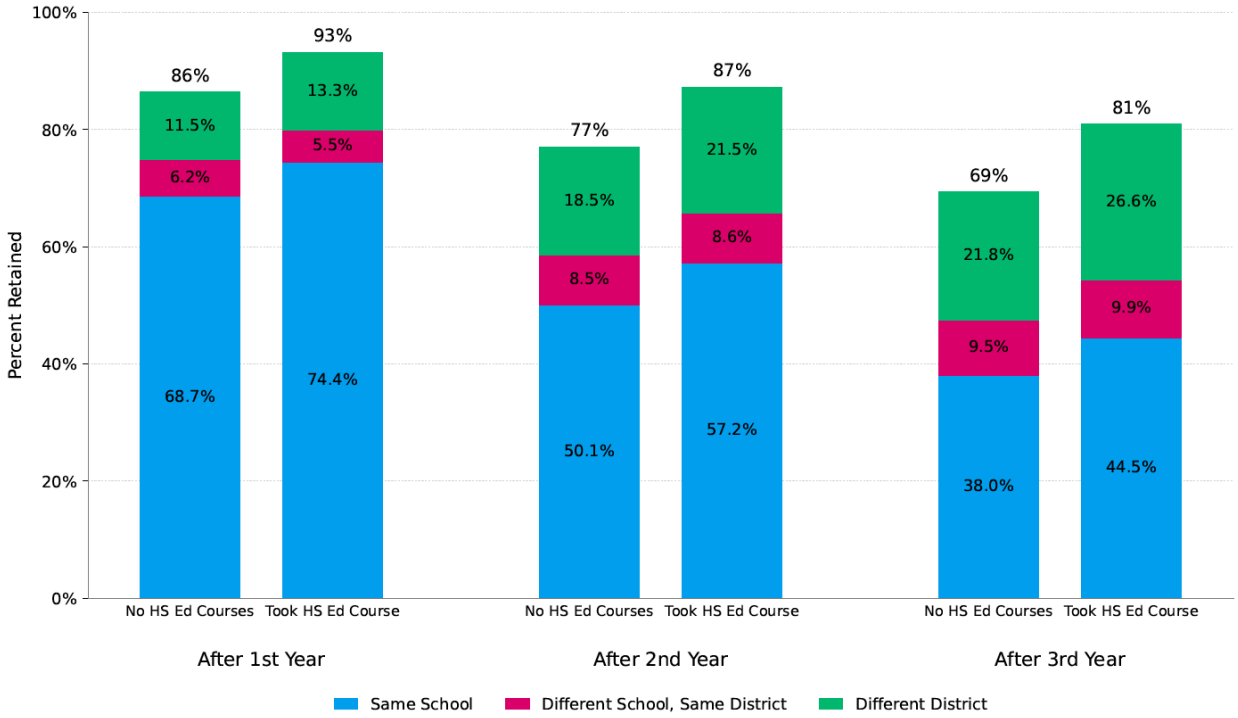
Note. N=69,750 students. Graduating HS=graduating high school within 5 years of starting 9th grade; Enrolls in TX Public 4. Yr College=enrolling in a Texas public 4-year college within 7 years; Enroll in Teacher Cert Program=enrolling in an undergraduate certification program at a Texas public 4-year college within 7 years; Graduates TX Public 4 Yr. College=graduating from a Texas public 4-year college within 9 years; Earns Teacher Certification=earning a Texas teacher certification within 11 years. Becomes Teacher=teaches in a Texas public school classroom within 11 years. Bolded percentages are the percent of all HS education course takers flowing between the 2 milestones. We note that 3% of HS education course takers graduate from TX public 4-year college within 9 years of starting 9th grade but do not enroll in one within 7 years, potentially due to transfer from another institution. Another 1.5% of HS education course takers earn teacher certification without being observed in a TX public 4 year. These students likely graduate from private or out-of-state universities. Percentages in parentheses represent the percent of all HS education course takers in our sample that complete the milestone. Flows that are less than 1 percent of the sample are suppressed. Claude Code assisted in generating this figure from author-created tabular output.

Figure 4. Teacher Pipeline Exit Point For HS Education Course Takers by Demographic Characteristics



Note. N=69,750 students. Bar values represent the proportion of students who do not complete any further milestones in the data within one year after on-time completion. For example, if we observe a student graduating high school but no other milestones, we consider them to have exited after high school (HS). No more than 1% of any group of students exit the teacher pipeline after certification but before becoming a teacher. Claude Code assisted in generating this figure from author-created tabular output.

Figure 5. Teacher Retention for First 3 Years by HS Education Course Taking Status



Note. N=145,092 teachers. Sample includes all first year teachers from 2012-13 to 2018-19. 140,872 teachers did not take HS education courses. 4,220 took HS education courses. Claude Code assisted in generating this figure from author-created tabular output.

ONLINE SUPPLEMENTARY MATERIALS

Online Appendix A: Supplementary Tables

Appendix Table A1. HS Education Courses Offered in Texas 2005 to Present

2005-2012
Education I, II, and III
Ready, Set, Teach! I and II
Careers in Education I and II
Bridging the Educational Scene for Teachers of Tomorrow 1 and 2
Education/Teaching Internship
Exploring Education Careers
Exploring Careers in Child Development, Education and Social Services
Orientation to the Teaching Profession
Current Issues in Education
Texas Teacher Cadets
Seminar in the Educational Process
2011-Present
Principles of Education and Training
Instructional Practices in Education and Training
Practicum in Education and Training I and II

Appendix Table A2: Propensity to Enroll in HS Education Courses as a Function of Student Characteristics: Logit Coefficients

Female	1.363***
	(0.016)
Asian/Pacific Islander	-0.801***
	(0.059)
Black	-0.031
	(0.021)
Hispanic	-0.080***
	(0.016)
Indigenous	-0.155
	(0.103)
English Learner	0.002
	(0.038)
Special Education	0.208***
	(0.024)
Economically Disadvantaged	0.043***
	(0.015)
8th Grade Math Achievement	-0.008
	(0.009)
8th Grade Reading Achievement	-0.003
	(0.010)
Missing Math Achievement	-0.643***
	(0.076)
Missing Reading Achievement	-0.516***
	(0.076)
Observations	1,391,462

Note. Robust standard errors in parentheses. ***p<0.01, **p<0.05, * p<0.1.

Table A3. Difference-in-Differences Treatment Estimates: Callaway & Sant'Anna Estimator

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	Outcome							
	Takes an Education Course	Becomes Teacher	Graduates from HS	Enrolls in TX Pub. 4 Yr.	Enrolls in Tch. Cert.	Graduates from TX Public 4 Yr.	Certified	Obs.
Sample								
All Students	0.0321***	-0.0016	-0.0151	-0.0125*	-0.0014	-0.0109*	-0.0018	1,391,462
	(0.0024)	(0.0007)	(0.0052)	(0.0040)	(0.0006)	(0.0034)	(0.0008)	
Above Median Propensity	0.0490***	-0.0028	-0.0129	-0.0118	-0.0022	-0.0112	-0.0029	695,731
	(0.0034)	(0.0013)	(0.0055)	(0.0047)	(0.0011)	(0.0041)	(0.0014)	
Female	0.0509***	-0.0024	-0.0132	-0.0130	-0.0023	-0.0126	-0.0023	678,953
	(0.0036)	(0.0012)	(0.0055)	(0.0047)	(0.0011)	(0.0042)	(0.0013)	
Male	0.0141***	-0.0008	-0.0166	-0.0115	-0.0003	-0.0088	-0.0011	712,509
	(0.0015)	(0.0006)	(0.0056)	(0.0041)	(0.0005)	(0.0033)	(0.0006)	
White	0.0388***	-0.0027	-0.0043	-0.0018	-0.0017	-0.0057	-0.0035	554,017
	(0.0030)	(0.0012)	(0.0050)	(0.0045)	(0.0010)	(0.0043)	(0.0012)	
Hispanic	0.0284***	-0.0005	-0.0196**	-0.0199***	-0.0011	-0.0125***	0.0000	561,718
	(0.0033)	(0.0011)	(0.0061)	(0.0048)	(0.0009)	(0.0031)	(0.0010)	
Black	0.0296***	-0.0005	-0.0297***	-0.0112	-0.0003	-0.0090	-0.0005	222,281
	(0.0031)	(0.0012)	(0.0077)	(0.0072)	(0.0010)	(0.0050)	(0.0011)	

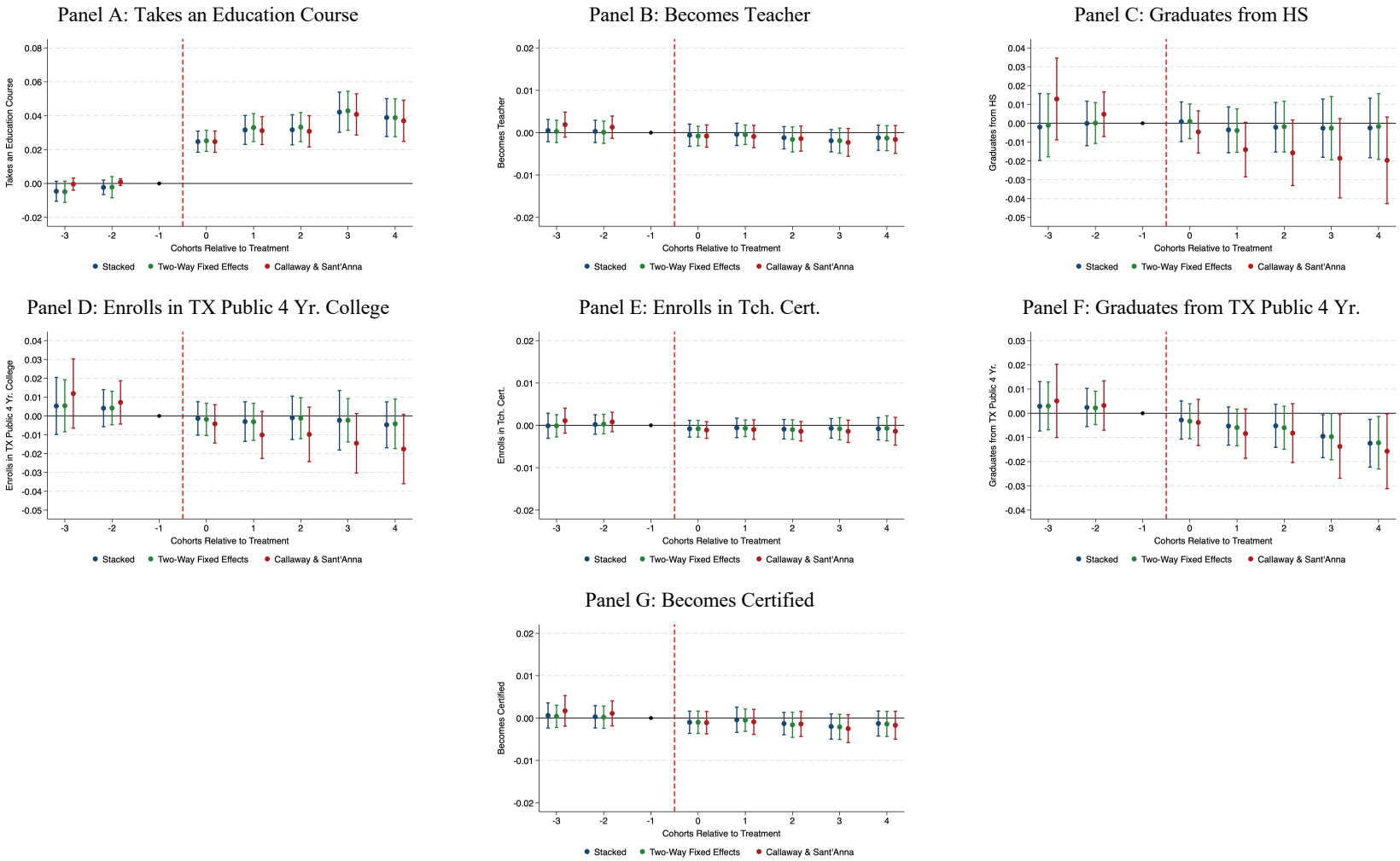
Note. Robust standard errors clustered at the school level in parentheses. Significance levels are adjusted using a Bonferroni correction (49 tests) *** Family-Wise Error Rate (FWER)<0.01, ** FWER<0.05, * FWER<0.1. Treatment, defined as access to high school education courses, equals one if student attended a high school in 9th grade that offered at least one HS education course in the year or within 3 years of their 9th grade year.

Table A4. Difference-in-Differences Treatment Estimates: Two-Way Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
	Outcome							
	Takes an Education Course	Becomes Teacher	Graduates from HS	Enrolls in TX Public 4 Yr. College	Enrolls in Tch. Cert.	Graduates from TX Public 4 Yr.	Becomes Certified	Obs.
Sample								
All Students	0.0331***	-0.0010	-0.0013	-0.0045	-0.0008	-0.0066**	-0.0011	1,391,389
	(0.0025)	(0.0005)	(0.0033)	(0.0025)	(0.0006)	(0.0020)	(0.0006)	
Above Median Propensity	0.0493***	-0.0020	-0.0018	-0.0053	-0.0015	-0.0068	-0.0017	695,646
	(0.0035)	(0.0010)	(0.0033)	(0.0030)	(0.0010)	(0.0025)	(0.0010)	
Female	0.0511***	-0.0017	-0.0003	-0.0051	-0.0016	-0.0066	-0.0014	678,865
	(0.0036)	(0.0009)	(0.0035)	(0.0038)	(0.0010)	(0.0025)	(0.0010)	
Male	0.0160***	-0.0003	-0.0020	-0.0037	0.0001	-0.0065	-0.0007	712,415
	(0.0017)	(0.0004)	(0.0036)	(0.0027)	(0.0004)	(0.0022)	(0.0004)	
White	0.0384***	-0.0017	-0.0009	-0.0037	-0.0008	-0.0072	-0.0021	553,894
	(0.0032)	(0.0010)	(0.0030)	(0.0029)	(0.0008)	(0.0029)	(0.0010)	
Hispanic	0.0304***	-0.0001	0.0000	-0.0033	-0.0008	-0.0030	0.0002	561,617
	(0.0033)	(0.0008)	(0.0040)	(0.0036)	(0.0010)	(0.0023)	(0.0008)	
Black	0.0289***	-0.0004	-0.0066	-0.0012	0.0000	-0.0048	-0.0009	222,104
	(0.0035)	(0.0010)	(0.0052)	(0.0047)	(0.0008)	(0.0033)	(0.0009)	

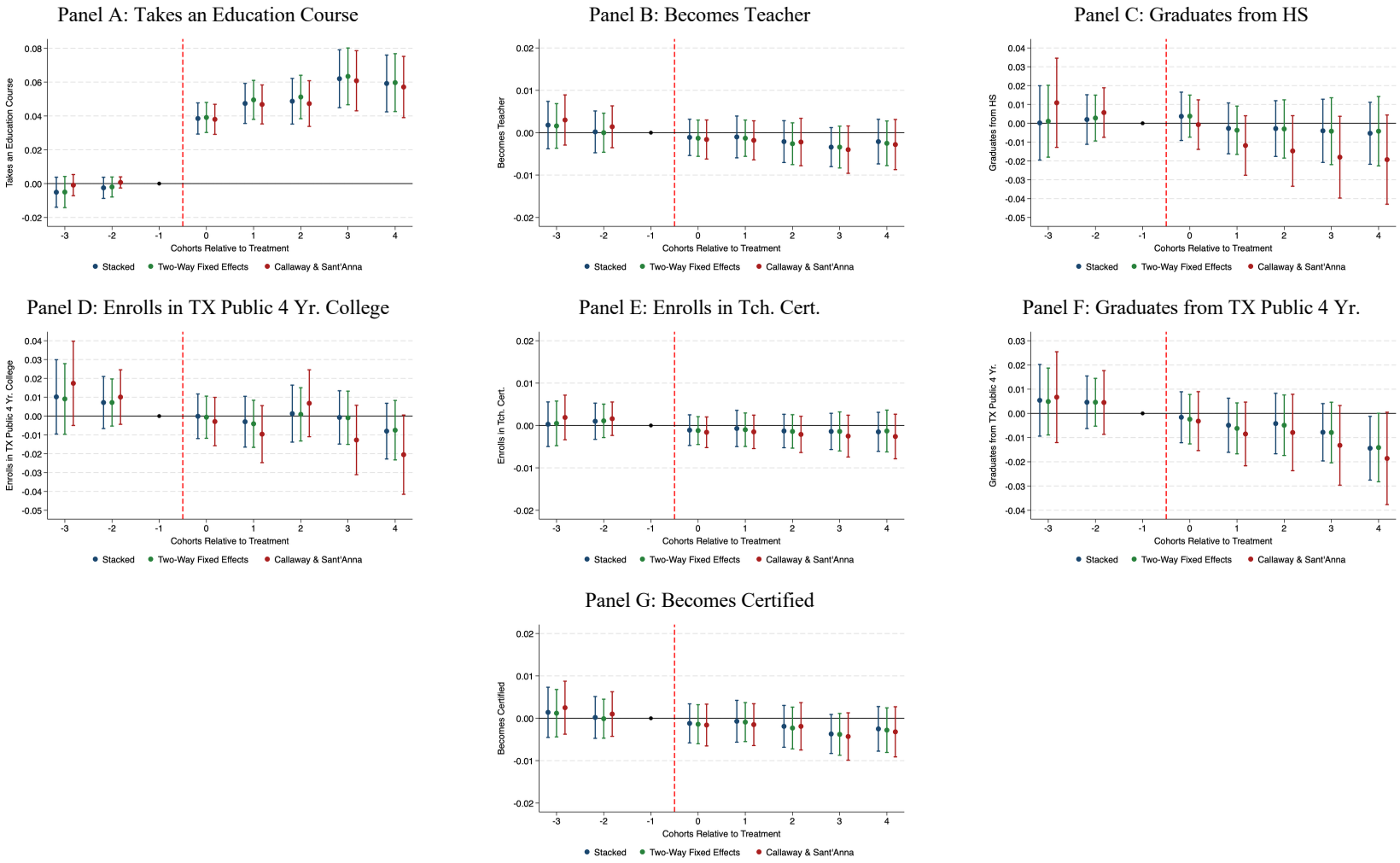
Note. Robust standard errors clustered at the school level in parentheses. Significance levels are adjusted using a Bonferroni correction (49 tests) *** Family-Wise Error Rate (FWER)<0.01, ** FWER<0.05, * FWER<0.1. Models include school and year fixed effects. Treatment, defined as access to high school education courses, equals one if student attended a high school in 9th grade that offered at least one HS education course in the year or within 3 years of their 9th grade year.

Figure A1. Event Study Treatment Estimates of Exposure to HS Education Courses—All Students



Note. Estimates from the Stacked, Two-Way Fixed Effects, and Callaway & Sant'Anna estimators are shown censored to t=-3 to t=4. Robust standard errors clustered at the school level. Bonferroni-adjusted 95% confidence intervals reported (adjusted for 49 tests). Exposure to high school education courses equals one if the student attended a high school in 9th grade that offered at least one HS education course in the year or within three years of their 9th grade year. Claude Code assisted in generating these figures from author-created tabular output.

Figure A2. Event Study Treatment Estimates of Exposure to HS Education Courses—Median or Above Propensity to Take HS Education Courses



Note. Estimates from the Stacked, Two-Way Fixed Effects, and Callaway & Sant'Anna estimators are shown censored to t=-3 to t=4. Robust standard errors clustered at the school level. Bonferroni-adjusted 95% confidence intervals reported (adjusted for 49 tests). Exposure to high school education courses equals one if the student attended a high school in 9th grade that offered at least one HS education course in the year or within three years of their 9th grade year. Claude Code assisted in generating these figures from author-created tabular output.

Online Appendix B: Simulations

Our simulations answer the question: how much would the probability a HS education course taker becomes a teacher increase if there was a policy shock that increased one of the following stages of the teacher pipeline by one percentage point?:

1. The probability of graduating high school for a HS education course taker
2. The probability of college enrollment at Texas public four-year institutions for a HS education course taker that graduates high school
3. The probability of college graduation at Texas public four-year institutions for a HS education course taker that enrolls in one
4. The probability of teacher certification for a HS education course taker that graduates from a Texas public four-year institution

The probability a HS education course taker becomes a teacher, $P(T)$, can be decomposed into the probability a course taker completes stage *i*, $P(i)$, and the probability a course taker who complete stage *i* becomes a teacher, $P(T \mid i)$, according to the multiplication rule of probability. Similarly, the probability of completing stage *i* can be decomposed into the probability a course taker completing the stage prior to stage *i* [which we denote as $i-1$], $P(i-1)$, and the probability a stage $i-1$ completer completes stage i, $P(i \mid i-1)$. Thus, we can represent the probability a HS education course taker becomes a teacher with the following equation:

$$P(T) = P(i-1) \times P(i \mid i-1) \times P(T \mid i) \quad \text{(B1)}$$

This assumes all HS education course takers must complete all stages of the pipeline to become teachers. Although this assumption does not strictly hold, we can apply this equation to simulate the expected change in the probability a HS education course taker becomes a teacher due to a one percentage point increase in the probability of completing stage *i* conditional on completing stage $i-1$ holding all else constant (e.g., a one percentage point change in the percent of high school graduates that enroll in college):

$$\Delta P(T) = P(i-1) \times \Delta P(i \mid i-1) \times P(T \mid i) \quad \text{(B2)}$$

For each of our policy shocks, we calculate $\Delta P(T)$ for a one percentage point change in $P(i \mid i-1)$. We assume that the same probability a student completes stage $i-1$ and a student that is induced into the next stage in the teacher pipeline as a result of this policy shock have the same propensity to enter teaching, $P(T \mid i)$, as students that did complete that step in the pipeline in our sample.

We report the probability a HS course taker completes the prior stage and the probability a student who reaches stage *i* that becomes a teacher in our data as well as the simulated effect on teacher supply of each policy shock in Table B1. We estimate this for the full population of students as well as separately for White, Black, and Hispanic students.

Table B1. Effects of a One Percentage Point Policy Shock on the Probability that a HS Education Course Taker becomes a Teacher

Policy Shock	Probability of reaching prior milestone $P(i-1)$	Assumed propensity to teach $P(T\|i)$	Change in probability to teach $\Delta P(T)$	New Teachers per 1,000 HS education course enrollees
All Students				
Increase HS graduation among all HS education course takers	1.000	0.092	0.00092	0.920
Increase college enrollment among HS graduates	0.950	0.218	0.00207	2.071
Increase college graduation among college enrollees	0.314	0.297	0.00093	0.933
Increase teacher certification among college graduates	0.235	0.923	0.00217	2.169
White Students				
Increase HS graduation among all HS education course takers	1.000	0.137	0.00137	1.370
Increase college enrollment among HS graduates	0.963	0.272	0.00262	2.619
Increase college graduation among college enrollees	0.372	0.339	0.00126	1.261
Increase teacher certification among college graduates	0.303	0.939	0.00285	2.845
Black Students				
Increase HS graduation among all HS education course takers	1.000	0.054	0.00054	0.540
Increase college enrollment among HS graduates	0.920	0.133	0.00122	1.224
Increase college graduation among college enrollees	0.292	0.231	0.00067	0.675
Increase teacher certification among college graduates	0.165	0.940	0.00155	1.551
Hispanic Students				
Increase HS graduation among all HS education course takers	1.000	0.058	0.00058	0.580
Increase college enrollment among HS graduates	0.946	0.177	0.00167	1.674
Increase college graduation among college enrollees	0.260	0.258	0.00067	0.671
Increase teacher certification among college graduates	0.186	0.882	0.00164	1.641

Note. $P(i-1)$ and $P(T|i)$ are derived from the study sample: All public school Texas 9th graders 2004-05 to 2011-12 who enrolled in a high school education course. $\Delta P(T)$ is calculated using Equation B2 assuming $\Delta P(i\,|i-1)$ equals 0.01.