

IS COLLEGE REMEDIATION A BARRIER OR A BOOST?

EVIDENCE FROM TENNESSEE

FOR MILLIONS OF STUDENTS at American colleges, freshman year starts off with an unpleasant surprise: despite graduating high school, students find themselves assigned to remedial classes in math or English, which they must pay for and pass before being allowed into college-level courses. Given that many of these students never complete a certificate or degree, advocates have begun to refer to remediation as a “bridge to nowhere.” Thus, policymakers looking to increase postsecondary enrollment and completion have put their focus on lessening the delays created by remedial course requirements.

The problem is especially acute in Tennessee, where in 2013, only one in three adults had more than a high-school diploma and two in three incoming college freshmen at local community colleges were placed in remedial classes. That year, the state launched the “Drive to 55” initiative, with the goal of increasing the number of adults with postsecondary credentials to 55 percent by 2025. It is a priority widely shared by policymakers across the country, with 41 other states working toward similarly ambitious graduation goals.

Studying Tennessee’s experience is uniquely valuable because it gives us a chance to compare two different alternatives to traditional remediation policies. First, the state began allowing students to complete their remedial math requirements while they were still in high school. Under the Seamless Alignment and Integrated Learning Support (SAILS) program, students designated as needing remediation based on their junior-year ACT math scores can enroll in an online remedial course during their senior



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PHOTOGRAPH / ROBIN RUDD

Training for high-tech: In Chattanooga, Tennessee, Tyner Academy students (from left) Jada Beckett and Takayla Sanford work on building circuits, while “mechatronics” teacher Bryan Robinson instructs Brookeana Willams and Noemy Marberry about soldering.

year. Although held in high-school classrooms and staffed by high-school instructors, the course is modeled on the remedial course offered in community colleges in Tennessee, and students who complete it are exempt from math remediation when they enroll at one of the state's 13 community colleges.

Then, in 2015, Tennessee began allowing students to take remedial-math courses concurrently with college-level math. Many other states, including Texas, California, and Massachusetts, have begun to experiment with similar “co-requisite” remediation policies. Although co-requisite remediation no longer delays students’ entry into college-level courses, such courses could still hamper students’ ability to take other college-level, credit-bearing courses. Moreover, completing remediation concurrently with college-level courses could be more or less effective than doing so beforehand, depending

the co-requisite courses were more likely to pass their college-level math course work than the SAILS graduates—implying that “just-in-time” or concurrent postsecondary remediation may be a more effective way to help students pass college math than remediation during high school.

Our findings suggest that both high school–based remediation like SAILS and co-requisite remediation have advantages over prerequisite college remediation. Both allow students to get a faster start and complete more credits within the first two years. In addition, co-requisite remediation also may be more successful than high-school remediation in helping students to pass their college-level math classes, by eliminating the time lag between remediation and the demands of college courses.

However, our findings also suggest that the role of remedial course requirements as a cause of low completion rates has

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upon whether students fully retain the material between the time they complete remediation and enroll in college classes. The key question is whether SAILS or co-requisite remediation can prepare students for college-level work with less delay or displacement than prerequisite remediation.

Waves of remediation

In order to learn about both alternatives to prerequisite remediation, we look at changes in outcomes for three different waves of high schools that introduced the SAILS program between 2013 through 2016, and compare them with outcomes at high schools that never had the program. In the first year of the program’s implementation, when completing SAILS allowed students to forgo prerequisite remediation, we measure the impact of eliminating the delay of prerequisite college remediation. In the second and third years, after the co-requisite policy was in effect, we again measure the effect of SAILS participation, this time measuring the effect of eliminating co-requisite requirements.

Under the prerequisite policy, we find that participating in SAILS boosted enrollment in college courses during the first year of college and allowed students to earn a modest 4.6 additional college credits by the end of their second year, or about one and a half classes. However, we learn that the program also did not improve students’ math skills on the math ACT test, nor did it improve their chances of passing college-level courses by the end of their second year.

Once the co-requisite policy was in place, however, we find that SAILS participation no longer had an impact on the number of college credits completed—implying that the co-requisite courses were just as effective as SAILS in reducing the delay associated with remediation and that they were not crowding out other college-level courses. Moreover, we see evidence that students in

been overstated. Prerequisite remediation is neither the major cause of low completion (as many of its critics have argued) nor a major solution for students with weak math skills—we find no effect of SAILS participation on the math achievement of remediation-eligible students in high school, relative to the typical high-school math course. Whenever it is delivered, remediation does little to undo the negative consequences of entering one’s senior year in high school with weak math skills.

Replacing pre-requisite remediation with SAILS or co-requisite remediation may help students complete an additional class or two, but that will do little to help Tennessee or other states meet ambitious goals for postsecondary degree completion. To improve students’ chances of completing a certificate or degree, institutions and policymakers will have to clear other barriers to college success, such as by providing more financial aid, better college advising, and clearer course pathways to a degree.

Keeping Tennessee’s promise

Nationwide, just one third of community-college students referred to remedial course work graduate within six years. Given alarmingly low graduation rates, states are increasingly focused on college remediation policies as a way to increase degree completion. Federal data show that in 2011, 29 percent of students at four-year public institutions and 41 percent at public two-year schools were required to take remedial English or math. One analysis found that students spend \$1.3 billion on remedial college course work annually.

Unlike most other states, Tennessee notifies students of their remediation status while they are still in high school, based on their 11th-grade ACT math test scores. The first full wave of SAILS high schools launched in 2013–14, gradually expanding over time so that by the 2018–19 school year, over

10,000 students in 271 high schools were enrolled.

The SAILS course is self-paced, with students progressing through the material on their own schedule, either over one semester or across the whole school year depending on their school's course schedule. The course material is delivered entirely through a computer-based platform, including videos, homework problems, and assessments. Most of the work is completed in class, although students have the option of working outside of class as well. Students progress through the course content at their own pace. Although teachers occasionally provide direct instruction, their primary role is to monitor progress through the online modules and provide guidance when students are stuck. Over the life of the program so far, more than 60,000 students have passed a SAILS course—89 percent of all those who enrolled.

As the SAILS program was expanding, Tennessee became the first state in the country to offer free community college for recent high-school graduates, beginning with the class of 2014–15. The Tennessee Promise scholarship covers tuition and fees at community and technical colleges and at a small number of public and private four-year institutions offering associate degrees.

Also in fall 2015, Tennessee's community colleges transitioned from a policy of prerequisite remediation to a co-requisite policy. In other words, rather than completing remedial course work before enrolling in for-credit classes, students were able to enroll in a remedial course simultaneously with their college-level course. Like SAILS, the new remediation policy was intended to allow students to enroll in college-level course work directly. However, while SAILS allows students to avoid remedial course taking entirely in college, potentially freeing up time to take other classes, the new co-requisite policy still required students to spend time in a remedial section, potentially crowding out other course options.

Data and method

To conduct our analysis, we gathered data for students who were seniors in Tennessee public high schools between 2010–11 and 2015–16, including high-school enrollment, demographic characteristics, student and school participation details from the SAILS program, junior-year ACT scores, postsecondary enrollment, community-college course grades, and college degree completion.

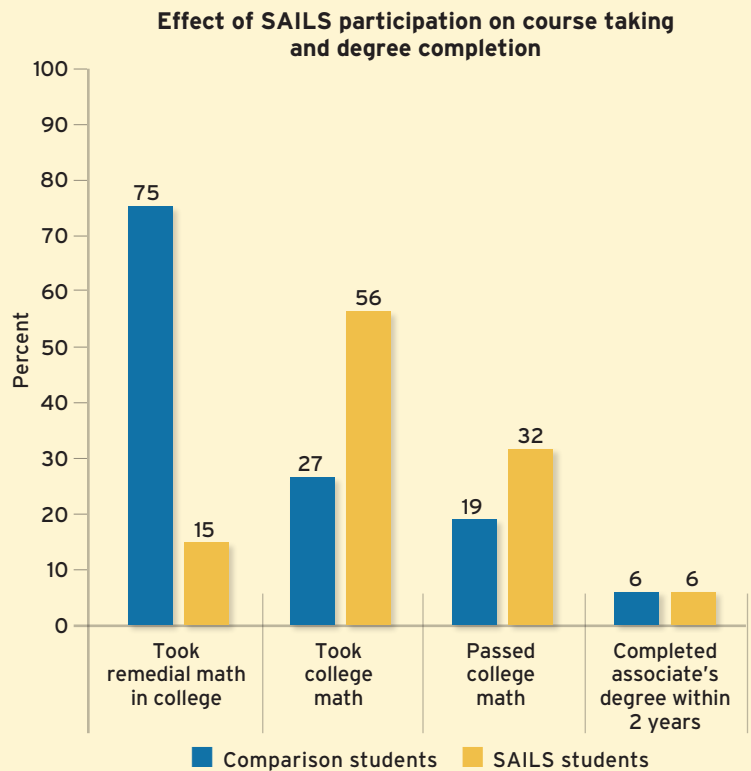
In 2015–16, we also administered a posttest and survey to a sample of approximately 16,000 seniors at 119 high schools that were implementing SAILS, and collected complete responses from approximately 61 percent of students in the targeted classes. (We did not target seniors enrolled in either Advanced Placement or early high school math courses, such as

geometry, who were therefore likely to be far above or below the ACT remedial cutoff.) The 50-minute, 35-item posttest was an abbreviated version of their 11th-grade ACT math test. Students completed it at the end of their senior-year math course either in November 2015 or April 2016, and it was then scored by ACT. During the last five minutes of the posttest, students completed a 15-item student survey on topics such as perceptions of their math courses, attitudes toward math, and postsecondary aspirations.

To measure the impact of SAILS participation on progress in college, we examine outcomes for various waves of high schools in the year they began implementing SAILS, and compare those to outcomes at schools that never implemented the program. Depending on the specific years under study,

Moving remediation from college to high school (Figure 1)

After high schools implemented Tennessee's SAILS program, fewer students took remedial math in college and more students took and passed college-level courses. However, there were no differences in two-year degree completion.



NOTE: Outcomes for SAILS students are calculated by adding the estimated treatment effects of participation under prerequisite remediation to the outcomes for comparison students.

SOURCE: Authors' calculations

the comparison group was exposed to either prerequisite or co-requisite remediation.

To measure the impact of SAILS on students' math achievement and attitudes toward math, we compare outcomes for students just above and below the math remediation cutoff, the latter of whom were referred to the SAILS course. Because

their first year, SAILS participants saw a boost of 29 percentage points in college-math enrollment and an increase of 13 percentage points in passing college math. SAILS participation also resulted in a small increase of 4.6 credits in the number of college credits accumulated by the end of the second year. But we find no statistically significant impact of SAILS on



PHOTOGRAPH / MIKE SIEGEL: THE SEATTLE TIMES

Karla MacIntyre, an admissions counselor at Lipscomb University in Nashville, is one of many mentors assigned to students during an evening at Nashville's McGavock High.

high-school students in Tennessee are required to take four years of math, we are measuring the effect of SAILS relative to a typical senior-year math class.

Prerequisite and co-requisite course work

In our first analysis, we look at the impacts of SAILS on student outcomes in the first year of the program, when students with ACT scores below 19 were subject to prerequisite remedial requirements. We find that the SAILS program led to a decline of 60 percentage points in the proportion of community-college entrants taking remedial math during their first year in college (see Figure 1). In other words, SAILS succeeded in shifting the locus of remediation from college back to high school for 60 percent of remediation-recommended community-college students.

In addition, we find that students in SAILS high schools were more likely to take and pass college-level math classes during their first and second years in community college. In

certificate or degree completion within two years. Within two years of enrolling, just 6 percent of remediation-recommended students had completed an associate degree (with or without SAILS); another 4 percent of entrants completed a certificate program during that time.

After the co-requisite policy was implemented in 2014–15, our analysis shows a similar shift in remediation from college to high school; SAILS participants were about 57 percentage points less likely to enroll in remediation during their first year in college. However, we no longer see a positive impact on the proportion of students taking or passing college math during their first year—in fact, the estimates are negative. Likewise, the estimated impacts on college credits completed by the end of the second year of college is not significantly different from zero.

Taken together, our findings across both years confirm that prerequisite course requirements do slow students' progress in college. Recall that, when the prerequisite remedial requirement was still in place, the SAILS program allowed students to complete an additional 4.6 credits by the end of their second year—basically the time students would have spent in remedial courses had they not taken them in high school via SAILS. This advantage disappeared after the co-requisite remediation

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policy was introduced, suggesting that co-requisite policies do not seem to displace college-level courses. By completing their remediation in high school rather than at the same time as their college-level classes, SAILS participants no longer enjoyed any benefit in terms of completed college credits by the end of their second year. Indeed, there is some evidence that they were worse off, being less likely to successfully pass the college-level math course than those taking the co-requisite course.

Impacts on math performance and perceptions

Our findings above suggest that prerequisite remedial math requirements do represent a sort of “time tax” on students, and that replacing them with high-school or co-requisite remediation allows students to make faster progress. But does the time spent on remedial courses benefit struggling students by improving their math skills?

There is surprisingly little evidence on whether college remediation actually improves students’ math skills. The primary reason has been lack of data: while most students are assigned to remediation based on a single test score, they complete remediation by passing the remedial course, not by retaking the test. Colleges rarely collect posttest data for participants, and even less often do they gather such data for a comparison group, which is difficult to do for college students who can drop out at any time.

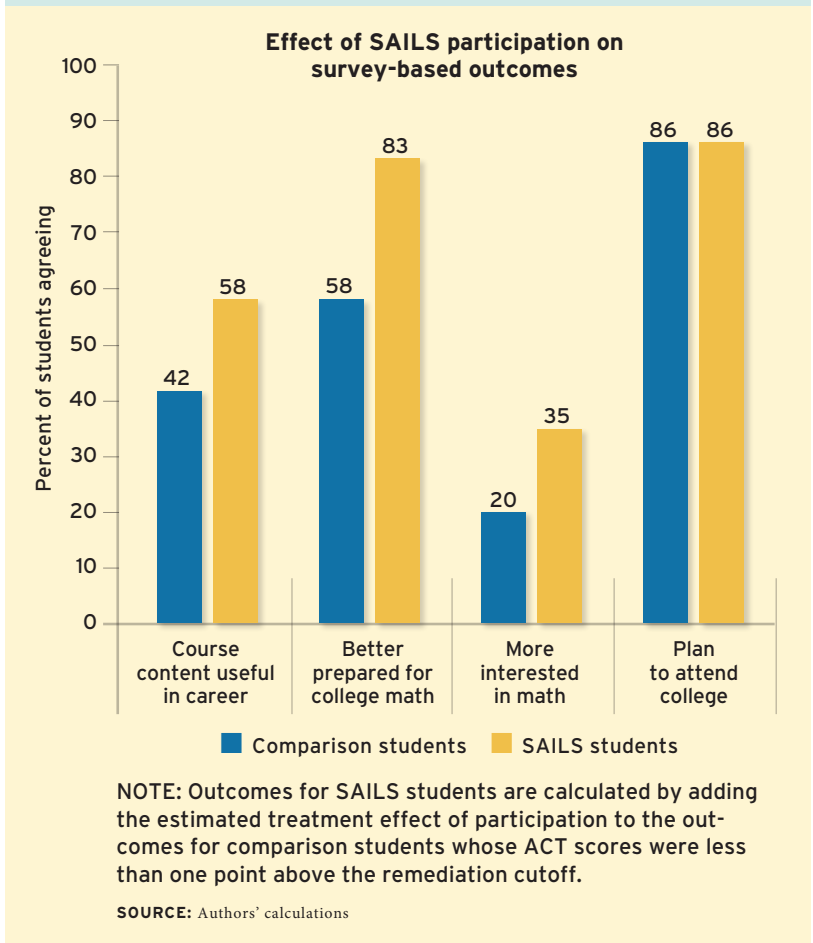
Because the SAILS course was (and is) offered in high school, where it is easier to track down and administer assessments to students, we had a unique opportunity to measure impacts of the SAILS course on math achievement and attitudes toward math. To do so, we focus on those students who were immediately above and below the cutoff for remediation on the 11th-grade ACT test, administering a posttest and survey to high-school seniors in 119 SAILS-participating schools in 2015–16. We find no differences in students’ scores on the posttest for those above and below the threshold, implying that students in SAILS classes improved no more (or less) than students who did not take SAILS during their senior year of high school. Even after asking program staff to identify the subset of ACT test items most aligned with the SAILS course, we still find no difference.

We also find no significant differences in students’ postsecondary college plans (see Figure 2). However, we do estimate that SAILS participation generated more positive feelings about math:

participants were nearly 16 percentage points more likely to perceive that their math course content would be useful in their careers, 25 percentage points more likely to report that they felt prepared for college math, and 15 percentage points more likely to say that they were interested in math. The impact on student perception of being better prepared for college math was particularly large for black students. Despite this perception, we do not observe an impact on posttest scores or see a disproportionate increase in college-math enrollment, math passage, or accumulated credits among black students.

Improved perceptions of math, but no changes in college plans (Figure 2)

In an end-of-course survey, students who participated in SAILS reported more positive feelings about math and its role in their lives, but their college plans were similar to comparable students who did not qualify for SAILS.



Looking beyond remediation

In recent years, Tennessee has implemented two major reforms to its remediation policies: the SAILS program, which allows students to complete their math remediation during the senior year in high school; and a statewide co-requisite remediation policy, which allows students to complete their remedial course work concurrently with college course work. Our results suggest that both have been effective in opening the doors to college-level course work, increasing the proportion of remediation-recommended students taking college-level math in their first year at community college by roughly 30 percentage points. We find some evidence that co-requisite remediation has been somewhat more effective in helping students to pass their college-math requirements than high-school remediation, implying that there may be some benefit to reducing the time lag between remediation and college course work.

However, our evidence suggests that the SAILS course does not improve students' math achievement or boost their likelihood of

Our findings also suggest a more thorough rethinking of the content and delivery of remediation. For instance, it could be that the senior year in high school is too late to start. Earlier efforts have been shown to have positive effects on student achievement—for example, in Chicago Public Schools, a double-period algebra course in the 9th grade had positive effects on students' algebra grades, credits earned in high school, test scores, and rates of high school graduation and college enrollment (see “A Double Dose of Algebra,” *research*, Winter 2013).

It is also possible that the self-paced, online course used in Tennessee is not well matched to the needs of low-achieving students. A growing body of work from college and high-school settings has found that students with lower levels of academic preparation perform less well in online courses than with traditional instruction. Online credit-recovery classes for struggling high-school students may be delivered poorly (see “A Digital Path to a Diploma,” *features*, Winter 2020). If states cannot find a model of remediation that actually increases

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passing college math once they take the course. Of the additional students who are able to take college-level math as a result of SAILS, only about half have passed.

Allowing students to complete remediation in high school (with a program such as SAILS) or allowing students to enroll in college and remedial math concurrently (with a co-requisite remediation policy) will lead to modest increases in credit completion by the end of students' second year in college. However, remediation is neither a major cause of low completion nor a solution for students who emerge from high school with weak math skills. Achieving significant improvements in the number of Tennesseans with a postsecondary credential will require identifying and clearing other barriers to college completion and not simply reducing the time cost of remediation. For instance, students may be having trouble navigating their way toward a degree, struggling to understand their course requirements or switching between majors.

A review of remedial-education reform efforts in recent years, for example, found that programs with comprehensive, integrated, and long-lasting student supports have produced the largest increases in college success outcomes. Other research has found that programs that offer students comprehensive advising, tutoring, and financial support, such as the City University of New York's Accelerated Study in Associate Programs, have positive impacts on degree completion. Other institutions, such as Georgia State University, encourage students to choose “meta-majors,” broad areas of interest with common course requirements and themed freshman learning communities; university data show that students in these groups earn better grades and are more likely to return sophomore year.

students' success in math, the next step will be to evaluate the consequences of eliminating remediation requirements for more students. In a study at the City University of New York, for example, researchers found that students who qualified for remedial course work but were instead placed in a college-level statistics class with extra support did far better than their counterparts in the remedial class (see “Reforming Remediation,” *research*, Spring 2017).

Many students are emerging from high school without the skills traditionally expected for college-level course work. In order to reach ambitious goals for increasing degree completion among their residents, many states are rethinking their remediation requirements. Our analysis shows that boosting degree completion will require a more effective model of math remediation—either in high school or college—or the elimination of other barriers to completion, such as inadequate advising or the level of math required in gateway college courses.

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