Interim Report 2 on the Implementation, Impact, and Cost Effectiveness of Developmental Education Reform in California's Community Colleges

June 2024

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Abstract: Research for Action (RFA) in partnership with the University of Texas at Austin is engaged in a five-year mixed-methods study of the reforms associated with California AB 705. Over the course of the study, our team will assess the implementation, impact, and cost effectiveness of reforms associated with the law. This second interim report, presented at the conclusion of year three of the study, focuses on gaining a deeper understanding of on-campus implementation through a faculty survey administered to math and English departments across our study sample, an Interrupted Time Series analysis with nine cohorts of FTIC student data, and preliminary data collection for our cost effectiveness study. Collectively, these data highlight significant changes that colleges have made on campus regarding shifting enrollments from developmental education into transfer-level coursework in both English and math, and providing additional supports to students to promote retention and completion. We find that AB 705 has demonstrated notable successes in improving enrollment and completion rates in transfer-level courses, particularly in math, among FTIC students in California's community colleges. While our survey results suggest that faculty believe additional resources and supports would be helpful, most faculty report that implementation supports have been adequate.

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Introduction

Fewer than one third of students who are assessed as not meeting college readiness standards and placed into traditional developmental education (DE) complete their DE sequences and move on to college-level coursework (Bailey et al., 2010). While DE was designed to improve the reading, writing, and/or math skills of students to support their success in subsequent college-level coursework, evidence indicates that DE placement hinders student progression and retention (Bailey et al., 2010; Calcagno et al., 2007; Clotfelter et al., 2015; Hern & Snell, 2010). Additionally, scholars have documented significant racial disparities in both students' assignment to and successful completion of DE courses. Widespread use of standardized placement testing, often criticized for racial bias and as poor predictors of college success, likely contributes to the overrepresentation of Black, Latinx, and Indigenous students in DE (Chen & Simone, 2016), creating opportunity gaps between those students and their White and Asian peers. Research suggests that allowing all students to enroll directly into introductory college-level courses is an effective alternative approach to increasing completion – either with concurrent DE or in lieu of DE altogether (Cho et al., 2012; Jenkins et al., 2010; Park-Gaghan et al., 2020). In response to this growing body of research, many states have been working to revise their placement practices, utilizing multiple measures assessment rather than placement testing, as well as accelerating or eliminating DE sequences and revising curricula and pedagogy (Edgecombe, 2011).

California Community College Context

The California community college system is the largest, most diverse community college system in the country, serving more than two million students each year. The system has been working to reform DE for over 30 years. In 2017, California passed AB 705 to address continued challenges with existing DE placement practices. The law was also considered an equity reform, as the state's Black and Latinx populations had been disproportionately placed into DE course sequences. The law took effect in January 2018, with the implementation of curricular reforms required by fall 2019. Implementation of AB 705 includes placement reform and the provision of cocurricular support models, both supported by a growing body of research (see Jaggars & Bickerstaff, 2018 for a summary). Specifically, the policy requires all community colleges to use one or more of three measures (high school coursework, high school grades, and/or high school grade point average) to determine course placements that will maximize the probability that a student will complete introductory transfer-level coursework in math and English within one year.

In September 2022, perceiving that institutions were not making adequate reforms in response to AB 705, the legislature passed AB 1705. The law took effect in July 2023, clarifying that any student with a U.S. high school diploma or equivalent was to be placed directly into transfer-level coursework in English and math, regardless of background or special population status. AB 1705 also prohibits colleges from requiring students to repeat coursework that they have successfully completed in high school or any other prior learning, and stipulates that colleges can only enroll students in non-credit courses for the purpose of providing additional concurrent support, not as a stand-alone replacement for enrolling in transfer-level coursework.[1]

California's AB 705 Research

A significant body of descriptive research on AB 705 has demonstrated that the proportion of students enrolling in transfer-level English and math coursework, including Black and Latinx students, has increased since the policy passed (RP Group, 2019; 2021). Access to introductory transfer-level English courses since AB 705 has improved dramatically, with 97% of students enrolling directly in college composition (Cuellar Mejia et al, 2022). As the percentage of students enrolling in transfer-level courses in English and math increased since the passage of AB 705, the completion rates among those enrolled directly into transfer-level courses declined, though not at a rate proportional to the size of the increase in enrollment. **Overall, there are net increases in the total volume of students completing transfer-level English and math courses, as well as in overall throughput rates** (RP Group, January 2021).

To examine student outcomes resulting from the shift in course offerings, researchers in California have primarily focused on measuring "throughput." The emphasis on throughput stems from AB 705's requirement that community colleges maximize the probability that a student will enter and complete transfer-level coursework in English and math *within a one-year timeframe*. However, that one year timeframe may start *at any time*, not necessarily from the start of a student's entry into the community college. This distinction has led to **the use of throughput as a central indicator of course completion**. The RP Group (2022) defined throughput as the proportion *of the entire cohort of students* attempting any level of English or mathematics course who successfully complete a transfer-level course in that same subject within one year at any California community college. Other analyses focused on measuring the "one-term throughput rate," which PPIC defined as the proportion of first-time students who successfully complete a transfer-level course with a grade of C or better *on their first attempt*, with the denominator including students who took developmental or transfer-level courses for the first time (Cuellar Mejia et al., 2021).

Research has also examined changes in throughput rates among student subgroups, highlighting that **equity gaps remain**, especially between Black and Latinx students and their white peers (RP Group, 2019). Despite overall improvements in course completion, equity gaps in course completion rates remain almost as high as they were in 2019: in transfer-level math courses, the white-Black gap in one-term course completion rates was 22 percentage points, and the white-Latinx gap was 17 percentage points (Cuellar Mejia et al., 2023). Gaps can also be seen among other student subgroups, with lower throughput rates in transfer-level math courses compared with their peers, for students identified as economically disadvantaged, former foster care youths, and those participating in Disabled Students Programs and Services (DSPS); students with those designations (compared to those without) experienced larger gaps in 2019 than in 2015 (RP Group, 2021). However, although DSPS students' throughput rates continue to fall below those of non-DSPS

[1] https://www.cccco.edu/-/media/CCCCO-Website/Files/Educational-Services-and-Support/ab-1705-implementation-guide-3-14-23-a11y.pdf

students, students from all disability types supported under DSPS are still experiencing an improvement in throughput in both transfer-level math and English courses (RP Group, 2022).

Although some research has described the implementation of cocurricular supports (e.g., corequisite courses, embedded tutoring) and instructional strategies such as "just-in-time" remediation (Cuellar Mejia, et al, 2023; RP Group, 2019a, 2019b, 2021), the bulk of the research has focused on tracking student outcomes. Our implementation and impact analyses are designed to address this gap in the literature.

Purpose of this Interim Report

Project staff from Research for Action (RFA) and the University of Texas at Austin are engaged in a five-year mixed-methods study of the reforms associated with AB 705 and 1705. Over the course of the study, our team will address eleven research questions related to the implementation, impact, and cost effectiveness of reforms associated with AB 705.[2] This Interim Report, presented at the conclusion of year three of our study, contributes to an understanding of three of our research questions.

The Implementation Study section of this report shares findings related to RQ2:

- How do institutional capacity and faculty buy-in affect institutional adoption and implementation of curricular reform? How does capacity and faculty buy-in vary between math and English departments, and why?

The Impact Study section of this report presents findings related to RQ7:

- What is the overall impact of the AB 705 policy on students' short- and medium-term outcomes (i.e., enrollment within one and two years, completion within one and two years, and transferable course credit accumulation within one and two years)? Does the overall policy effect vary across different student subgroups (i.e., gender)?

The Cost Study section of this report offers preliminary findings related to RQ11:

- Which cocurricular support model is the most cost-effective?

Implementation Study

Our study seeks to understand how California community colleges have responded to AB 705 and 1705 through systemwide data collection and in-depth case studies at fifteen institutions. Our case study sample was identified through the development of a Scale of Implementation to classify institutions along a continuum of implementation, from low to high.[3] We balanced the sample with consideration for region, size, urbanicity, and enrollment of Black and Latinx students, identifying five colleges each in the low, medium, and high quintiles. We ultimately secured participation from 13 colleges; 4 low implementers, 5 middle implementers, and 4 high implementers. We conducted in-depth site visits in year 2 of the study. In year 3 of the study, we sought to glean additional faculty perspectives from our site visit institutions related to implementation of reforms in response to AB 705 and 1705.

[2] The eleven research questions associated with the full study are listed in Appendix A.

[3] The Scale of Implementation relies on four indicators: proportion of introductory math and English courses offered at transfer-level; prevalence of cocurricular supports; placement measures utilized in math and English; and placement guidance provided to students. Additional details about the Scale are available in our year 2 report (Burkander et al., 2024).

Survey Design and Administration

In Spring 2024 we administered a survey to the English and math faculty at our site visit institutions. This survey was designed to address four constructs: institutional capacity, faculty buy-in, pedagogy, and faculty mindsets. We also included several questions related to the cost study.

We obtained English and math department rosters from twelve of our 13 sample colleges and sent personalized survey links to all full- and part-time faculty members. Faculty members received $25 gift cards for completing the survey. Our response rates ranged across institutions from 3% to 39%. Because we included part-time faculty and asked faculty to reflect on the institution where they taught the most course sections, some faculty shared feedback related to a different California Community College campus. We exclude these responses from our analysis of institution-specific constructs.

Findings

One hundred and twenty-six total faculty completed the survey. Sixty-three percent of respondents were full-time, and 54% of respondents were English faculty. Among math faculty, most (55%) reported that they taught both Statistics and Liberal Arts (SLAM) math and Business, Science, Technology, Engineering, and Math (BSTEM) math courses. Most math (93%) and English (94%) faculty reported that they taught introductory courses.

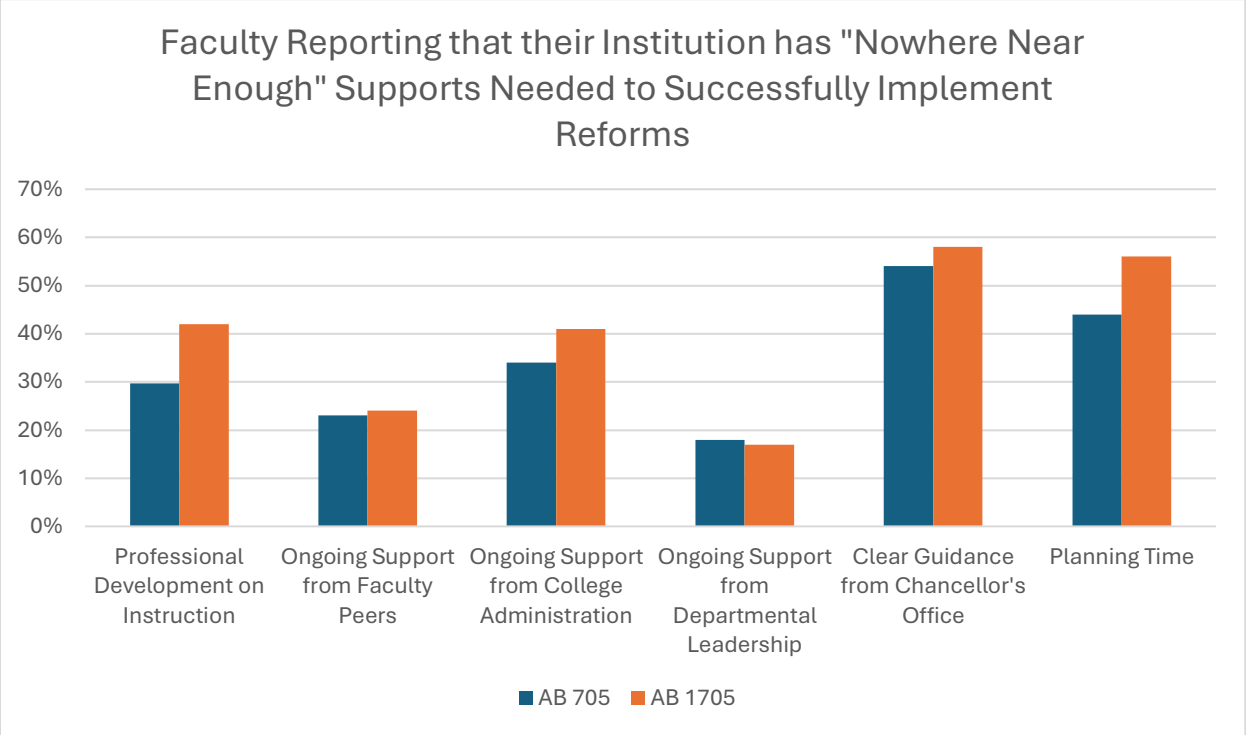
Institutional Capacity

Recognizing the importance of institutional capacity in supporting reforms such as this (Edgecombe et al., 2013; Schudde et al., 2022), we asked a series of questions related to faculty perceptions of the staff and resources mobilized by the institution in responding to these reforms, focusing on *implementation supports*, *staff capacity*, and *resources needed to successfully implement the changes*.

Implementation Supports

Figure 1 explores respondent perspectives on the implementation supports needed to implement the college's response to AB 705 and AB 1705.

Figure 1. Adequate supports to successfully implement response to AB 705 and AB 1705 (n=118)



In spring 2024, nearly five years into implementation of AB 705 and nearly two years into implementing AB 1705, some faculty indicate that their institutions are lacking supports critical to implementation. Specifically, **faculty report a lack of clear guidance from the Chancellor's Office, and insufficient planning time to implement both AB 705 and 1705**. While only 30% of respondents indicate that professional development in support of AB 705 is an issue, 42% of faculty indicate that they are lacking adequate professional development in support of AB 1705. Ongoing support from faculty peers and departmental leadership appears to be more prevalent, but 34% of faculty respond that support from college administration is lacking with regard to AB 705, and 41% of faculty say the same about AB 1705.

Differences between Implementation Levels

Comparing institutions classified as low and high implementers according to the Scale of Implementation, we see some significant differences in institutional capacity. Faculty from low implementation colleges report significantly lower levels of support in the area of professional development [χ^2 (3, N=85)= 9.44, p<.05] with regard to AB 705, but there were no significant differences between low and high implementers when describing supports associated with AB 1705.

Staff Capacity

Our 2022-23 site visits helped to elucidate the staff roles critical for effective implementation of reforms associated with AB 705 and 1705. Figure 2 explores respondent perspectives as to whether their institutions have the needed staff capacity to successfully implement the college's response to these reforms.

Figure 2. Adequate staff to successfully implement response to AB 705 and AB 1705 (n=118)

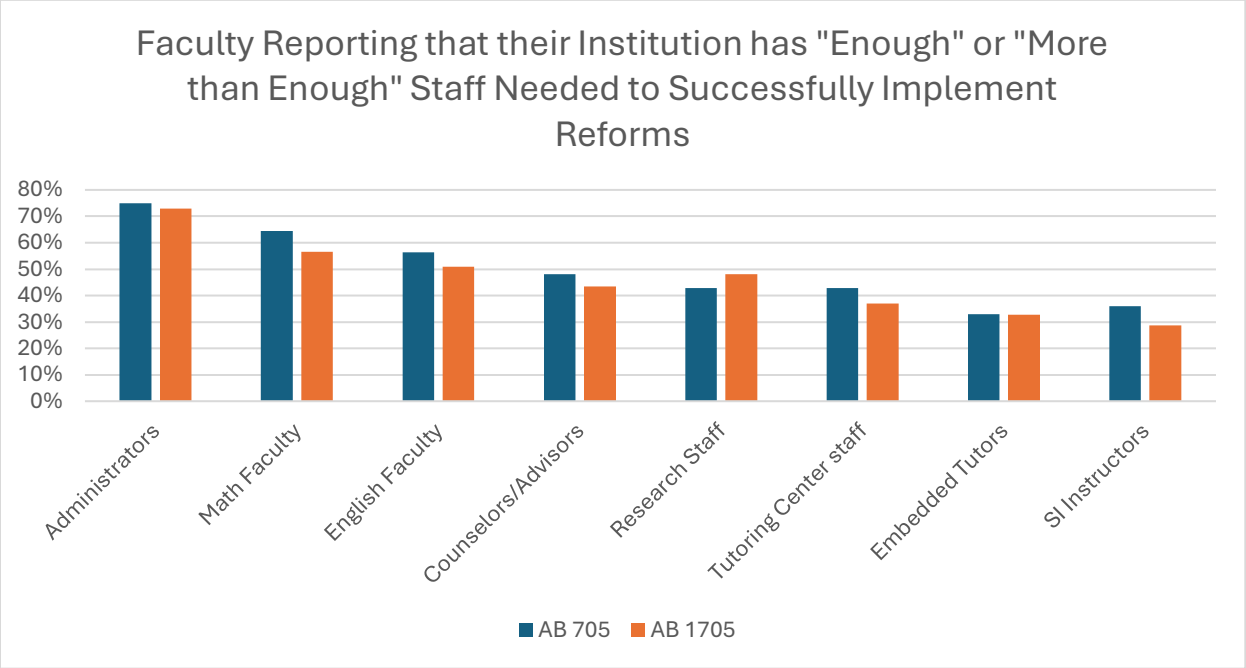


Figure 2 indicates that faculty report that campus administration levels are adequate for AB 705 and 1705 implementation. Faculty levels in both math and English are also reportedly adequate. However, **less than half of respondents reported that there were adequate counselors or research staff.** Research staff are critical for successful implementation, as having local data to evaluate student outcomes can be crucial for garnering faculty buy-in. Faculty also reported that additional academic support staff are needed. Embedded tutors have emerged across the system as a promising practice to support implementation, but **nearly 40% of respondents indicated that there were "nowhere near enough" embedded tutors to support implementation of both reforms**.

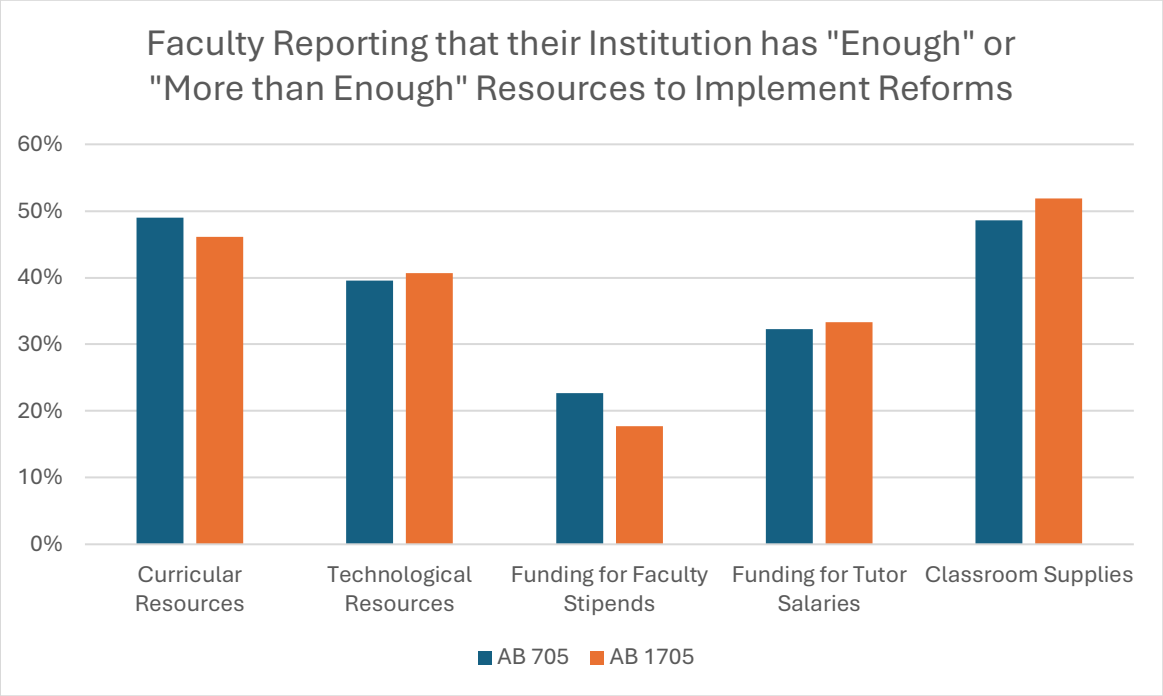
Differences between Implementation Levels

Contrasting responses from faculty at low and high implementer colleges, some significant differences emerge. Faculty at low implementer colleges reported significantly fewer supplemental instructor leaders to support implementation of AB 705 [χ^2 (3, N=85) = 9.26, p<.05] and AB 1705 [χ^2 (3, N=85)= 9.02, p<.05]. Significantly more faculty at low implementer colleges also report that they are lacking adequate research staff [χ^2 (3, N=85) = 8.95, p<.05] to support implementation of AB 1705.

Resources

Lastly, we asked faculty about the presence of adequate financial and material resources to support implementation of AB 705 and 1705. Our site visits in 2022-23 identified a number of materials resources that faculty and administrators indicated were important for successful implementation. Figure 3 explores respondent perspectives on available institutional resources to successfully implement the college's response to AB 705.

Figure 3. Resources to successfully implement response to AB 705 and AB 1705 (n=118)



While around half of faculty report that their institutions have adequate classroom supplies to implement AB 705 and 1705, other resources are reportedly lacking. In particular, funding to support faculty stipends and tutor salaries is an issue. **Fifty-five percent of faculty responded that there was "nowhere near enough" funding for faculty stipends to support AB 705; sixty percent reported that this was true for AB 1705.** In our site visit institutions, we heard that faculty stipends were used to support communities of practice and professional development, two important supports for successful implementation. Faculty in Figure 2 reported that there were inadequate embedded tutors; allocating adequate funding to support tutor positions is an important step toward addressing that gap.

Differences between Implementation Levels

Indeed, when comparing faculty respondents from low and high implementation levels, there are significant differences with regard to adequate funding for tutor salaries for both AB 705 [χ^2 (3, N=85) = 8.67, p<.05] and 1705 [χ^2 (3, N=85) = 7.81, p<.05].

Faculty Buy-in

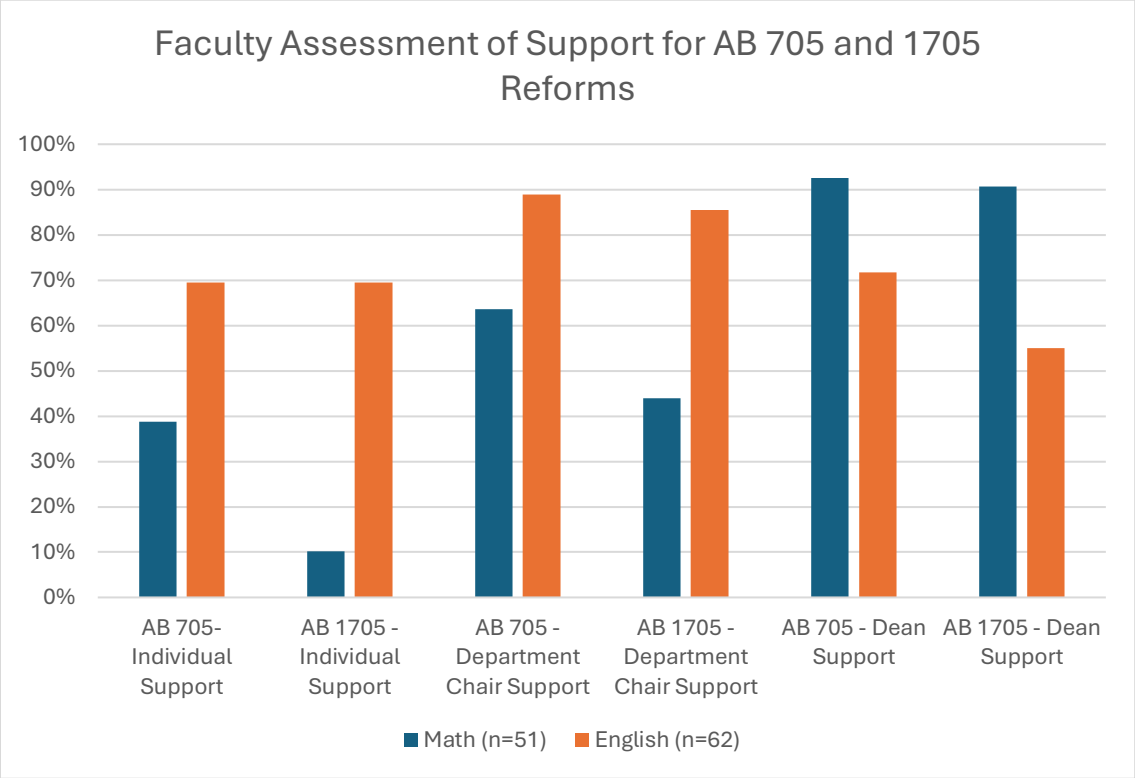
Faculty buy-in for reforms associated with curriculum and instruction, in a context like California where faculty are primarily responsible for the same, is critical for effective implementation. California's community college faculty are street-level bureaucrats (Lipsky, 2010) with significant influence to facilitate or challenge implementation of the policy. Previous research has indicated that faculty buy-in was a challenge for reforms associated with AB 705 (Burkander et al., 2024; Hern, 2019). We asked faculty a series of questions to evaluate their level of buy-in; regarding the overall direction of the reforms associated with AB 705 and 1705; about which students are well-served by these reforms; and about their use and perceptions of effectiveness of cocurricular supports.

Faculty support for AB 705 and 1705

We asked faculty a series of questions aimed at understanding their current level of individual support for the overall direction of AB 705 and 1705, as well as how they would evaluate the level

of support held by their department chair and dean for reforms associated with these laws. Figure 4 indicates the level of support assessed by faculty.

Figure 4: Faculty Assessments of Support for AB 705 and 1705



While enthusiasm for AB 705 lags among faculty, **AB 1705 is demonstrably less popular, with 57% of faculty reporting that they disagree or strongly disagree with the overall direction of the reform**. Both department chairs and deans are perceived as being more supportive of both AB 705 and 1705 than individual faculty report themselves to be, and more supportive of AB 705 than AB 1705.

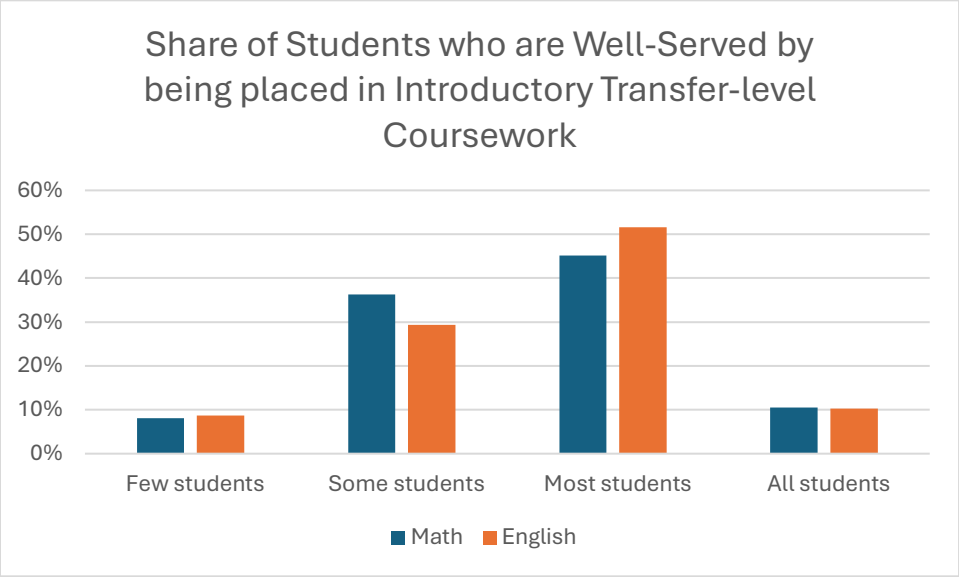
Differences between Departments

Comparing faculty responses from math and English departments, math faculty are significantly less supportive of both AB 705 [χ^2 (1, N=113) = 6.63, p<.01] and AB 1705 [χ^2 (1, N=113) = 10.83, p<.001] than English faculty. While both English and math faculty report that their department chairs are more supportive than they are, English department chairs are perceived as significantly more supportive of both AB 705 [χ^2 (1, N=113) = 8.81, p<.01] and AB 1705 [χ^2 (1, N=113) = 10.83, p<.001] than math department chairs. Contrarily, math deans are perceived to be significantly more supportive of AB 705 [χ^2 (1, N=113) = 7.55, p<.01] and AB 1705 [χ^2 (1, N=113) = 10.83, p<.001] than English deans.

Faculty Perceptions of Student Experience in Transfer-level Coursework

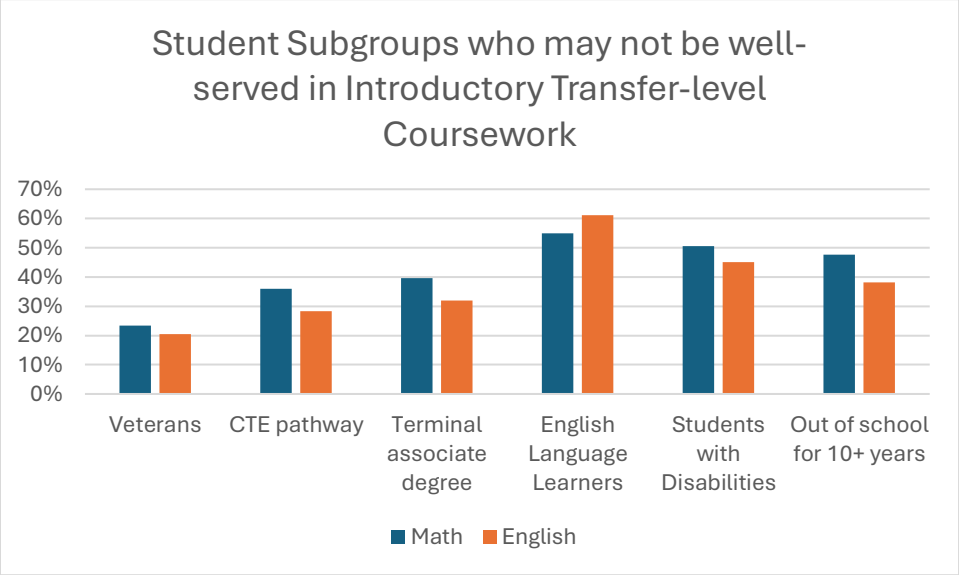
Prior research (Burkander et al., 2024, Hern, 2019) has indicated that a contributing factor to the low level of faculty buy-in is the belief that some students were not well-served by these reforms. This survey asked faculty for their perception of the share of students who are well-served by being placed into introductory transfer-level coursework. Figure 5 presents these data.

Figure 5: Faculty perceptions of the share of students well-served by being placed into Introductory Transfer-level Coursework (n=126)



Indeed, survey results indicate that **while most faculty now believe that some or most students are well-served by being placed directly into transfer-level coursework, only about 10% of faculty believe this is true of all students**. It's worth noting that English faculty are more likely than math faculty to indicate that most students are well-served by being placed into introductory transfer-level work. It has been documented that English departments were typically quicker to adopt reforms associated with AB 705 (Burkander et al., 2024; Hern, 2019). We asked faculty who indicated that not all students were well-served in introductory transfer-level coursework to indicate which student subpopulations they felt were not well served. Figure 6 provides those data.

Figure 6: Faculty perceptions of Student Subgroups who may not be well-served by Introductory Transfer-level Coursework (n=126)



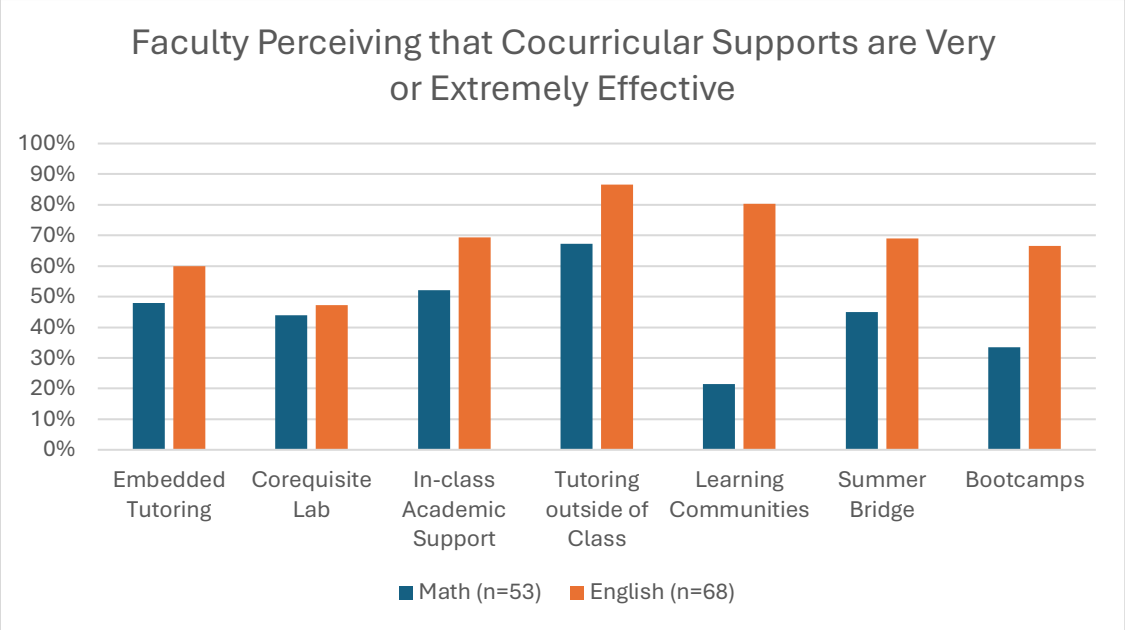
These data suggest that **faculty are primarily concerned that these reforms may not adequately serve English Language Learners, students with disabilities, and students who are returning to school after a long absence**. While there is suggestive evidence that all of these

student groups have better outcomes when granted direct access to transfer-level coursework than they did when they were placed into developmental education (RP Group, 2019a; 2019b; 2021; 2022), some faculty remain unconvinced that this is the best approach for all students.

Use and Perceptions of Effectiveness of Cocurricular Supports

As more students gain direct access to transfer-level coursework in math and English, departments have responded by offering various types of cocurricular support including corequisites and embedded tutoring. We surveyed math and English faculty about their use and perceptions of effectiveness of cocurricular supports. Figure 7 presents the proportions of math and English faculty who report that cocurricular supports are very or extremely effective.

Figure 7: Faculty Perceptions of Cocurricular Supports



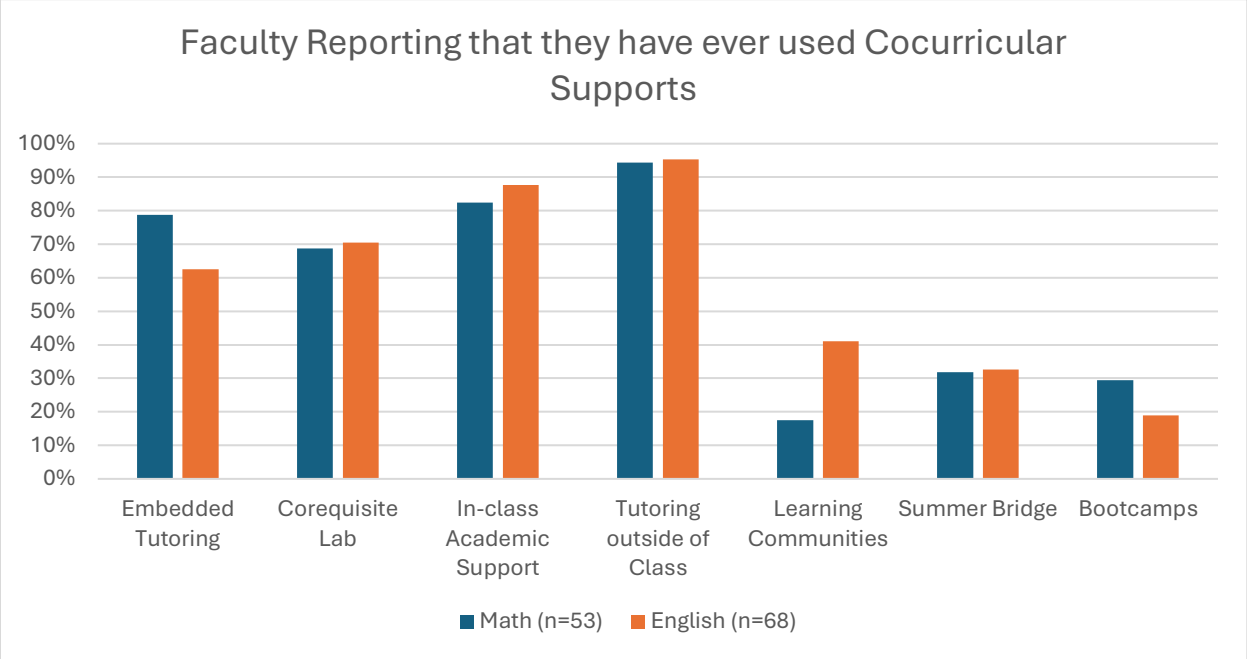
These data indicate that **fewer than half of math faculty surveyed believe that any of these supports are very or extremely effective, with the exception of tutoring outside of class and in-class academic support**. Across cocurricular supports, English faculty were more likely than math faculty to report that the supports are effective.

Differences between Departments

Comparing faculty responses from math and English departments, math faculty are significantly less likely to believe that learning communities [χ^2 (1, N=121) = 10.83, p<.001], tutoring outside of class [χ^2 (1, N=121) = 6.31, p<.05], summer bridge courses [χ^2 (1, N=121) = 4.83, p<.05], and skill-building bootcamps [χ^2 (1, N=121) = 8.81, p<.01] than English faculty.

We also asked faculty to report on their use of these cocurricular supports, asking them to reflect on the current semester as well as previous semesters. Figure 8 presents these data.

Figure 8: Faculty Use of Cocurricular Supports



Most faculty reportedly have experience using embedded tutors, teaching a corequisite-paired course, providing in-class academic support, and tutoring outside of class. Fewer faculty report having experience with learning communities, summer bridge programs, and bootcamps. Far fewer math faculty report experience with learning communities; this is not surprising considering that most institutions include English but not math in their learning communities. It is interesting that **most (69% of math faculty and 71% of English faculty) report having experience with corequisites but fewer than half (44% of math faculty and 47% of English faculty) report that they are very or extremely effective.** Indeed, 10% of math faculty and 9% of English faculty reported that corequisites were not at all effective. Despite a significant body of evidence that corequisite courses increase student retention and completion of introductory college-level math and English (Cuellar Mejia et al., 2020; Daugherty et al., 2021; Denley, 2016; Logue et al., 2019; Meiselman & Schudde, 2022; Miller et al., 2022; Ran & Lin, 2022), community college faculty in our sample remain skeptical. We observed a wide variety of corequisite structures during our 2022-23 site visits, consistent with other research (Bahr et al., 2022; Duffy et al., 2024; Ryu et al, 2022) documenting the variation in design and effectiveness of corequisites.

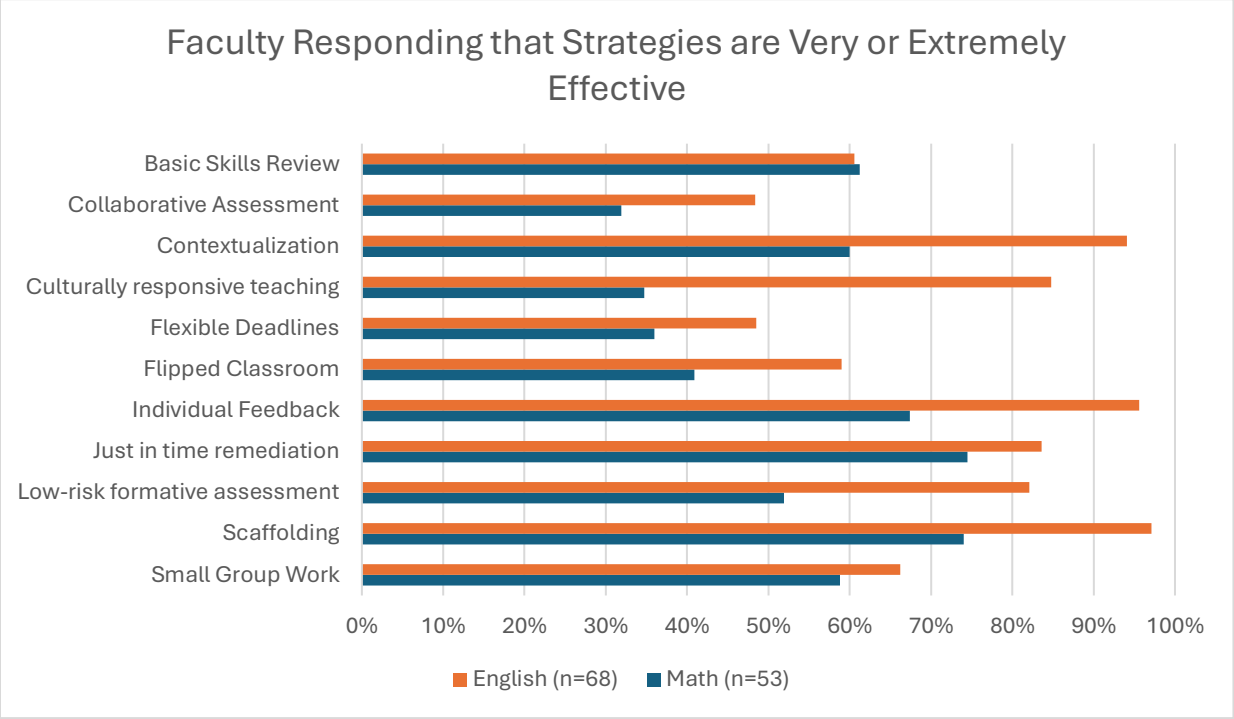
Pedagogy

Accompanying the shift away from DE, many institutions and faculty have also revisited their instructional approaches, aiming to create a more culturally responsive and affirming classroom and implementing practices such as flexible deadlines, cooperative learning and small group work, and formative feedback (Avni & Finn, 2019; Daugherty et al., 2021; Murphy et al., 2022; Zachry Rutschow et al., 2019). These strategies have been the focus of professional development across many California community colleges leading up to and since the passage of AB 705.

Faculty Perceptions of Instructional Supports

Both English and math faculty members were asked about their opinion of effectiveness of instructional supports, and which instructional support strategies they used most frequently in their classrooms. Figure 9 presents responses from English and math faculty about their perceptions of the effectiveness of instructional support strategies.

Figure 9: Faculty Perceptions of Effectiveness of Instructional Strategies



These responses indicate that **English faculty are more likely to report that instructional strategies are very or extremely effective**. The one notable exception is basic skills review, for which math faculty expressed more enthusiasm; this is perhaps not surprising, given the cumulative nature of mathematics and the need to revisit basic skills as students advance. Another significant finding is that **while 85% of English faculty report that culturally responsive teaching is very or extremely effective, only 35% of math faculty share this opinion.**

Differences between Departments

There are several significant differences between math and English faculty responses. Math faculty are significantly less likely than English faculty to believe that culturally responsive pedagogy [χ^2 (1, N=121) = 10.83, p<.001], low-risk formative assessment [χ^2 (1, N=121) = 10.83, p<.001], scaffolding [χ^2 (1, N=121) = 10.83, p<.001], contextualization [χ^2 (1, N=121) = 10.83, p<.001], and individual feedback [χ^2 (1, N=121) = 10.83, p<.001] are effective instructional strategies.

Faculty Utilization of Instructional Supports

We then asked faculty to indicate how frequently they utilize these instructional strategies. The heat map displayed in Figure 10 below depicts which instructional support strategies were used most frequently among respondents.

Figure 10. Instructional support strategy heat map

English Faculty (n=68)	**Math Faculty** (n=53)
Basic Skills Review	Basic Skills Review
Collaborative Assessment	Collaborative Assessment
Contextualization	Contextualization
Culturally Responsive Teaching	Culturally Responsive Teaching
Flexible Assignment Deadline	Flexible Assignment Deadline
Flipped Classroom	Flipped Classroom

Individual Feedback	Individual Feedback
Just-in-Time Remediation	Just-in-Time Remediation
Low Risk Formative Assessment	Low Risk Formative Assessment
Scaffolding	Scaffolding
Small Group Work	Small Group Work

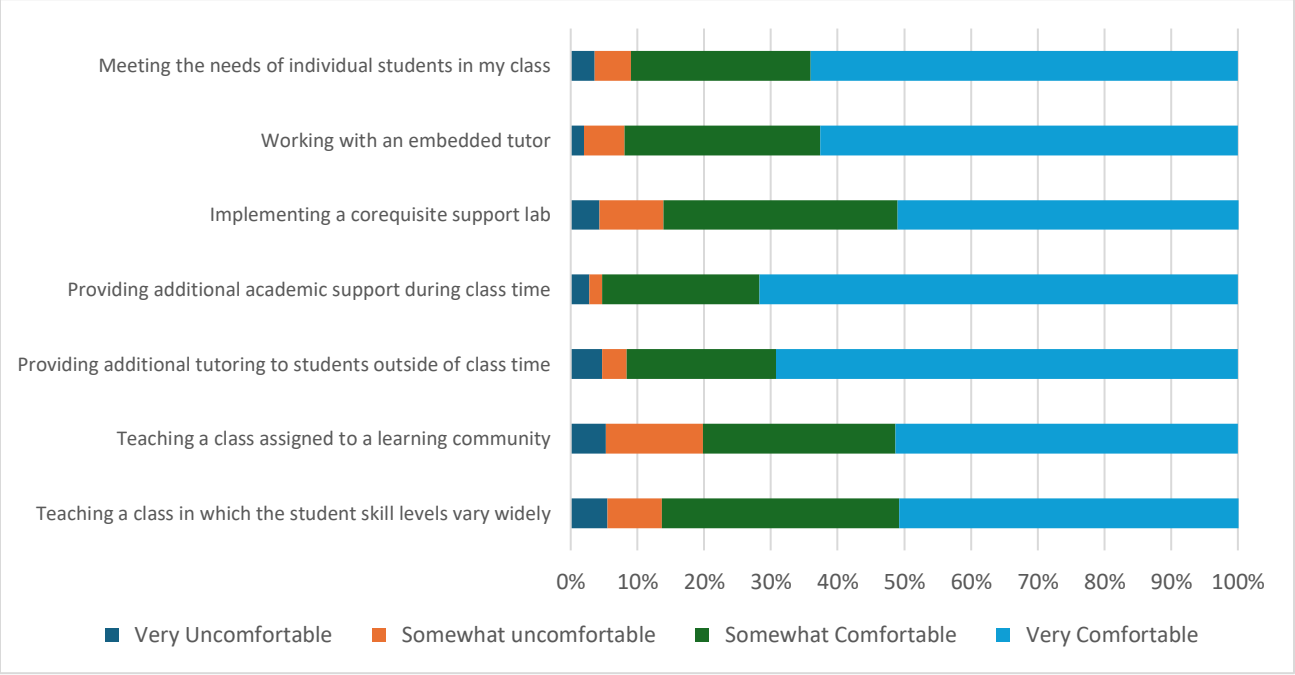
Key	
	> 75% of respondents reported that they used the instructional support strategy often
	50% - 74% of respondents reported that they used the instructional support strategy often
	25% - 49% of respondents reported that they used the instructional support strategy often
	≤ 24% of respondents reported that they used the instructional support strategy often

Again, **English faculty are more likely to report that they utilize instructional support strategies than math faculty**. More than 75% of English faculty respondents reported that they use four of the strategies more than 75 percent of the time, while none of the math faculty respondents reporting similarly. **The most commonly used strategies in both English and math are scaffolding and low risk formative assessment.** The vast majority (93%) of English faculty respondents reporting using scaffolding often, while 70% of math faculty respondents reported similarly; scaffolding was the most frequently strategy in both subject areas. Low risk formative assessment was the second most frequently used strategy in both subjects, with 79% of faculty reporting using it frequently in English and 63% in math.

Faculty Comfort Level in Implementing Common Instructional Supports

In exploring faculty comfort levels in implementing instructional strategies in introductory, transfer-level courses to help students succeed, **faculty most commonly reported being somewhat or very comfortable** across support strategies and cocurricular models, as shown in Figure 11. This was especially true related to providing additional academic support during class time and tutoring outside of class time.

Figure 11. Faculty comfort level in providing instructional support (n=126)



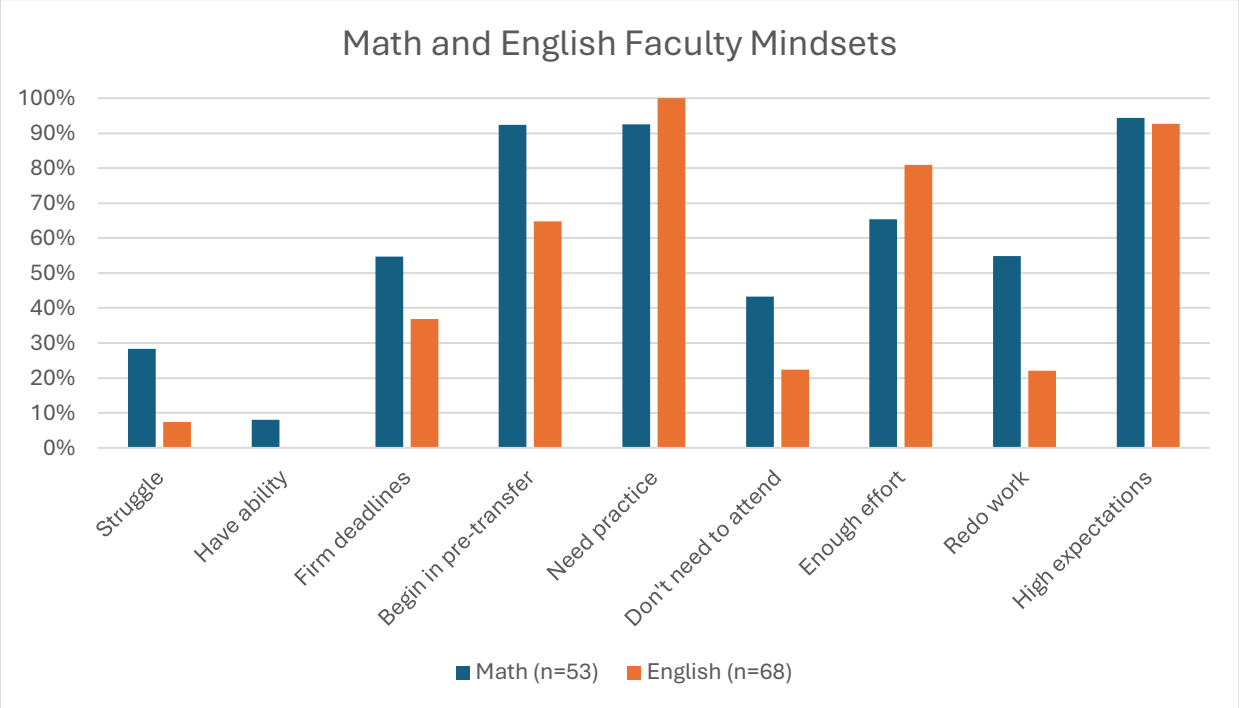
Faculty Mindsets

As institutions have shifted away from DE and worked to transform their classrooms into culturally responsive and affirming spaces, many colleges have also considered the role of faculty mindset in supporting students' success. There is a developing consensus regarding the importance of faculty espousing a growth mindset, or the belief that all students can be successful with appropriate support (Kroeper et al., 2022; Murphy et al., 2022, Muenks et al., 2020; Tibbetts et al., 2022). We developed a series of questions related to faculty mindset, drawing on the work of Kroeper and colleagues (2022) which identifies four dimensions of faculty mindset: explicit messages about progress and success; opportunities for practice and feedback; instructor's responses to poor performance; and the value instructors place on student learning and development. Translating these behaviors into opinion statements, we comprised the following list:

1. If a student struggles in my course, it's an indication that they shouldn't be there.
2. People either have academic/math ability or they don't.
3. Firm deadlines for course assignments are important to help students develop time management skills.
4. It would be better for some students to begin in pre-transfer level coursework.
5. Students need opportunities to practice skills and get feedback.
6. Some students don't need to attend class in order to be successful.
7. If they put in enough effort, any student can pass my class.
8. Giving students too many opportunities to redo their work reduces the rigor of my course.
9. I have high expectations of my students.

Figures 12 presents the responses from math and English faculty to these survey questions.

Figure 12. Proportion of Math and English faculty who "Agree" or "Strongly Agree" to Faculty Mindset survey questions



While there is a high level of agreement between math and English faculty, there are some notable differences. Overall, **English faculty appear more likely to respond in ways that indicate a**

growth mindset. For instance, while a small number of math faculty (8%) agreed with the statement that one either has ability or doesn't, a strong indication of a fixed mindset, no English faculty agreed that this statement. A greater proportion of math faculty (57%) than English faculty (37%) agreed with the statement that firm deadlines are important for helping students developing time management skills. **More math faculty (92%) than English faculty (65%) indicate that they believe some students should begin in pre-transfer level coursework.** More English faculty (81%) than math faculty (65%) report that all students can be successful if they put in enough effort, and more math faculty (55%) than English faculty (22%) disagree that giving students opportunities to redo assignments reduces the rigor of the course.

Differences between Departments

While the majority of math and English faculty agree that they have high standards for their students and that students need opportunities to practice skills and get feedback, there are significant differences between departments on all other questions. Math faculty are significantly more likely than English faculty to believe that a struggling student does not belong in their class [χ^2 (1, N=121) = 9.55, p<.01]; that people either have ability or they don't [χ^2 (1, N=121) = 5.33, p<.05], that firm deadlines are important for the development of time management skills [χ^2 (1, N=121) = 3.88, p<.05], that it would be better for some students to begin in pre-transfer level coursework [χ^2 (1, N=121) = 10.83, p<.001], that some students can be successful without attending class [χ^2 (1, N=121) = 6.04, p<.05], and that giving students too many opportunities to redo their work reduces rigor [χ^2 (1, N=121) = 10.83, p<.001]. Math faculty are significantly less likely to believe that students need opportunities to practice and get feedback [χ^2 (1, N=121) = 5.33, p<.05].

Conclusion

Our survey of math and English faculty at our 13 site visit institutions sheds new light on variation in implementation across the colleges. Our construct of **institutional capacity** had three components: implementation supports, staff capacity, and resources. With regard to implementation supports, we learned that faculty believe that they are lacking clear guidance from the Chancellor's Office and planning time to implement both reforms, and observed significant differences between low and high implementing colleges in the areas of professional development and ongoing support from department leadership. With regard to staff capacity, we learned that faculty perceive a lack of sufficient counselors or research staff, and "nowhere near enough" embedded tutors to support implementation. Faculty at low implementer colleges were significantly more likely than those at high implementer colleges to report that there were insufficient embedded tutors, supplemental instructor leaders, and research staff. Lastly, regarding resources, most faculty reported that there was "nowhere near enough" funding for faculty stipends to support reforms, and significant differences between low and high implementing colleges emerged concerning adequate funding for tutor salaries. In sum, it appears that implementation may be more challenging in low-implementing colleges due to these differences, which may help explain why they are struggling.

Our second survey construct was **faculty buy-in**. We asked faculty about their own opinions about AB 705 and 1705, and their perceptions of those of their department chairs and deans. AB 1705 is demonstrably less popular than AB 705, and math faculty were significantly less supportive than English faculty of both reforms. Math and English faculty both report higher levels of support among their department chairs and deans. Survey results indicate that while most faculty now believe that some or most students are well-served by being placed directly into transfer-level coursework, only about 10% of faculty believe this is true of all students. Faculty expressed concern about several subpopulations of students, including English Language Learners, students with

disabilities, and students returning to school after a long absence. When asked about various instructional supports, fewer than half of math faculty reported believing that any of these common supports are very or extremely effective, with the exception of tutoring and in-class support. While most faculty report having experience teaching corequisite-paired courses, fewer than half of faculty in both English and math report that they are very or extremely effective.

We also asked faculty about changes they have made in their **pedagogical practices**. English faculty were more likely than math faculty to report believing that listed instructional strategies were effective. Math faculty were significantly less likely to believe that culturally responsive teaching, scaffolding, contextualization, and individual feedback were effective for student success. Similarly, English faculty were more likely to report utilizing instructional support strategies. Faculty most commonly reported being somewhat or very comfortable delivering support strategies and cocurricular models.

Lastly, we surveyed faculty with regard to their **mindsets**. Overall, English faculty appear more likely to respond in ways that indicate a growth mindset. More math faculty than English faculty indicate that they believe some students should begin in pre-transfer level coursework. There were significant differences between math and English faculty on all mindset questions except one regarding holding students to high expectations.

Together, these survey findings help to nuance our understanding of implementation across site visit institutions, indicating that low-implementing colleges may be struggling due to lower institutional capacity, and that lagging implementation in math departments may be due to significantly different perceptions between math and English faculty regarding what students need and how to support them.

Impact Study

We examine changes in enrollment, credit accumulation, and completion trends in response to AB 705 using an interrupted time series (ITS) design. The ITS analysis aims to estimate the effect of the policy by comparing changes in student outcome trends for first-time-in-college (FTIC) student cohorts before and after its enactment. Moreover, our study includes an examination of how changes vary across student subgroups.

Interrupted Time Series Analysis

Utilizing student-level administrative data, our analytic sample comprises nine cohorts of FTIC entrants spanning from fall 2014 to fall 2022. We employ an ITS design to compare outcome trends between pre- and post-reform cohorts. Additionally, our analysis explores whether changes in response to the reform vary across different demographic groups, specifically examining variations by race/ethnicity and gender.

Research Questions

To investigate how AB 705 influences educational outcomes over time and its varying effects on student subgroups, we aim to answer the following research questions:

- What was the overall policy effect of AB 705 on first-time-in-college (FTIC) students' enrollment and completion of transfer-level math and English courses, as well as accumulation of transferable course credits within one and two years of college enrollment?
- Did the impact of the reform differ significantly across racial/ethnic backgrounds and by gender?

Data and Sample

We use data from the Chancellor's Office Management Information System (COMIS), which contains longitudinal data for the entire population of community college students in California. The current data include student enrollment records, demographics, credits, course grades, degree attainment, and financial aid data in all years from academic years 2014-15 to 2022-23. Using these data, we create an analytic sample that includes 9 cohorts of first-time-in-college (FTIC) students entering CA public community colleges in fall 2014 through fall 2022. This dataset allows us to observe student outcomes across several key periods: four years prior to the reform (fall 2014 through fall 2017 cohorts), the period encompassing the reform roll-out (fall 2018 cohort), and four years of follow-up (fall 2019 through fall 2022 cohorts). Sample students are restricted to those who were registered for at least one credit during their first fall semester, and students attending the three colleges on the quarter system are not included. Table 1 reports the number of FTIC students included in each cohort.

Table 1. Number of FTIC Students by Cohort

Number of FTIC Students by Cohort								
2014	2015	2016	2017	2018	2019	2020	2021	2022
103,403	98,957	89,729	91,058	88,806	96,263	78,608	88,949	102,092

The fall enrollment of FTIC students declined by 7% (7,140 students) from 2014 through 2019. The sharp 19% decrease (18,195 students) in enrollment from fall 2019 to fall 2020 aligns with research indicating the impact of COVID-19 on community college enrollment (Bulman & Fairlie, 2021). Although fall 2021 enrollment recovered from the previous year, it remained approximately 8% below the fall 2019 enrollment levels.

Key Analytic Measures

In the current study, we focus on student outcomes captured within the first two academic years of initial college enrollment, including enrollment in and completion of transfer-level math and English courses and accumulation of transferable course credits within one and two years. The initial academic year includes the fall term, winter intersession, spring term, and summer term.

We define the successful completion of transfer-level math and English courses as whether a student receives an A, B, C, or a passing grade such as P or CR, in at least one transfer-level math or English course in which they enrolled within their first academic year. Note that students could enroll in multiple math and/or English courses at both transfer- or below-transfer-level during their first academic year. Grades of D or D- are not included because a minimum grade of C is required to transfer a credit or to fulfill degree completion requirements.

Our independent variables of interest included student background characteristics for race/ethnicity (Black, Hispanic, Asian, White, and other), gender, and age. We had no missing data for these variables. In our models, we were also able to include Pell grant recipient status during the first year, household status, principal educational goal, and highest parental education. This group of independent variables had missing values. We included a missing value indicator for each of these variables in our ITS model. Table 2 presents summary statistics by cohort on first-year transfer-level math and English course enrollment and completion within one and two years, accumulation of transferable course credits within one or two years, and student background characteristic variables.

Table 2. Summary Statistics for First Year Transfer-Level Course Enrollment and Completion and Student Background Characteristics by Cohort

Variable	College entry year of FTIC students in fall cohort								
	2014	2015	2016	2017	2018	2019	2020	2021	2022
First-year course enrollment									
% took transfer-level math	15.3	14.6	15.5	18.1	23.5	37.2	35.6	34.7	36.0
% took transfer-level English	28.8	29.5	33.0	38.5	47.2	56.9	52.5	51.4	50.6
Two-year course enrollment									
% took transfer-level math	22.9	21.4	21.9	26.1	32.9	42.8	40.9	41.1	NA
% took transfer-level English	39.9	39.2	40.7	47.3	53.6	60.7	56.6	55.4	NA
First-year course completion									
% passed transfer-level math	10.5	10.2	10.7	11.9	14.9	20.2	20.8	20.1	19.4
% passed transfer-level English	22.0	22.4	24.8	28.6	34.1	37.6	34.3	33.1	32.4
Two-year course completion									
% passed transfer-level math	16.8	15.9	16.2	18.6	22.5	25.9	25.5	26.0	NA
% passed transfer-level English	31.6	30.9	31.8	36.5	39.9	41.7	38.4	37.6	NA
First-year transferable course credits earned	10.0	8.2	8.4	8.7	10.7	10.4	12.1	9.8	10.4
Two-year transferable course credits earned	18.3	16.2	16.0	17.3	19.9	19.5	20.8	18.7	NA
Demographic Background									
% Black	7.3	6.5	6.3	6.0	5.4	5.6	5.2	4.8	5.6
% Hispanic	48.0	50.4	52.1	52.7	52.5	52.5	51.7	49.8	54.2
% Asian	10.4	9.8	9.3	8.7	9.9	9.7	10.4	10.3	9.4
% White	25.6	25.3	24.0	23.8	23.7	20.2	23.4	25.4	22.0
% Other race/ethnicity	8.7	8.0	8.3	8.7	8.5	12.0	9.3	9.7	8.7
% Female	46.3	46.1	45.6	45.0	45.3	46.1	48.6	46.5	46.3
Average age	21.3	21.5	21.6	21.1	20.9	20.9	20.3	21.5	20.7
Pell grant status									
% received Pell in 1st year	41.1	37.6	36.6	37.7	35.4	39.8	34.7	36.2	36.0
Household status									
% independent	20.4	20.3	19.4	16.1	14.6	14.3	12.5	14.8	13.3
% dependent	44.6	40.8	41.9	45.5	48.2	51.8	53.2	52.1	52.5
% missing	35.0	38.8	38.7	38.5	37.1	33.9	34.3	33.1	34.2
Educational goal									
% transfer to 4-year university	58.2	57.1	57.2	57.9	58.1	57.3	61.3	58.3	58.2
% associate degree	6.3	6.9	6.4	6.2	6.8	7.1	6.5	8.6	8.2
% certificate	1.0	1.0	1.2	1.0	0.9	0.8	0.7	0.7	0.9
% other	26.5	27.2	27.2	25.3	25.3	24.7	22.0	23.0	27.1
% missing	8.0	7.8	8.0	9.6	8.9	10.1	9.6	9.4	5.6
Highest parental education									

% below HS degree	10.2	12.1	12.9	13.2	14.3	15.4	13.4	13.0	13.0
% HS degree	11.3	13.0	14.8	16.4	17.1	18.5	16.7	16.6	17.3
% some college, no degree	8.8	10.1	11.3	13.0	13.4	13.4	12.5	11.4	11.3
% associate degree	4.3	5.0	5.6	6.5	7.1	7.2	7.1	6.6	6.6
% bachelor's degree	8.1	8.8	10.1	11.3	13.1	14.2	15.1	13.7	13.5
% advanced degree	3.7	4.6	5.2	5.5	6.9	7.5	8.6	7.5	8.1
% missing	53.6	46.5	40.1	34.0	28.1	23.8	26.6	31.1	30.1

Analytic Strategy

The ITS design is well-suited for assessing "natural experiments" that affect entire populations (Baicker & Svoronos, 2019; Kontopantelis et al., 2015; Bloom, 2003). Our ITS model compares enrollment and completion rates of transfer-level math and English courses after the reform with the pre-AB 705 trend.

It's notable that although AB 705 technically took effect in fall 2019, many California community colleges began reducing remedial courses as early as 2018. By then, over 90% and 84% of colleges had decreased English and math remedial sections, respectively, while increasing offerings of transfer-level courses (RP Group, 2019a). To account for this early implementation, we categorize the fall 2018 cohort as a roll-out year cohort rather than including it as part of the pre-AB 705 cohorts.

We evaluate changes in trends for enrollment and completion of transfer-level math and English courses and accumulation of transferable course credits within the first academic year for student ***i*** at college ***j*** in year (cohort) ***t*** using the following linear probability model:

$$Y_{ijt} = \beta_0 + \beta_1 Time_t + \beta_2 P_{18-19} + \beta_3 P_{19-20} + \beta_4 P_{20-21} + \beta_5 P_{21-22} + \beta_6 P_{22-23} + \beta_7 X_{ijt} + C_j + \varepsilon_{ijt}$$

where:

Y_{ijt} =	first-year outcome for a FTIC student ***i***, enrolled in college ***j***, in the fall of academic year ***t***,
$Time_t$ =	a continuous variable which indicates the time (cohort),
P_{18-19} =	1 for student ***i*** in the fall 2018 (AB 705 roll-out year) cohort, 0 otherwise
P_{19-20} =	the fall 2019 cohort indicator
P_{20-21} =	the fall 2020 cohort indicator
P_{21-22} =	the fall 2021 cohort indicator
P_{22-23} =	the fall 2022 cohort indicator
X_{ijt} =	a vector of student background variables for a first-time college student ***i***, enrolled in college ***j***, in the fall of academic year ***t***
C_j =	college fixed effects
ε_{ijt} =	random errors

In this model, β_0 and β_1 represent the intercept and slope of pre-policy trend line (baseline trend), and β_2, β_3, β_4, β_5, and β_6 capture deviations from the baseline trend, estimating the overall policy effect of the DE reform on the outcomes of roll-out cohort and four follow-up cohorts, respectively. β_7 captures the effects of a vector of student background variables. Note that P_{22-23} is dropped when estimating effects on two-year outcomes because two-year outcome data are not yet available for the fall 2022 cohort.

The strength of the ITS analysis hinges on its capacity to establish stable, linear pre-reform trends (Kontopantelis et al., 2015), crucial for constructing a valid counterfactual against which to compare post-reform outcomes. The stable and consistent pre-reform trends observed in transfer-level math and English enrollment and completion rates as well as accumulation of transferable course credits (refer to Figures 13 through 15 in the next section) indicate that our data likely fulfill this condition.

However, the ITS approach also presents potential weaknesses related to "selection bias" and "history" effects (Bloom, 2003). Firstly, if there were significant changes in the composition of students across pre- and post-AB 705 cohorts, and these changes influenced student outcomes, this variation could bias our estimates, complicating the interpretation of observed deviations from baseline trends. To mitigate this, we incorporate student background variables as covariates in our ITS model. These covariates account for differences in student demographics, socioeconomic characteristics, and educational goals across FTIC cohorts attending California community colleges.

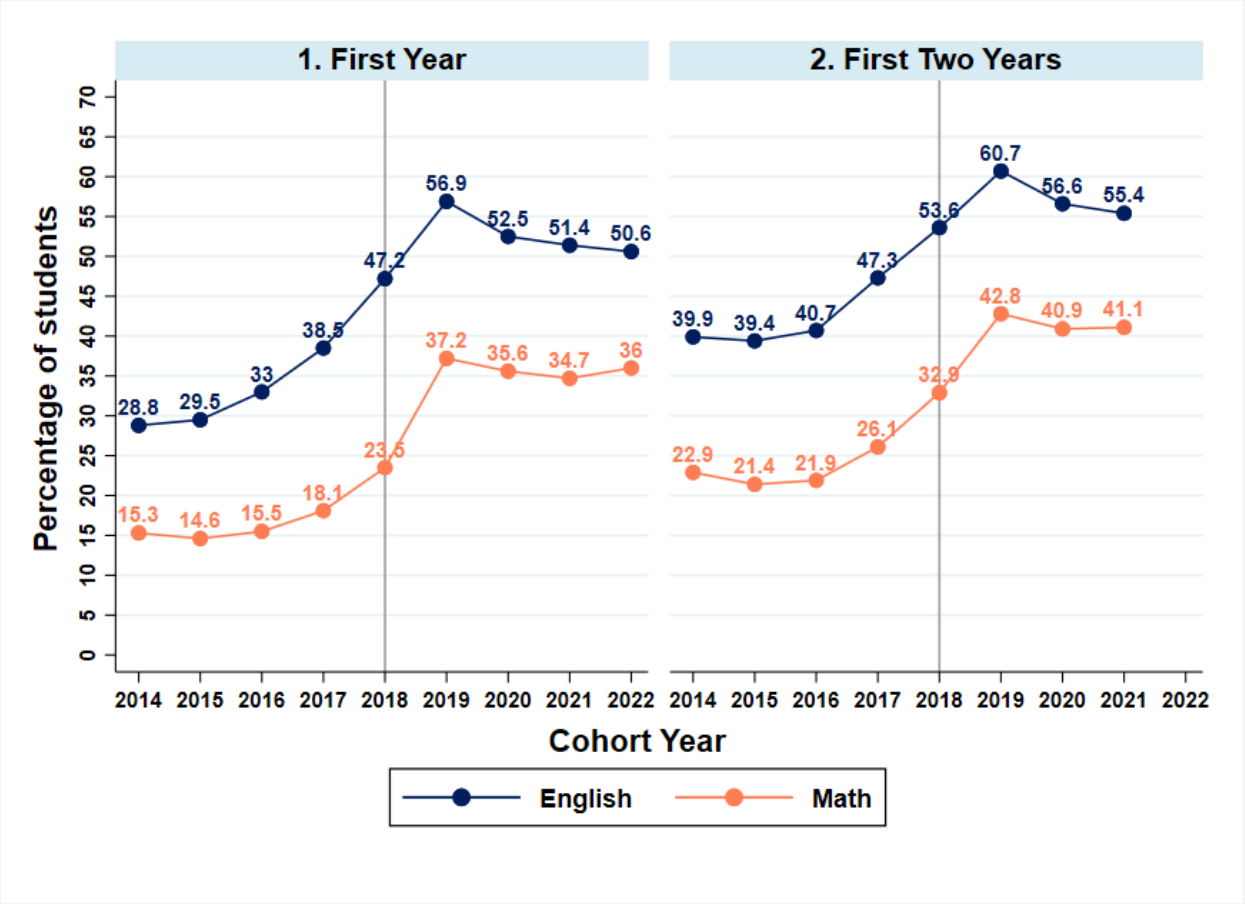
Secondly, external factors such as the COVID-19 pandemic or other concurrent policy changes may introduce "history" effects, offering alternative explanations for observed reform impacts. Recent studies have indicated that the shift to remote instruction and disruptions in health and work status during 2020 and 2021 negatively impacted community college enrollment and outcomes (Fairlie & Bulman, 2022; NCES, 2021; NSC, 2021). Our data also reflect a leveling out of the upward trend in transfer-level course enrollment and completion rates and transferable course credits earned among the 2020, 2021, and 2022 cohorts. To address potential the confound of COVID-19, our ITS model separately estimates the AB 705 policy effect on each post-policy cohort (fall 2018, 2020, 2021 cohorts).

Lastly, studies evaluating the effects of developmental education reforms often include high school achievement measures as covariates to control for differences in college readiness at baseline (Cullinan & Biedzio, 2021; Park-Gaghan et al., 2020; Barnett et al., 2020; Mokher et al., 2020; Jaggars & Bickerstaff, 2018; Hu et al., 2019). At this time, we do not include high school achievement data in our ITS model, and thus our results may be biased if there are substantial variations in FTIC students' average high school achievement across pre- and post-reform cohorts. We are actively working to obtain high school math and English achievement data from the California Department of Education, which we will incorporate into an updated ITS model.

Results

We start by presenting findings from descriptive trend analyses that illustrate FTIC students' enrollment and completion rates in transfer-level math and English courses, along with transferable credits earned within one and two years, for pre-AB 705 cohorts (2014-2017), the rollout-year cohort (2018), and post-AB 705 cohorts (2019-2022). Figure 13 shows the percentages of FTIC students in each fall cohort from 2014 through 2022 who enrolled in transfer-level math and English courses within their first academic year and within the first two academic years.

Figure 13. Percentage of FTIC Students Who Enrolled in Transfer-Level Math and English Courses within their First Year and First Two Years by Cohort

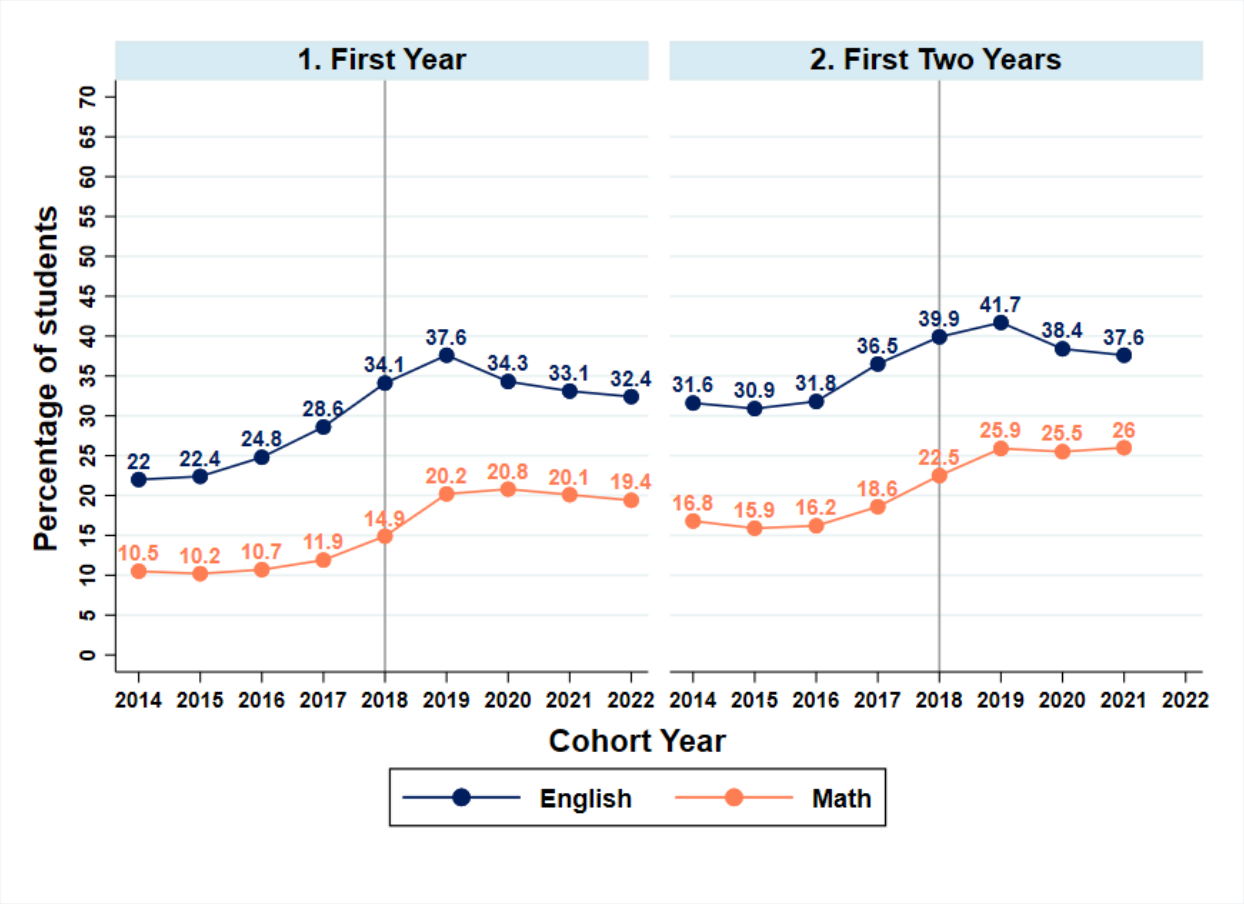


The percentage of FTIC students who enrolled in transfer-level math courses during their first academic year remained at or below 18.1% in pre-AB 705 cohorts (2014 – 2017), but it rose to 23.5% in the rollout-year cohort (2018) and peaked at 37.2% in the 2019 cohort. The percentage decreased slightly to 35.6% and 34.7% in the 2020 and 2021 cohorts, respectively. While the percentage bounced back slightly to 36.0% in the 2022 cohort, it remained below the level observed in the 2019 cohort. The percentage of students enrolled in transfer-level English courses within their first academic year showed a comparable trend to math. There was an 8.7 percentage point increase in the 2018 cohort compared to its previous cohort, reaching a peak of 56.9% (a 9.7 percentage point increase from the 2018 cohort) in the 2019 cohort. However, the enrollment rate for transfer-level English courses slightly decreased in the 2020, 2021, and 2022 cohorts.

The percentage of FTIC students who enrolled in transfer-level math courses during their first two academic years shows a similar trend to that of the first-year math enrollment, starting to rise in the 2018 cohort, peaking in the 2019 cohort, and declining in the 2020 and 2021 cohorts after reaching a peak. The two-year transfer-level English course enrollment rate began increasing in the 2017 cohort (the last pre-AB 705 cohort) by a 6.6 percentage point from the previous cohort and continued to rise in subsequent cohorts, peaking at 60.7% in the 2019 cohort before declining in the 2020 and 2021 cohorts.

Figure 14 presents the percentages of first-time college students in each fall cohort from 2014 through 2022 who passed transfer-level math and English courses within their first academic year and first two academic years.

Figure 14. Percentage of FTIC Students Who Passed Transfer-Level Math and English Courses within their First Year and First Two Years by Cohort



The percentage of FTIC students who passed transfer-level math courses within their first academic year ranged from 10.5% to 11.9% in pre-AB 705 cohorts and increased by 3 percentage points to 14.0% in the 2018 cohort. The pass rate continued to rise in the 2019 and 2020 cohorts but slightly declined in the 2021 and 2022 cohorts. Similarly, the first-year pass rate for transfer-level English courses showed a significant increase in the 2018 cohort, with a 5.5 percentage point increase compared to the previous cohort. The pass rate continued to increase in the 2019 cohort but slightly decreased in the 2020, 2021, and 2022 cohorts. The two-year passing rates for transfer-level math and English courses exhibited similar trends to those of the one-year passing rates, peaking in the 2019 cohort and declining in the 2020 and 2021 cohorts.

Figure 15. Accumulation of Transferable Course Credits within their First Year and First Two Years by Cohort

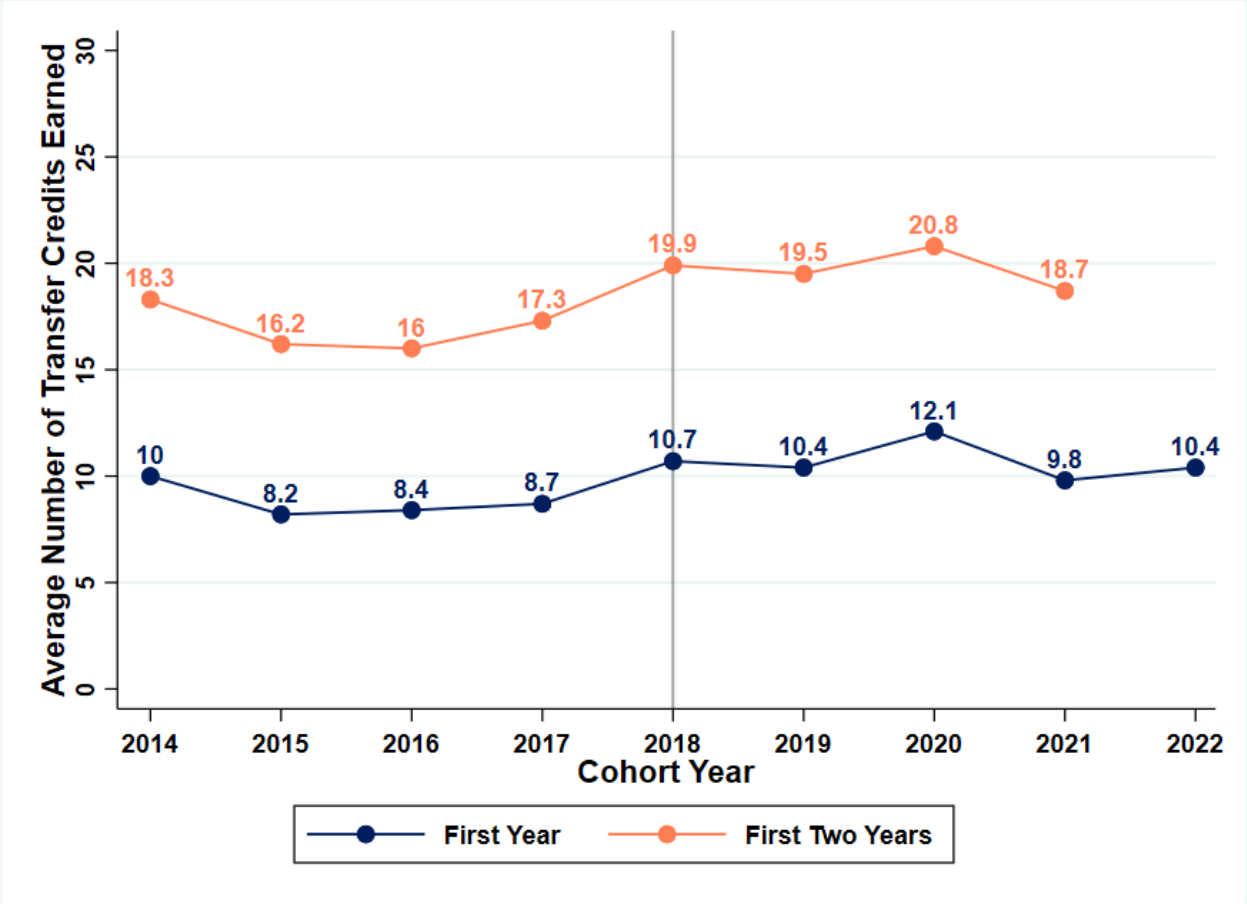


Figure 15 illustrates the number of transferable course credits earned by FTIC students within their first and first two academic years, broken down by cohort from 2014 through 2022 (2021 for the two-year credit accumulation). Both the one-year and two-year credit accumulation measures show a slight decline or flat trend in the pre-AB 705 cohorts (the 2014 - 2017 cohorts). However, there were notable increases in both measures observed in the 2018 through 2020 cohorts compared to the pre-AB 705 cohorts. Subsequently, these measures showed slight declines in the later cohorts (2021 and 2022).

Changes in Response to AB 705 in Transfer-Level Math and English Enrollment and Completion

We present the regression-adjusted results from the ITS analysis of transfer-level math and English course enrollment and completion rates in Table 3. Table 4 displays the ITS analysis results for the two-year enrollment and completion rates. Overall, these ITS analysis results align closely with the findings from the descriptive trend analyses.

Table 3. Interrupted Time Series Analysis Results of the Development Education Reform on the Enrollment and Completion of Transfer-Level Math and English Courses during the First Academic Year

Academic Year	Transfer-level course enrollment		Transfer-level course completion	
	Math	English	Math	English
Time	0.0114***	0.0298***	0.0068***	0.0209***
	(0.0006)	(0.0006)	(0.0005)	(0.0006)
Fall 2018 cohort (roll-out year)	0.0349***	0.0547***	0.0122***	0.0262***
	(0.0021)	(0.0023)	(0.0018)	(0.0022)
Fall 2019 cohort (follow-up year 1)	0.1530***	0.1010***	0.0548***	0.0246***
	(0.0025)	(0.0027)	(0.0021)	(0.0026)
Fall 2020 cohort (follow-up year 2)	0.1150***	0.0218***	0.0459***	-0.0368***
	(0.0030)	(0.0033)	(0.0026)	(0.0032)
Fall 2021 cohort (follow-up year 3)	0.1000***	-0.0074	0.0342***	-0.0592***
	(0.0035)	(0.0038)	(0.0030)	(0.0037)
Fall 2022 cohort (follow-up year 4)	0.1120***	-0.0354***	0.0308***	-0.0770***
	(0.0040)	(0.0044)	(0.0034)	(0.0043)
R-squared	0.195	0.252	0.127	0.166
N cohorts	9	9	9	9
N colleges	106	106	106	106
N students	837,865	837,865	837,865	837,865

Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Table 4. Interrupted Time Series Analysis Results of the Development Education Reform on the Enrollment and Completion of Transfer-Level Math and English Courses during the First Two Academic Years

Academic Year	Transfer-level course enrollment		Transfer-level course completion	
	Math	English	Math	English
Time	0.0114***	0.0203***	0.0069***	0.0133***
	(0.0006)	(0.0006)	(0.0005)	(0.0006)
Fall 2018 cohort (roll-out year)	0.0540***	0.0473***	0.0238***	0.0170***
	(0.0022)	(0.0022)	(0.0020)	(0.0023)
Fall 2019 cohort (follow-up year 1)	0.1320***	0.0735***	0.0448***	0.0035
	(0.0026)	(0.0027)	(0.0024)	(0.0027)
Fall 2020 cohort (follow-up year 2)	0.0900***	0.0062	0.0245***	-0.0506***
	(0.0032)	(0.0033)	(0.0029)	(0.0033)
Fall 2021 cohort (follow-up year 3)	0.0881***	-0.0124**	0.0267***	-0.0604***
	(0.0037)	(0.0038)	(0.0033)	(0.0039)
R-squared	0.216	0.282	0.153	0.195
N cohorts	8	8	8	8
N colleges	106	106	106	106
N students	735,714	735,714	735,714	735,714

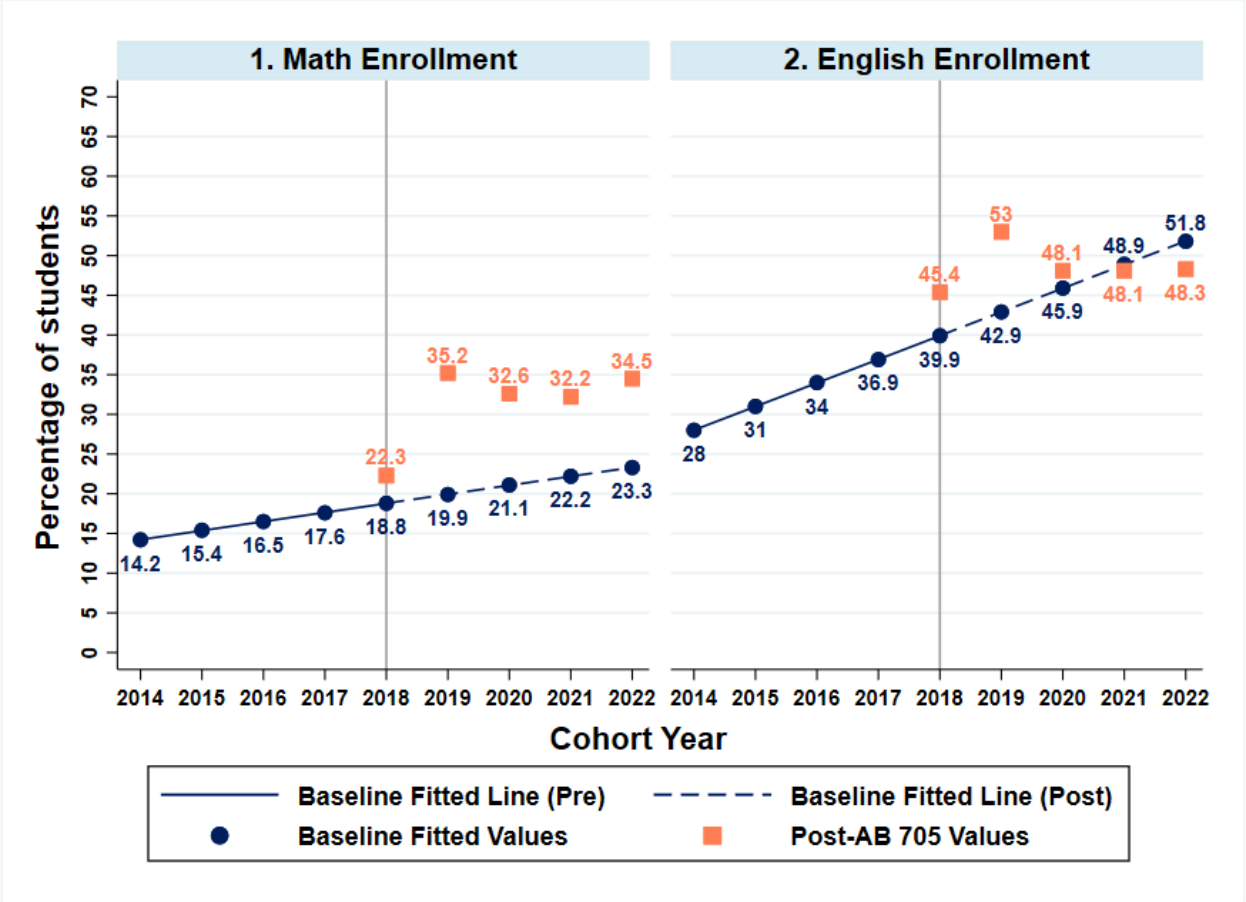
Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05

In Tables 3 and 4, the positive and statistically significant coefficients on the baseline trend variable (Time) indicate that both one-year and two-year enrollment and completion rates of transfer-level math and English courses were experiencing small but steady improvements over time before the DE reform began. Specifically, the average pre-reform rate of increase was approximately three times greater in English than in math for the one-year enrollment and completion rates, and about two times greater in English than in math for the two-year enrollment and completion rates.

Change in transfer-level course enrollment within the first academic year

Figure 16 illustrates the ITS analysis results for the transfer-level math and English enrollment rates within the first academic year. Compared with the baseline trend, the rate of FTIC students enrolled in transfer-level math courses within their first academic year increased by 3.5 percentage points in the 2018 cohort. The math enrollment rate continued to improve significantly in the 2019 cohort, rising by 15.3 percentage points above the projected baseline level. Although the change was slightly smaller in the 2020, 2021, and 2022 cohorts, it remained at 10.0 to 11.5 percentage points above the baseline trend. Similarly, the one-year English course enrollment rate significantly increased by 5.5 percentage points in the 2018 cohort and further increased by 10.1 percentage points in the 2019 cohort compared to the projected baseline trend. While the English course enrollment rate in the 2020 cohort remained above the baseline trend, the deviation decreased to 2.2 percentage points. However, the one-year English course enrollment rate in the 2022 cohort was 3.5 percentage points below the baseline.

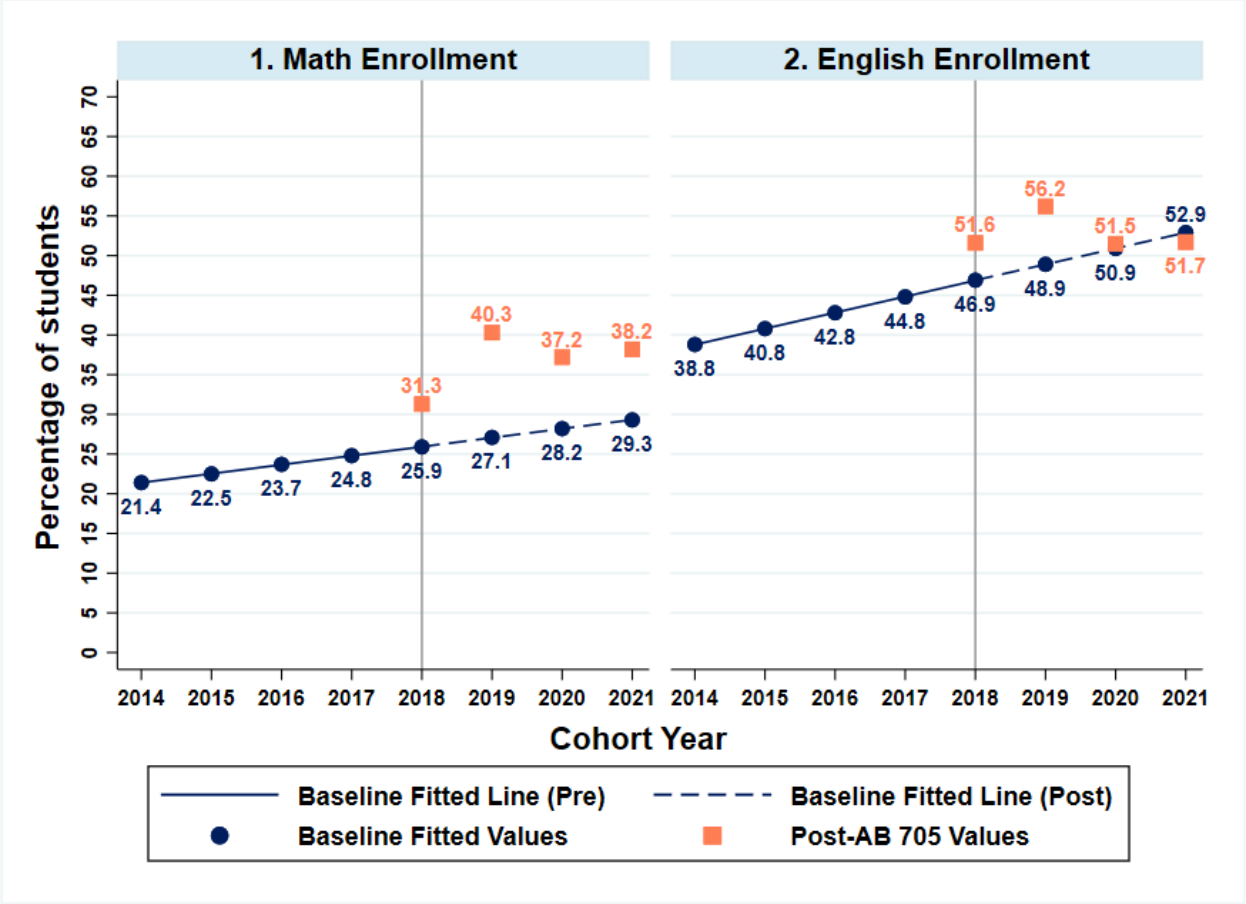
Figure 16. Change in Transfer-Level Course Enrollment within the First Academic Year



Change in transfer-level course enrollment within the first two academic years

As illustrated in Figure 17 below, the ITS analysis of the rate of FTIC students enrolled in transfer-level math courses within their first two academic years shows results similar to those of the first-year enrollment presented in Figure 14 above. The two-year enrollment rate for transfer-level math courses saw significant increases in both the roll-out cohort (2018) and the subsequent cohorts from 2019 to 2021. Compared to the projected trend line, the two-year math enrollment rate increased by 5.4 percentage points in the 2018 cohort and by 13.2 percentage points in the 2019 cohort. Although the increase in the two-year math enrollment rate declined in the 2020 and 2021 cohorts, it remained approximately 9 percentage points above the projected baseline. While the roll-out and follow-up cohorts maintained positive trends in two-year enrollment for math courses, English course two-year enrollment rates exhibited more variability. Specifically, the two-year English enrollment rate increased by 1.2 and 5.5 percentage points above the projected trend line in the 2018 and 2019 cohorts, respectively. However, there was no statistical difference in the 2020 cohort, and it fell 1.2 percentage points below the projected trend line in the 2021 cohort.

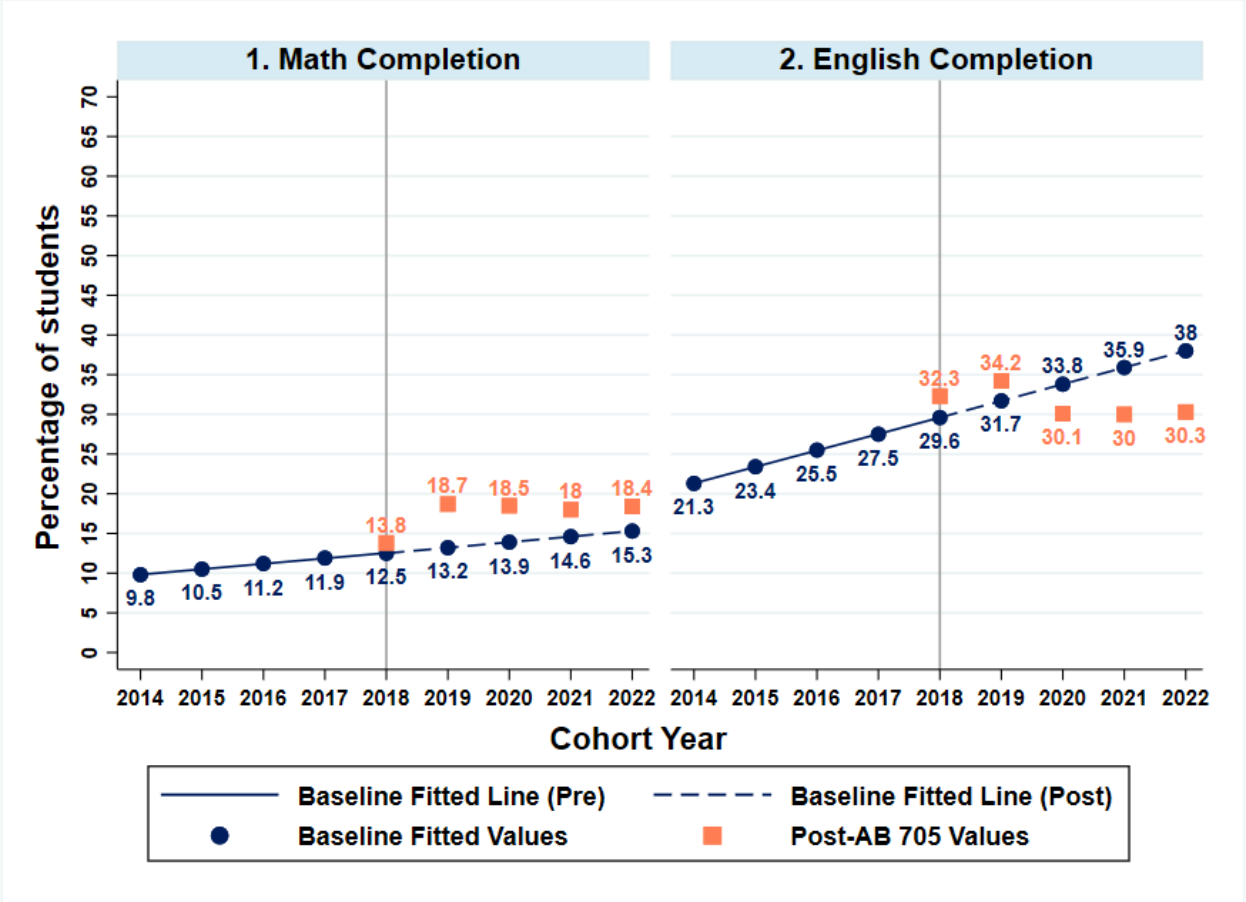
Figure 17. Change in Transfer-Level Course Enrollment within the First Two Academic Years



Change in transfer-level course completion within the first academic year

As shown in Table 4, our analysis revealed positive and significant effects of the DE reform on transfer-level math completion rates across all fall FTIC cohorts from 2018 through 2022. While the changes were smaller compared to those in math enrollment rates, the math completion rate increased by 1.2 percentage points in the 2018 cohort, 5.5 percentage points in the 2019 cohort, 4.6 percentage points in the 2020 cohort, 3.4 percentage points in the 2021 cohort, and 3.1 percentage points in the 2022 cohort. However, the results for transfer-level English completion rates were mixed. While the completion rate for transfer-level English increased by 2.6 and 2.5 percentage points relative to the baseline trend in the 2018 and 2019 cohorts, respectively, we observed negative effects in the 2020, 2021, and 2022 cohorts ranging from 3.7 to 7.7 percentage points below the baseline trend. Figure 18 presents the ITS analysis results on the first-year transfer-level math and English completion rates.

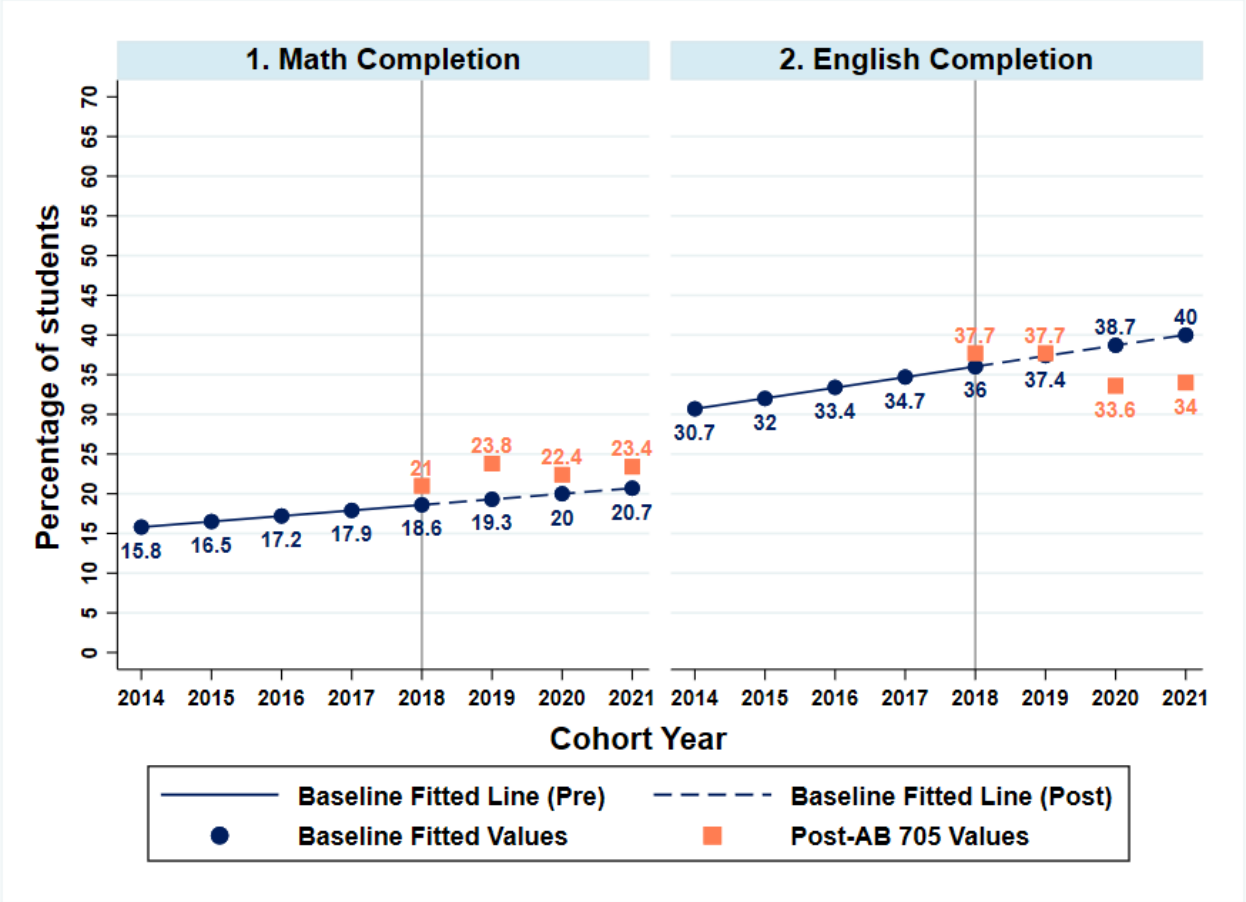
Figure 18. Change in Transfer-Level Course Completion within the First Academic Year



Change in transfer-level course completion within the first two academic years

ITS analysis results for the two-year transfer-level math course completion rate are also consistent with those of the one-year math completion rate. The two-year completion rate for transfer-level math courses consistently exceeded the projected trend line by 2.4 to 4.5 percentage points across all cohorts from 2018 to 2021. However, for the two-year English completion rate, the ITS analysis revealed a statistically significant positive change only in the 2018 cohort, with completion rates 1.7 percentage points above the projected baseline trend. In contrast, there was no statistical difference in the 2019 cohort, and completion rates fell significantly below the projected trend line in subsequent years, decreasing by 5.1 percentage points in the 2020 cohort and 6.0 percentage points in the 2021 cohort. Figure 19 illustrates the ITS analysis results for the transfer-level math and English completion rates within the first two academic years.

Figure 19. Change in Transfer-Level Course Completion within the First two Academic Years



Changes in Response to AB 705 in Accumulation of Transferable Course Credits

We present the regression-adjusted results from the ITS analysis of FTIC students' transferable course credit accumulation during their first and first two academic years.

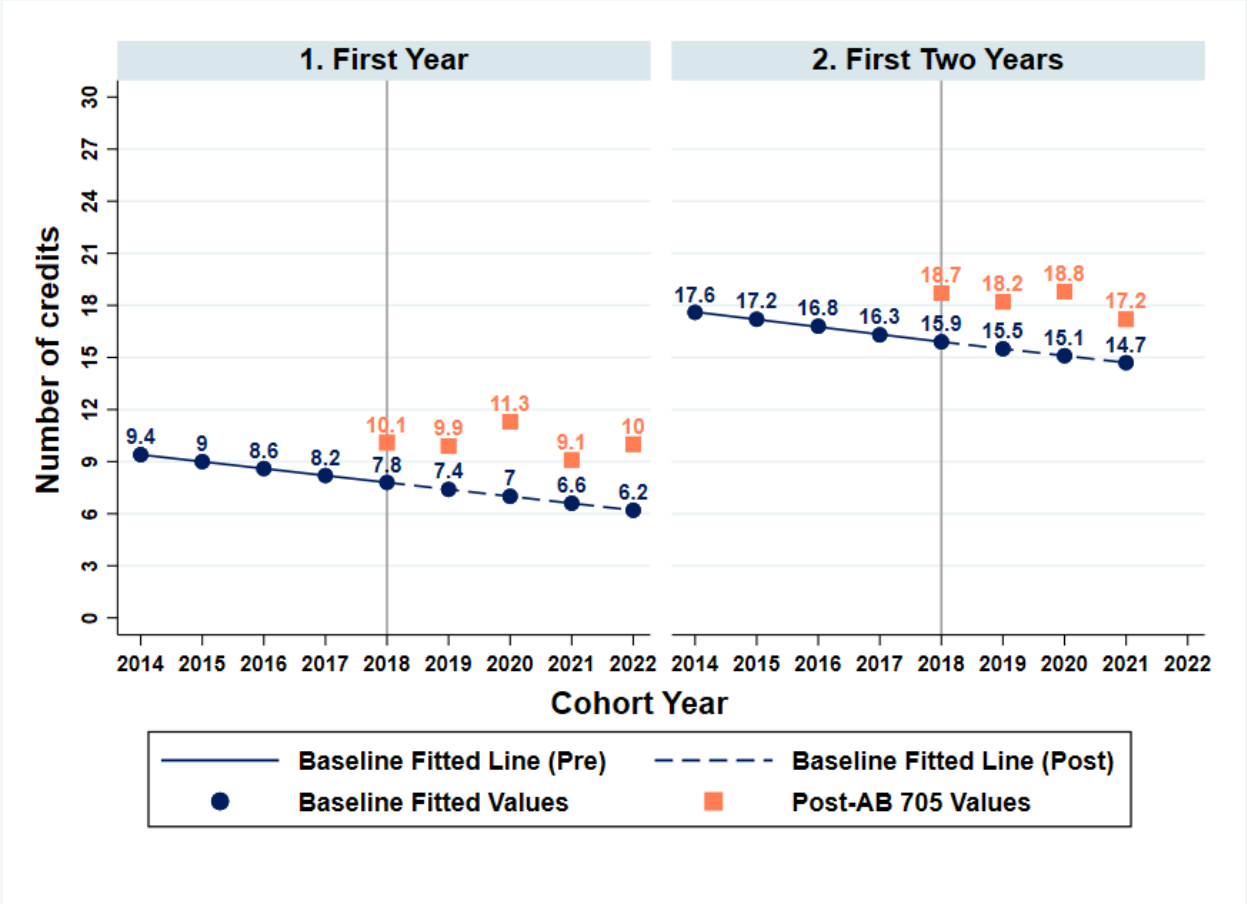
Table 5. Interrupted Time Series Analysis Results of the Development Education Reform on the Accumulation of Transferable Course Credits during the First and First Two Academic Years

Academic Year	First Year	First Two Years
Time	-0.406***	-0.4004***
	(0.0137)	(0.0246)
Fall 2018 cohort (roll-out year)	2.312***	2.6127***
	(0.0493)	(0.1436)
Fall 2019 cohort (follow-up year 1)	2.518***	2.9091***
	(0.0591)	(0.1595)
Fall 2020 cohort (follow-up year 2)	4.261***	3.6721***
	(0.0722)	(0.1768)
Fall 2021 cohort (follow-up year 3)	2.517***	1.1054***
	(0.0835)	(0.1864)
Fall 2022 cohort (follow-up year 4)	3.792***	N/A
	(0.0954)	N/A
R-squared	0.156	0.186
N cohorts	9	8
N colleges	106	106
N students	837,865	735,714

Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05

The negative coefficient on the Time variable indicates a declining trend in both one-year and two-year transferable course credit accumulation rates among pre-AB 705 FTIC cohorts from 2014 to 2017. However, these trends were reversed in the roll-out and follow-up cohorts. In these cohorts, one-year transferable credit accumulation rates were consistently 2.3 to 4.3 credits higher compared to their projected trend line. Similarly, two-year credit accumulation rates showed an increase of 1.1 to 3.7 credits above their projected trend line.

Figure 20. Change in the Accumulation of Transferable Course Credits within the First and First Two Years



Differential Changes by Race/Ethnicity

In this section, we assess whether enrollment, completion, and credit accumulation changes varied across students' race/ethnicity. We explored this by incorporating interaction terms between race/ethnicity indicators (i.e., Black, Hispanic, Asian, and other) and each post-reform cohort indicator, with White students as the reference group. Table 6 below presents the change in transfer-level math and English course enrollment rates, transfer-level math and English course completion rates, and transferable course credit accumulation within the first academic year. The subgroup analysis results on the two-year enrollment and completion rates and transferrable course credits earned are not presented as they align consistently with the one-year results (see Appendix B1 for subgroup analysis results on two-year outcomes by race/ethnicity).

Table 6. Change in the Enrollment and Completion of Transfer-Level Math and English Courses during the First Academic Year, by Race/Ethnicity Group

Academic Year	Enrollment		Completion		Credit Accumulation
	Math	English	Math	English	
White vs. Black					

Fall 2018 cohort	-0.0120	0.0490***	-0.0149*	0.0129	-0.3413*
	(0.0068)	(0.0075)	(0.0059)	(0.0073)	(0.1639)
Fall 2019 cohort	-0.0013	0.0935***	-0.0382***	0.0102	-0.7029***
	(0.0066)	(0.0073)	(0.0057)	(0.0071)	(0.1592)
Fall 2020 cohort	0.0189**	0.1251***	-0.0378***	0.0261***	-0.5670**
	(0.0073)	(0.0080)	(0.0063)	(0.0078)	(0.1749)
Fall 2021 cohort	0.0462***	0.1450***	-0.0096	0.0418***	0.7545***
	(0.0071)	(0.0078)	(0.0061)	(0.0076)	(0.1699)
Fall 2022 cohort	0.0187**	0.1137***	-0.0208***	0.0294***	0.2197
	(0.0064)	(0.0070)	(0.0055)	(0.0069)	(0.1540)
White vs. Hispanic					
Fall 2018 cohort	0.0051	0.0661***	-0.0065*	0.0275***	0.1414
	(0.0036)	(0.0039)	(0.0031)	(0.0039)	(0.0863)
Fall 2019 cohort	0.0540***	0.1215***	-0.0073*	0.0385***	0.1856*
	(0.0037)	(0.0040)	(0.0031)	(0.0039)	(0.0875)
Fall 2020 cohort	0.0722***	0.1408***	0.0062	0.0545***	0.3440***
	(0.0038)	(0.0042)	(0.0033)	(0.0041)	(0.0913)
Fall 2021 cohort	0.0843***	0.1472***	0.0220***	0.0586***	1.2771***
	(0.0036)	(0.0039)	(0.0031)	(0.0038)	(0.0855)
Fall 2022 cohort	0.0617***	0.1155***	-0.0021	0.0293***	0.4418***
	(0.0035)	(0.0038)	(0.0030)	(0.0037)	(0.0831)
White vs. Asian					
Fall 2018 cohort	0.0082	0.0755***	0.0108*	0.0649***	0.7154***
	(0.0055)	(0.0060)	(0.0048)	(0.0059)	(0.1322)
Fall 2019 cohort	-0.0191***	0.0603***	-0.005	0.0461***	-0.143
	(0.0055)	(0.0060)	(0.0047)	(0.0059)	(0.1312)
Fall 2020 cohort	-0.0036	0.0637***	0.0230***	0.0514***	0.7271***
	(0.0057)	(0.0063)	(0.0049)	(0.0061)	(0.1373)
Fall 2021 cohort	0.0251***	0.0895***	0.0354***	0.0704***	0.5394***
	(0.0054)	(0.0059)	(0.0047)	(0.0058)	(0.1298)
Fall 2022 cohort	-0.0059	0.0760***	-0.0061	0.0502***	0.5086***
	(0.0053)	(0.0058)	(0.0046)	(0.0057)	(0.1279)
White vs. Other					

Fall 2018 cohort	-0.0131*	0.0286***	-0.0118*	0.0127*	0.0416
	(0.0058)	(0.0064)	(0.0050)	(0.0062)	(0.1394)
Fall 2019 cohort	-0.0211***	0.0386***	-0.0251***	0.0121*	-0.4969***
	(0.0052)	(0.0057)	(0.0045)	(0.0056)	(0.1254)
Fall 2020 cohort	0.0300***	0.0846***	0.0093	0.0385***	0.0004
	(0.0060)	(0.0065)	(0.0052)	(0.0064)	(0.1434)
Fall 2021 cohort	0.0295***	0.0687***	0.0064	0.0385***	0.0776
	(0.0056)	(0.0061)	(0.0048)	(0.0060)	(0.1335)
Fall 2022 cohort	0.0051	0.0638***	-0.0089	0.0356***	-0.2720*
	(0.0055)	(0.0060)	(0.0047)	(0.0059)	(0.1318)
R-squared	0.197	0.255	0.128	0.167	0.156
N cohorts	9	9	9	9	9
N colleges	106	106	106	106	106
N students	837,865	837,865	837,865	837,865	837,865

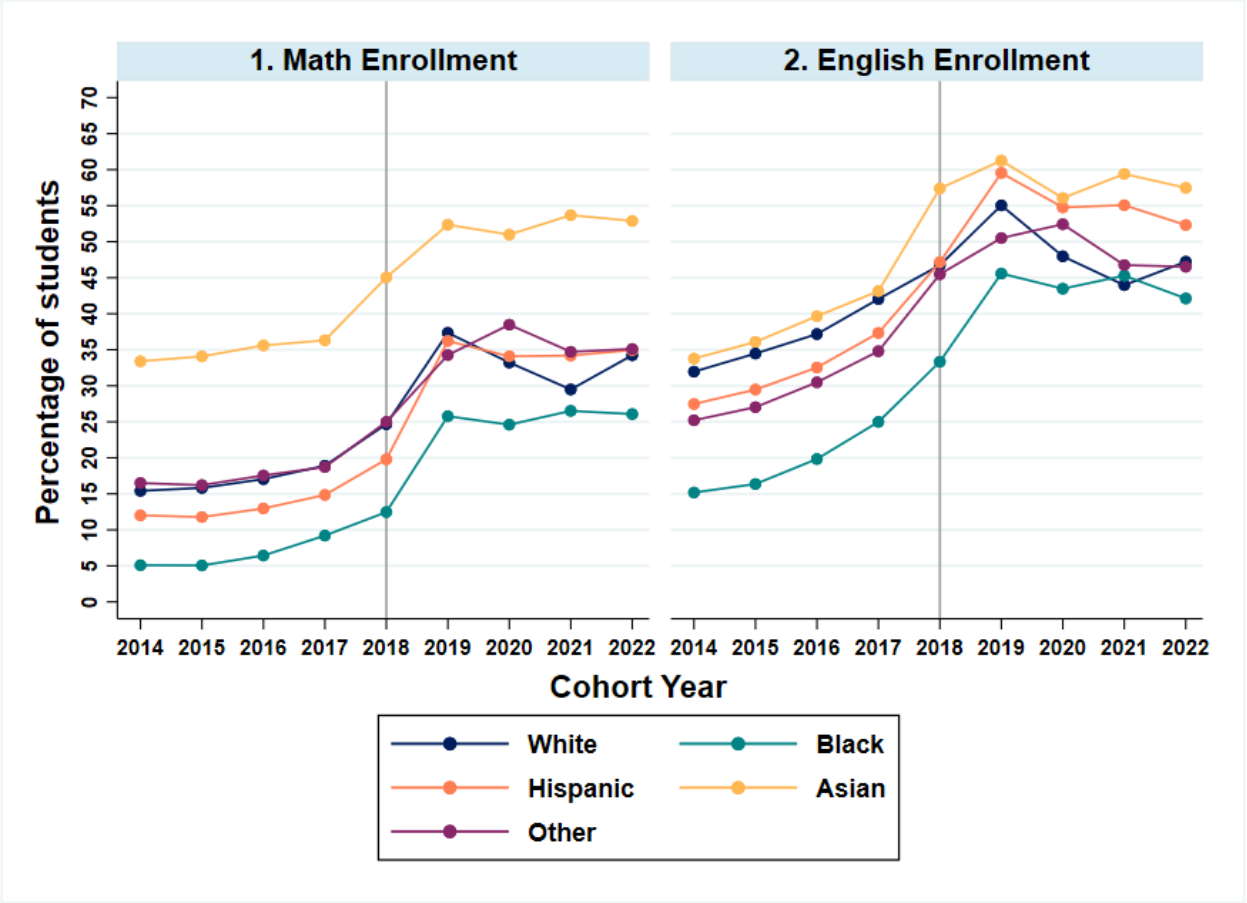
Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Change in transfer-level course enrollment by race/ethnicity

Compared with White students, we observed that first-year transfer-level English course enrollment rates for Black, Hispanic, Asian, and other students improved at a greater rate in all post-reform cohorts. Figure 18 displays the trends of regression-adjusted transfer-level course enrollment rates by cohort. Due to larger gains in English enrollment rates, gaps in transfer English course enrollment that existed in pre-reform cohorts reversed for Hispanic, Black, and other student groups in the 2021 cohort. However, the enrollment rate for Black students fell below that of White students by 5 percentage points in the 2022 cohort. Asian students' rate of transfer-level English course enrollment was similar to that of White students in pre-reform cohorts but was approximately 10 percentage points higher in the 2022 cohort.

However, gains in transfer-level math course enrollment rates varied across race/ethnic groups. Although math course enrollment increased at a higher rate for Hispanic students in all four follow-up cohorts from 2019 to 2022, results were mixed for Black, Asian, and other students. Black students showed no significant difference compared to White students in the 2018 and 2019 cohorts but made significantly larger gains in the subsequent three cohorts from 2020 to 2022. Asian students showed a lower gain in the 2019 cohort and a higher gain in the 2021 cohort, while showing no significant difference in all other cohorts. The other student group also showed mixed results with smaller gains in the 2018 and 2019 cohorts, larger gains in the 2019 and 2020 cohorts, and no difference in the 2022 cohort compared to the White student group. As of 2022, gaps in transfer-level math course enrollment rates between Hispanic and White students reversed. While the gaps slightly narrowed between Black and White students, Black students' transfer-level math course enrollment rate remained 8 percentage points below that of the White student group.

Figure 21. Changes in the Enrollment of Transfer-Level Math and English Courses during the First Academic Year, by Race/Ethnicity Group



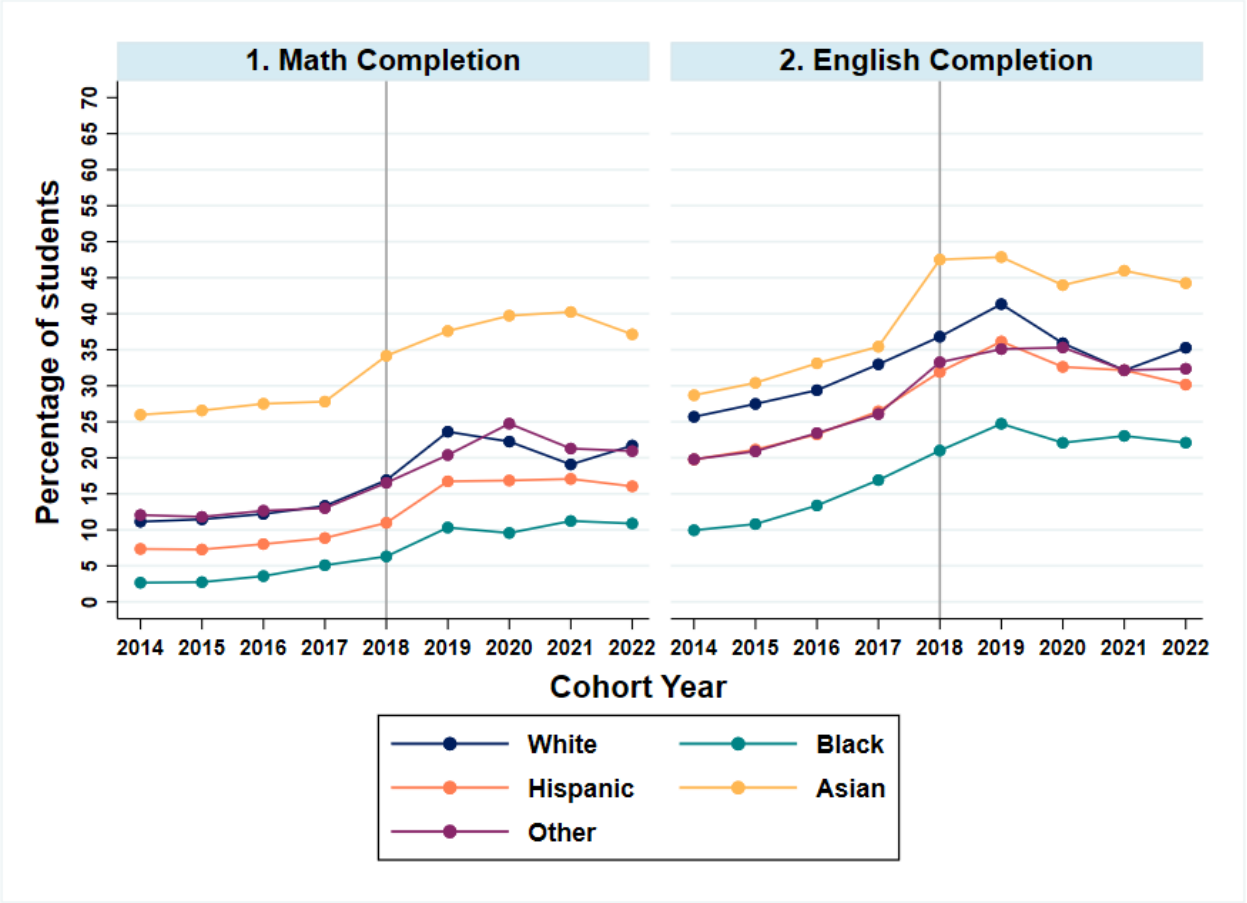
Change in transfer-level course completion by race/ethnicity

We observed similar patterns in transfer-level course completion rates. Transfer-level English course completion rates generally improved at a greater rate among Black, Hispanic, Asian, and other groups in post-reform cohorts compared with White students, except for Black students in the 2018 and 2019 cohorts.

However, results for transfer-level math completion rates are mixed. Changes in Black students' transfer-level math completion rates were 1.5 to 3.8 percentage points lower than those of White students in the post-reform cohorts, except for the 2019 cohort where no significant difference was observed. Compared to White students, changes in Hispanic students' math course completion rates were slightly lower in the 2018 and 2019 cohorts, showed no difference in the 2020 and 2022 cohorts, and exhibited a slightly higher gain in the 2021 cohort. Asian students showed similar changes to White students in the 2019 and 2022 cohorts, but their completion rate was 2.3 and 3.5 percentage points higher in the 2020 and 2021 cohorts, respectively. Other students' rate of change in transfer-level math course completion was slightly lower than that of White students in the 2018 and 2019 cohorts, with no significant difference in the 2020, 2021, and 2022 cohorts.

As shown in Figure 22, gaps in transfer-level English course completion rates between White students and Hispanic and Black students significantly narrowed as of the 2022 cohort, but gaps persisted in transfer-level math completion rates.

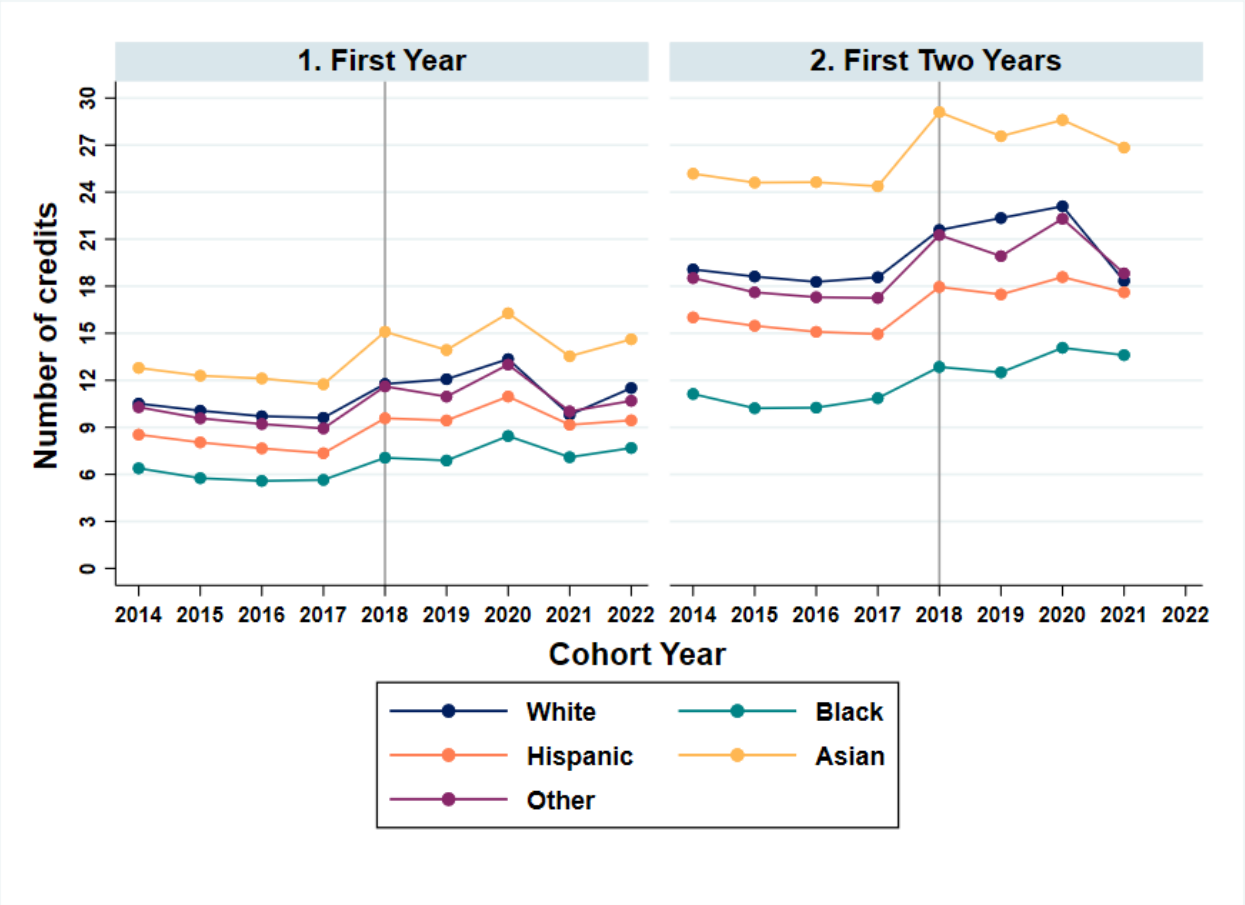
Figure 22. Change in the Completion of Transfer-Level Math and English Courses during the First Academic Year, by Race/Ethnicity Group



Change in transferable course credit accumulation by race/ethnicity.

We found that the changes in the accumulation of transferable course credits within the first academic year varied across race/ethnicity groups. Compared to White students, Hispanic and Asian students showed larger gains in one-year transferable course credit accumulation in all post-AB 705 cohorts, except for the 2018 cohort for Hispanic students and the 2019 cohort for Asian students. In contrast, Black students demonstrated lower gains in the number of transferable credits earned in their first academic year compared to White students from the 2018 to 2020 cohorts, higher gains in the 2021 cohort, and no significant difference in the 2022 cohort. Students in other race/ethnicity group exhibited lower gains in the 2019 and 2022 cohorts, with no significant difference observed in the 2018 and 2020 cohorts. Figure 23 presents the regression-adjusted number of transferable course credits earned in the first academic year by race/ethnicity groups.

Figure 23. Change in the Accumulation of Transferable Course Credit Accumulation during the First Academic Year, by Race/Ethnicity Group



Differential Changes by Gender

We also examined whether enrollment, completion, and credit accumulation changes varied across gender by including an interaction term between the female indicator and post-AB 705 cohort indicators into the ITS model. Table 7 presents the results, where students who identified as women are compared with those who identified as men (see Appendix B2 for subgroup analysis results on two-year outcomes by gender).

Table 7. Change in the Enrollment and Completion of Transfer-Level Math and English Courses during the First Academic Year, by Gender

Academic Year	Enrollment		Completion		Credit Accumulation
	Math	English	Math	English	
Male vs. Female					

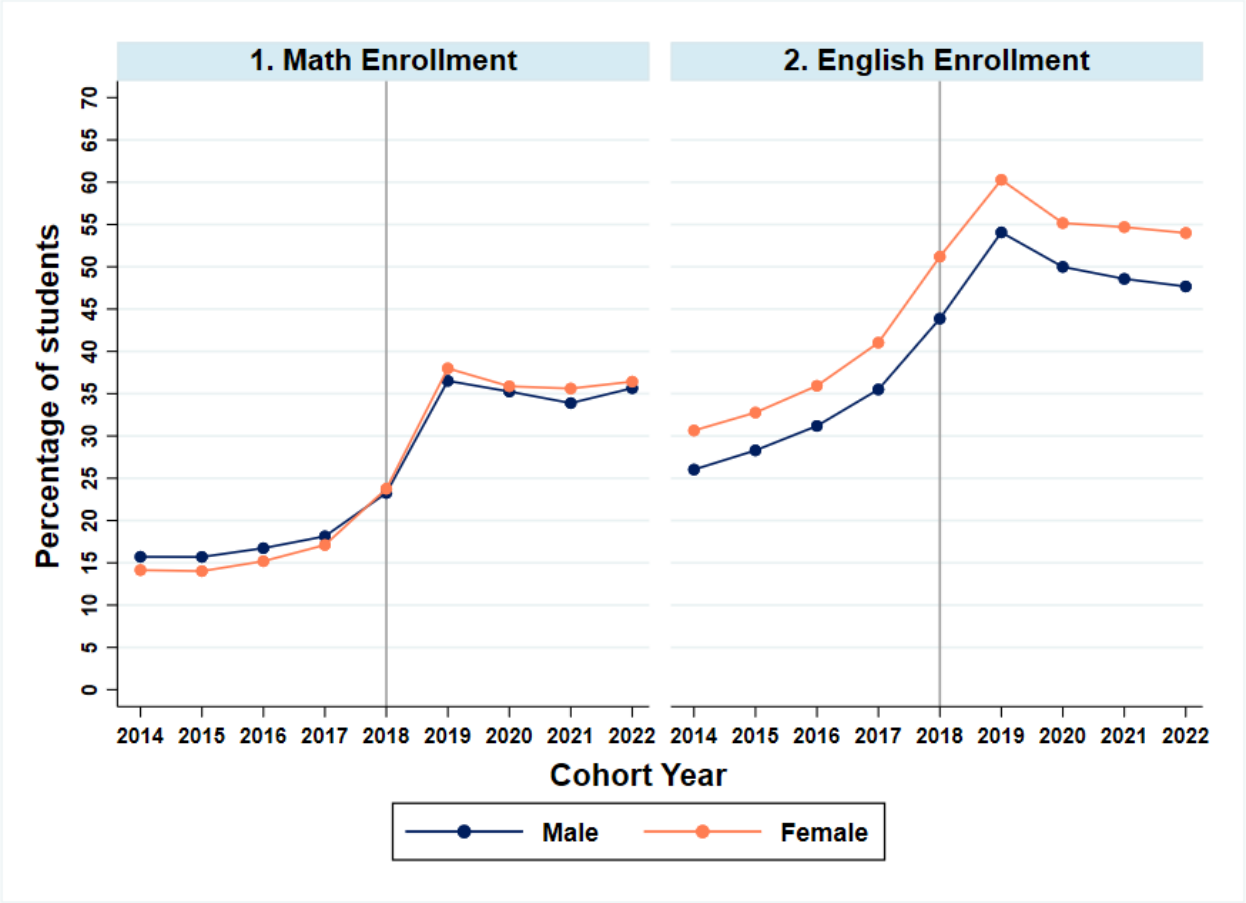
Fall 2018 cohort	0.0168***	0.0185***	0.0103***	0.0154***	0.5676***
	(0.0029)	(0.0032)	(0.0025)	(0.0031)	(0.0700)
Fall 2019 cohort	0.0306***	0.0119***	0.0284***	0.0206***	0.9266***
	(0.0028)	(0.0031)	(0.0024)	(0.0030)	(0.0677)
Fall 2020 cohort	0.0245***	0.0027	0.0170***	0.0022	0.5310***
	(0.0031)	(0.0034)	(0.0026)	(0.0033)	(0.0734)
Fall 2021 cohort	0.0291***	0.0078*	0.0126***	-0.0114***	0.0479
	(0.0029)	(0.0032)	(0.0025)	(0.0031)	(0.0699)
Fall 2022 cohort	0.0182***	0.0082**	0.0110***	-0.0061*	0.2236***
	(0.0028)	(0.0030)	(0.0024)	(0.0030)	(0.0661)
R-squared	0.197	0.255	0.128	0.167	0.156
N cohorts	9	9	9	9	9
N colleges	106	106	106	106	106
N students	837,865	837,865	837,865	837,865	837,865

Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Change in transfer-level course enrollment by gender

Regression coefficients on the interaction terms indicate that female students made larger gains in both transfer-level course enrollment and completion rates in all post-reform cohorts compared with male students, except for the English completion rate in the 2021 and 2022 cohorts. Female transfer-level math and English course enrollment rates improved approximately 1 to 3 percentage points more than the rates of male students in all post-reform cohorts. As a result, a small enrollment gap in math enrollment gap in the pre-reform cohorts disappeared in the 2018 cohorts and reversed in the 2019 through 2022 cohorts. Female students' English enrollment rates were greater than males in the pre-reform cohorts, and these gaps widened in the post-reform cohorts (see Figure 24).

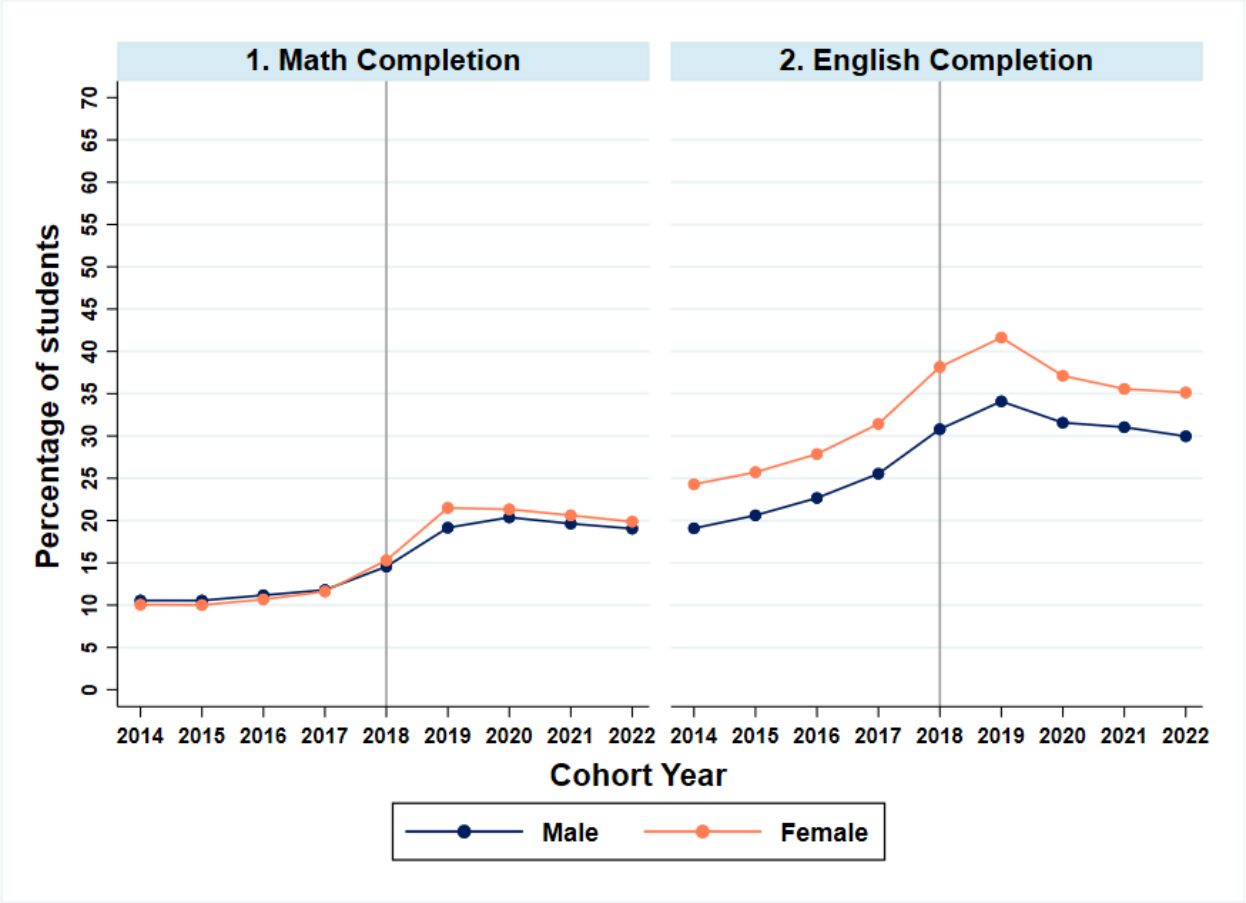
Figure 24. Change in the Enrollment of Transfer-Level Math and English Courses during the First Academic Year, by Gender



Change in transfer-level course completion by gender

We also observed that females showed approximately 1 to 3 percentage points higher rates of increase in math course completion compared to males. Females also exhibited higher increases in English course completion rates in the 2018 and 2019 cohorts, but no significant difference was observed in the 2020 cohort. However, females showed slightly lower increases in the 2021 and 2022 cohorts compared to males. As depicted in Figure 25, these higher gains made by female students reversed the small gap in math completion rates observed in the post-reform cohorts and further widened the difference in English completion rates.

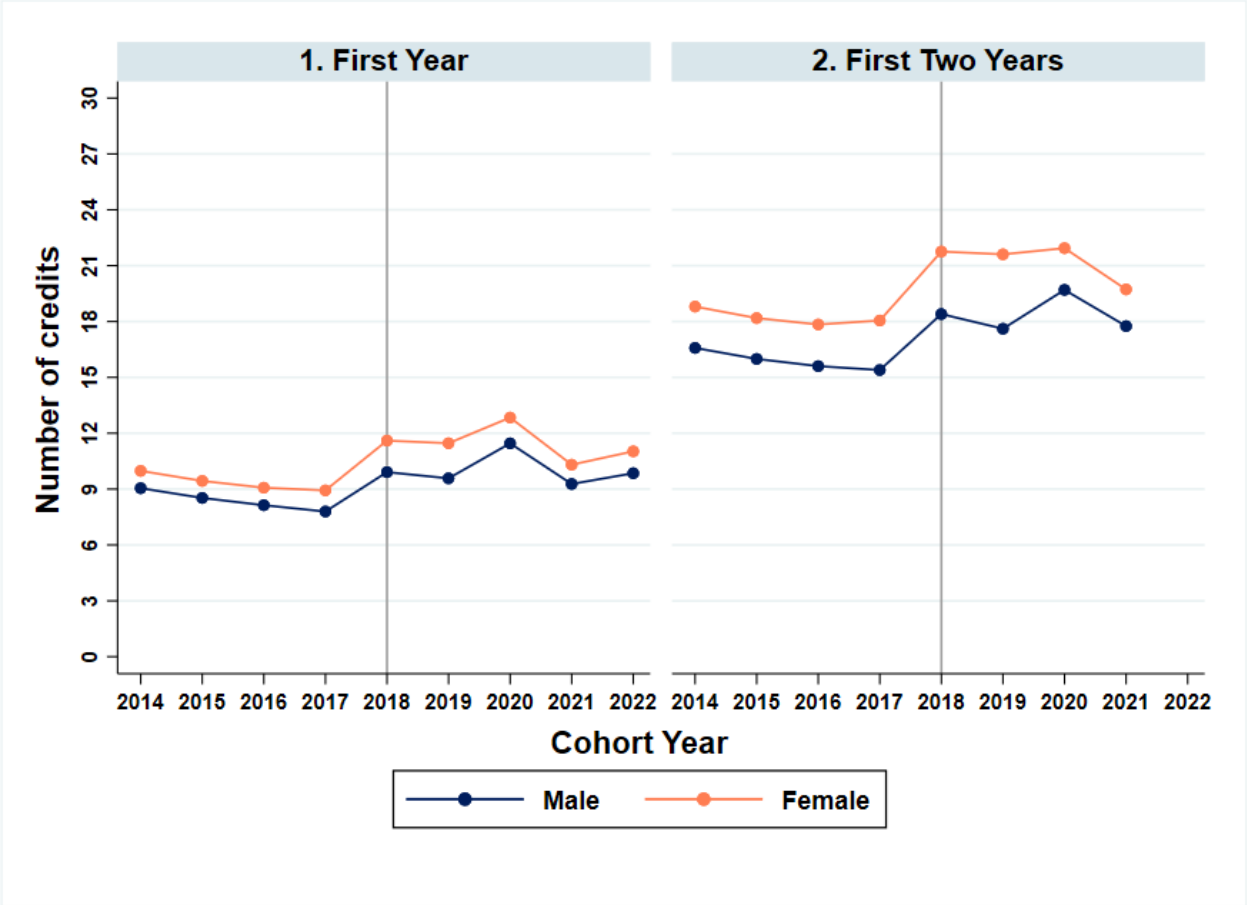
Figure 25. Change in the Completion of Transfer-Level Math and English Courses during the First Academic Year, by Gender



Change in transferable course credit accumulation by gender

Regression coefficients reported in Table 8 indicate that changes in transferable course credit accumulation during the first academic year were larger for females than males in all cohorts from 2018 through 2022, except for the 2021 cohort where no significant difference was observed. Consequently, the gaps in transferable course credits earned during the first academic year that were observed in the pre-AB 705 cohorts slightly widened in the post-AB 705 cohorts, as shown in Figure 26.

Figure 26. Change in the Accumulation of Transferable Course Credit Accumulation during the First Academic Year, by Gender Group



Summary and Conclusions

To assess changes in response to AB 705 in course enrollment and completion rates in transfer-level math and English courses and total transferable course credit accumulation within the first and first two academic years, we conducted Interrupted Time Series (ITS) analyses. Our study covers nine cohorts of First-Time-In-College (FTIC) students who enrolled in California community colleges from fall 2014 through 2022.

Overall changes in response to AB 705.

The enrollment rates of FTIC students in transfer-level math and English courses within their first academic year increased significantly in response to the reform. The ITS analysis identified consistent increases in enrollment rates for transfer-level math courses, particularly notable in the 2019 cohort with **a substantial 15.3 percentage point increase above the baseline trend**. Although the increases were slightly smaller in subsequent years (2020, 2021, and 2022 cohorts), they **remained significantly elevated by 10.0 to 11.5 percentage points compared to the baseline trend**. Similarly, enrollment rates for transfer-level English courses showed initial improvements in the 2018 and 2019 cohorts but exhibited variability in later years, particularly declining in the 2022 cohort.

The two-year enrollment rates for transfer-level math courses continued to reflect positive outcomes similar to the one-year analysis, with **increases ranging from 5.4 to 13.2 percentage points above the baseline trend across different cohorts**. In contrast, two-year enrollment rates

for transfer-level English courses showed more variability, with significant positive impacts observed only in the 2018 cohort and declines in subsequent years.

The analysis of transfer-level course completion rates within the first academic year indicated positive effects on math completion rates across all cohorts studied. The **increases ranged from 1.2 to 5.5 percentage points above the baseline trend, suggesting that AB 705 contributed to improved completion rates in transfer-level math course**s. However, completion rates for transfer-level English courses showed mixed results, with initial gains in the 2018 and 2019 cohorts followed by declines in subsequent years.

AB 705 has reversed declining trends in the accumulation of transferable course credits among FTIC cohorts. The analysis shows that cohorts subject to AB 705 **accumulated significantly more transferable credits within one and two years compared to pre-reform cohorts**. This suggests that the reform has facilitated smoother academic progression and increased readiness for transfer to four-year institutions among community college students in California.

In summary, despite the challenges posed by the COVID-19 pandemic, **AB 705 has demonstrated notable successes in improving enrollment and completion rates in transfer-level courses, particularly in math, among FTIC students in California's community colleges**. The reform's emphasis on multiple measures including high school GPAs for course placement and the provision of co-curricular supports has shown positive impacts on enrollment rates, initial course completion rates, and transferable course credit accumulation. However, challenges remain, particularly in sustaining positive outcomes in transfer-level English course enrollment and ensuring consistent completion rates across all post-AB 705 FTIC cohorts.

Differential changes of AB 705 by race/ethnicity and gender.

Student outcomes across different race/ethnicity groups and genders have varied in response to AB 705. Transfer-level course enrollment and completion rates have risen significantly as well as the accumulation of transferable course credits, with notable differences across race/ethnicity groups.

Compared to White students, **Black, Hispanic, Asian, and other minoritized students generally saw larger improvements in transfer-level English course enrollment rates post-reform**. The enrollment gap between Hispanic and White students reversed in the 2019 cohort. While Black students narrowed the gap in post-AB 705 cohorts, they still experienced about 5 percentage point lower enrollment rate than White students in the 2022 cohort. For transfer-level math courses, **Hispanic students consistently saw greater enrollment gains, whereas the results for Black, Asian, and other students were mixed**. Although the gaps in transfer-level English course completion rates narrowed between White students and Black and Hispanic students, disparities in math course completion rates persisted. Finally, Hispanic and Asian students showed higher gains in transferable course credit accumulation post-reform, whereas Black students exhibited mixed results, and other race/ethnicity groups saw varying impacts across different cohorts.

Student outcome changes also varied based on gender. **Female students consistently made larger gains** in both transfer-level course enrollment and completion rates compared to male students, with the exception of English completion rates in the 2021 and 2022 cohorts. The reform also led to a more significant increase in transferable course credit accumulation for women during the first academic year in most post-reform cohorts, slightly widening the pre-existing gaps in credit accumulation.

In summary, AB 705 has facilitated overall improvements in educational outcomes for California community college students. However, the differential changes by race/ethnicity and gender

highlight the need for ongoing monitoring and tailored interventions to address persistent disparities and ensure equitable educational opportunities for all student groups.

Cost Effectiveness Study

Study Design

Through the implementation study, we have learned that institutions' responses to AB 705 have been evolving since its passage. To comprehensively understand the cost-effectiveness of the cocurricular supports implemented in response to AB 705, we have planned two cost-effectiveness studies to answer our two cost study research questions.

Cost-Effectiveness Study 1

The first cost-effectiveness study aims to **understand the cost-effectiveness of transfer-level courses with any type of cocurricular supports compared to stand-alone DE courses pre-COVID.** This analysis will generate effectiveness outcomes based on AY 2018-19 or 2019-20 data. Cost estimates for transfer-level courses will be derived from recent implementation data collected for AY2022-23 and adjusted based on the timing of the impact estimates using discount rates. Cost estimates for DE courses will be informed by existing COMIS data and/or an extensive literature review of economic evaluations on DE.

Specifically, Cost-Effectiveness Study 1 will address Research Question 10:

- Are transfer-level placement programs with and without cocurricular student supports more cost-effective than stand-alone DE programs?

Cost-Effectiveness Study 2

Utilizing more recent student outcomes and cost data from AY2022-23, the second cost-effectiveness study aims to **evaluate the cost effectiveness of different types of cocurricular supports compared to the stand-alone transfer-level courses.** We will use the findings from the implementation study to inform the types of cocurricular supports that will be examined in this study. Our final analytic sample will be constructed based on a list of cocurricular supports or different combinations of cocurricular supports that are more widely implemented as institutions' responses to AB 705.

Cost-Effectiveness Study 2 aims to address Research Question 11:

- Which cocurricular support model is the most cost-effective in achieving short and long-term outcomes?

Furthermore, due to the evolving nature of institutions' responses to AB 705, in both cost-effectiveness studies, we will apply the Ingredient Cost Method (Levin et al., 2018) to two primary categories of costs: a) implementation support for faculty and b) course and student support. In Table 8 below, we provide some example ingredients included in each category and the perspectives to be examined.

Table 8: Cost categories and perspectives.

Cost Perspective	Cost Category	Example Ingredient
Institution	Implementation support for faculty	Resources used by institutions to provide professional development for faculty teaching transfer-level courses, the cost associated with providing administrative support for implementation, etc.
	Course and student support	Personnel costs associated with providing different types of co-curricular supports, scholarships, etc.
Student	Course and student support	Costs to complete additional credits required by certain types of transfer-level courses, costs to purchase instructional supplies, etc.

In Spring 2024, we began compiling cost estimates for both cost-effectiveness studies. After we gather the cost estimates using implementation data, web search, and literature review, we will price each ingredient and compute the cost-effectiveness ratios using the outcomes yielded from the impact studies. Additionally, we will conduct a series of sensitivity analyses to examine the robustness of the estimated ratios. For example, we may test assumptions on key cost estimates and explore low and high bounds of impact estimates.

Because of data delays related to cost-effectiveness study 1, this report focuses on the progress to date of cost-effectiveness study 2.

Data Collection

Cost-Effectiveness Study 2

Impact Estimates

We are currently constructing the outcome analysis to provide impact estimates for the study effectiveness analysis. This analysis will compare short-term outcomes (e.g., completion of transfer-level math and English courses within the first academic year, accumulation of transferable course credits) and mid- and long-term outcomes (e.g., completion of certificates, transfer to four-year colleges, associate degree attainment) between first-time-in-college students from AY2022-23 enrolled in a transfer-level math (or English) course without cocurricular support and those enrolled in a transfer-level course with different types of cocurricular supports. We will use propensity score matching to establish baseline equivalence between students in the transfer-level course with and without cocurricular supports, using high school math (or English) achievement measures as well as demographic and socioeconomic variables as matching variables.

Cost Estimates

For the second cost-effectiveness study, we rely on the following data sources to obtain cost estimates:

1. *Faculty survey*: The Spring 2024 faculty survey included questions related to the total number of hours English and math faculty spent on instructional practices and other activities in response to AB 705 in the 2022-23 academic year. For example, we asked faculty members to estimate the time they spent on attending professional development sessions and providing different types of co-curricular supports.

2. *College Administrator Questionnaire*: In Spring 2024, we administered a College Administrator Questionnaire at the 13 colleges sampled for the implementation study. Through this questionnaire, we gathered data specifically on what practices and supports the colleges implemented in response to AB 705 in the 2022-23 academic year. We also asked questions that are specific to each type of co-curricular support.

3. *Chancellor's Office Management Information Systems (COMIS) data*: This student-level longitudinal dataset provides us with information on the cost incurred by students to complete transfer-level courses, with or without cocurricular supports. In addition, this dataset includes information about faculty teaching load and other college-level details that may provide context for the cost estimates.

4. *Systemwide Departmental Survey data*: This college-level longitudinal dataset includes information about the specific co-curricular supports offered with each course section. We connected this dataset with the COMIS data to compile student-level cost estimates by types of co-curricular supports.

Preliminary Findings

A total of 104 faculty members completed the cost study questions in the survey with 55% of respondents being English faculty. Among all faculty members who responded to the cost study questions, 36% did not teach a transfer-level course with any cocurricular support in the 2022-23 academic year. Of those who did teach a transfer-level course with cocurricular supports, 44% taught a course with embedded tutors, 41% taught a course with corequisites, and a smaller share of faculty members taught a course with learning communities or embedded counselors. Additionally, 11 out of 13 selected colleges completed the College Administrator Questionnaire.

The construction of student data is still ongoing. Therefore, in this report, we focus on the **institution's perspective** and the cost estimates obtained from the Spring 2024 faculty survey and the College Administrator Questionnaire. In the following section, we describe the cost estimates available as of June 2024 organized by cost categories as presented in Table 8.

In Table 9 below, we summarize the average units of resources required to implement colleges' responses to AB 705 during the 2022-23 academic year.

Table 9: From the institution's perspective, resources were required to implement AB 705 related responses in AY2022-23.

Cost Ingredient	Cocurricular Support	Average Quantity in AY2022-23 (Range in [ ])	
		English	Math
Implementation Support for Faculty			
Faculty instructional time	Embedded tutor	24 hours [1, 140]	38 hours [4, 150]
	Corequisite	250 hours [21, 1500]	72 hours [10, 150]
	Embedded counselor	9 hours [1, 40]	3 hours [2, 4]
	Enhanced course	162 hours [8, 1500]	52 hours [1, 100]
	All transfer-level courses	491 hours [108, 630]	470 hours [108, 828]

Stipends for additional work related to AB 705	**All transfer-level courses**	$700 per faculty or administrator [$100, $1,500]	$700 per faculty or administrator [$100, $1,500]
Faculty time on professional development	**All transfer-level courses**	64 hours [1, 148]	63 hours [1, 136]
External conferences	**All transfer-level courses**	1 conference per year [1, 4]	1 conference per year [1, 4]
Compensation for college personnel who provided internal training	**All transfer-level courses**	8 people [4, 30]	8 people [4, 30]
Tutor instructional time	**Embedded tutor**	648 hours (on average, 14 tutors per college) [252, 1,080]	*Not available
Course and Student Support			
College scholarships	**All transfer-level courses**	*Not available	*Not available
Academic and wrap around services	**All transfer-level courses**	*Not available	*Not available

Based on insights from our implementation and impact studies, we have planned separate cost analyses by department to account for variations in how English and math departments implemented practices and changes in response to AB 705 differently. Table 9 indicates that while the total hours English and math faculty spent on providing academic support that is not unique to a certain type of co-curricular support are similar (i.e., an average of 491 and 470 hours respectively), English faculty spent substantially more hours on transfer-level courses with co-requisites or enhanced sessions compared to math faculty. For example, English faculty reported spending over 160 hours on enhanced courses compared to 52 hours reported by math faculty through the faculty survey.

In terms of professional development time, we found less variation by English or math departments from the College Administrator Questionnaire. Informed by our implementation study, we have planned for sensitivity analyses that will test different bounds in these estimates and examine how the cost-effectiveness ratios vary across scenarios.

After summarizing the information collected to date, we identified two limitations in the cost data and ways to address these gaps in the next year:

- First, we collected more data on transfer-level courses with embedded tutor, corequisite, and enhanced sections, while data are largely incomplete for other cocurricular supports such as embedded counselors. We will revisit the implementation data collected during the Fall 2022 site visit and work with colleges through the upcoming data collection opportunities to fill in this gap. The impact study and the student-level data will also help inform our decision regarding these ingredients with incomplete data.

- Second, information about the resources colleges used to provide course and student supports is limited in the data we collected to date. For example, several colleges identified that colleges purchased laptops or white boards to support instruction, but we were not able to obtain detailed descriptions of these purchases. As a result, we will utilize web searches and literature reviews on economic evaluations of higher education programs to generate estimates and bounds for most of the ingredients in this cost category.

Conclusion and Next Steps

Year 3 of our study focused on gaining a deeper understanding of on-campus implementation through a faculty survey administered to math and English departments across our study sample, an Interrupted Time Series analysis with nine cohorts of FTIC student data, and preliminary data collection for our cost effectiveness study. This report contributes to the literature through offering a new data analytic strategy to evaluate the impact of AB 705 and 1705, as well as elevating faculty voices regarding successes and remaining challenges related to implementation of the reforms five years and one year later, respectively.

Collectively, these data highlight significant changes that colleges have made on campus regarding shifting enrollments from DE into transfer-level coursework in both English and math, and providing additional supports to students to promote retention and completion. We find that AB 705 has demonstrated notable successes in improving enrollment and completion rates in transfer-level courses, particularly in math, among FTIC students in California's community colleges. While our survey results suggest that faculty believe additional resources and supports would be helpful, most faculty report that implementation supports are adequate. We did find differences between faculty at low and high implementation colleges with regard to institutional capacity, which may help explain variation. Notably, though local research capacity can bolster faculty buy-in and support staff as they develop and implement support strategies, faculty at low-implementation colleges reported significantly less local research capacity to evaluate student success data.

We also find that Black, Hispanic, Asian, and other minoritized students generally saw larger improvements in transfer-level English course enrollment rates than their White counterparts. For transfer-level math courses, Hispanic students consistently saw greater enrollment gains, whereas the results for Black, Asian, and other students were mixed. Our survey findings may help explain these differences between math and English student success rates. We also find significant differences between math and English faculty with respect to faculty buy-in for these reforms, pedagogical practices, and faculty mindset. English faculty were significantly more likely to report high levels of buy-in to these reforms, and to report utilizing equity-oriented pedagogical practices like culturally responsive pedagogy and scaffolding; math faculty were significantly more likely to espouse fixed mindsets and report believing that some students should begin in pre-transfer level coursework. We also find that while most faculty have experience teaching corequisite-paired courses, most believe this model of cocurricular support is ineffective.

As colleges continue iterating their responses to AB 705 and 1705, it is critical for us to monitor implementation and track the ways in which faculty buy-in and mindsets are shaping the experience of students in the classroom. Investments in professional development are critical to support faculty in building their skillset for differentiated instruction and culturally affirming strategies, as are investments in local research capacity so that faculty can see the effects of their work. We look forward to learning more about how implementation is changing during our second round of site visits this fall.

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About Research for Action

Research for Action (RFA) is a Philadelphia-based nonprofit education research organization. We seek to use research as the basis for the improvement of educational opportunities and outcomes for traditionally underserved and marginalized students. We conduct culturally-responsive and equity focused research and evaluation studies to inform policymakers, practitioners, philanthropy, and the public at the local, state, and national levels. We provide our partners with empirical evidence and recommendations they can trust, to guide decisions about programs, policies, and practices. We are passionate about the importance of high-quality education for strengthening students, families, and their communities and the need to advance racial and social justice in the systems that undermine equitable access and success. We believe that all students, families, and communities deserve the resources and supports needed to develop their potential and thrive. For more information, please visit our website at www.researchforaction.org.

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Appendix A: Full List of Research Questions

Implementation Study

RQ1) How are California community colleges implementing curricular reforms? How do institutional policies and practices regarding curricular reform vary across colleges?

a) How do policies and practices in math and English departments vary within colleges?

RQ2) How do institutional capacity and faculty buy-in affect institutional adoption and implementation of curricular reforms?

a) How does capacity and faculty buy-in vary between math and English departments, and why?

RQ3) How do student experiences vary between high, medium, and low implementation colleges, and why?

a) What information are colleges providing to students regarding curricular reform?

b) To what degree do students understand the curricular reforms taking place at their colleges?

c) How, if at all, do students' experiences of curricular reform vary across student characteristics, such as age, race/ethnicity, income, and level of preparation?

d) How, if at all, do students' experiences of math and English curricular reforms vary?

Impact Study using Propensity Score Matching and Difference-in-Differences-inspired Approaches

RQ4) What is the impact of transfer-level placement, compared with placement into a prerequisite DE math or English course, on both short- and long-term student outcomes?

RQ5) Which cocurricular supports (e.g., paired courses, embedded tutoring) are the most and least effective?

RQ6) Which cocurricular supports are more effective in improving short- and long-term student outcomes for traditionally marginalized students?

Impact Study Using Interrupted Timeseries Design

RQ7) What is the overall impact of the AB 705 policy on student outcomes (e.g., transfer-level math passing rate in the first year)? Does the effect of AB 705 vary across students with high, middle, and low high school achievement?

a) Does the overall policy effect vary across different student subgroups?

RQ8) What is the impact of different treatments available under the AB 705 placement policy (i.e., varied treatment groups illustrated by post-AB 705 placement groups) on student outcomes, compared with placing students in developmental education courses?

a) Does the impact of treatments available under the AB 705 policy vary across student subgroups?

Impact Study Using Institutional Level Data

RQ9) Does variation in institutional implementation of curricular reform (as indicated by their position on the Scale of Implementation) predict differences in aggregate student outcomes?

Cost Effectiveness Study

RQ10) Are introductory transfer-level courses with cocurricular support more cost-effective than DE courses as a whole (corresponding to RQ4)?

RQ11) Which cocurricular support model is the most cost-effective (corresponding to RQ5)?

Appendix B: Change in Two-Year Outcomes by Race/Ethnicity and Gender

Table B1. Change in the Enrollment and Completion of Transfer-Level Math and English Courses and Transferrable Credit Accumulation during the First Two Academic Years, by Race/Ethnicity Group

Academic Year	Enrollment		Completion		Credit Accumulation
	Math	English	Math	English	
White vs. Black					
Fall 2018 cohort	-0.001	0.0625***	-0.0113	0.0266***	-0.2722
	(0.0072)	(0.0074)	(0.0065)	(0.0075)	(0.2945)
Fall 2019 cohort	0.0244***	0.0956***	-0.0238***	0.0153*	-1.1306***
	(0.0070)	(0.0072)	(0.0064)	(0.0073)	(0.2861)
Fall 2020 cohort	0.0435***	0.1322***	-0.0191**	0.0391***	-0.5799
	(0.0076)	(0.0079)	(0.0070)	(0.0081)	(0.3143)
Fall 2021 cohort	0.0741***	0.1528***	0.0123	0.0531***	1.9763***
	(0.0074)	(0.0077)	(0.0068)	(0.0078)	(0.3054)
White vs. Hispanic					
Fall 2018 cohort	0.0169***	0.0517***	-0.0002	0.0186***	0.1818
	(0.0038)	(0.0039)	(0.0034)	(0.0040)	(0.1552)
Fall 2019 cohort	0.0563***	0.0911***	-0.0041	0.0181***	-0.0682
	(0.0038)	(0.0040)	(0.0035)	(0.0040)	(0.1573)
Fall 2020 cohort	0.0755***	0.1122***	0.0124***	0.0357***	0.1903
	(0.0040)	(0.0041)	(0.0036)	(0.0042)	(0.1641)
Fall 2021 cohort	0.0929***	0.1260***	0.0308***	0.0473***	2.3422***
	(0.0037)	(0.0039)	(0.0034)	(0.0039)	(0.1538)
White vs. Asian					
Fall 2018 cohort	-0.0091	0.0385***	0.0048	0.0294***	0.7684**
	(0.0058)	(0.0060)	(0.0053)	(0.0061)	(0.2376)
Fall 2019 cohort	-0.0368***	0.0208***	-0.0169**	0.0126*	-0.2338
	(0.0057)	(0.0059)	(0.0052)	(0.0060)	(0.2358)
Fall 2020 cohort	-0.0234***	0.0213***	0.0007	0.0141*	-0.3124
	(0.0060)	(0.0062)	(0.0055)	(0.0063)	(0.2467)
Fall 2021 cohort	0.0075	0.0480***	0.0207***	0.0320***	0.7227**
	(0.0057)	(0.0059)	(0.0052)	(0.0060)	(0.2334)
White vs. Other					

Fall 2018 cohort	-0.0042	0.0244***	-0.0078	0.0094	0.1767
	(0.0061)	(0.0063)	(0.0056)	(0.0064)	(0.2506)
Fall 2019 cohort	-0.0152**	0.0257***	-0.0243***	0.0019	-0.9955***
	(0.0055)	(0.0057)	(0.0050)	(0.0058)	(0.2254)
Fall 2020 cohort	0.0307***	0.0621***	0.0076	0.0240***	-0.1661
	(0.0063)	(0.0065)	(0.0057)	(0.0066)	(0.2577)
Fall 2021 cohort	0.0341***	0.0609***	0.0110*	0.0345***	0.3851
	(0.0058)	(0.0060)	(0.0053)	(0.0061)	(0.2400)
R-squared	0.218	0.284	0.153	0.195	0.186
N cohorts	8	8	8	8	8
N colleges	106	106	106	106	106
N students	735,714	735,714	735,714	735,714	735,714

Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Table B2. Effects of the Development Education Reform on the Enrollment and Completion of Transfer-Level Math and English Courses and Transferrable Credit Accumulation during the First Two Academic Years, by Gender

Academic Year	Enrollment		Completion		Credit Accumulation
	Math	English	Math	English	
Male vs. Female					
Fall 2018 cohort	0.0221***	0.0039	0.0171***	0.0077*	0.7453***
	(0.0031)	(0.0032)	(0.0028)	(0.0032)	(0.1258)
Fall 2019 cohort	0.0327***	-0.0006	0.0303***	0.0095**	1.6980***
	(0.0030)	(0.0031)	(0.0027)	(0.0031)	(0.1216)
Fall 2020 cohort	0.0170***	-0.0185***	0.0109***	-0.0158***	0.1753
	(0.0032)	(0.0033)	(0.0029)	(0.0034)	(0.1319)
Fall 2021 cohort	0.0206***	-0.0079*	0.0075**	-0.0230***	-0.3748**
	(0.0031)	(0.0032)	(0.0028)	(0.0032)	(0.1255)
R-squared	0.217	0.282	0.153	0.195	0.186
N cohorts	8	8	8	8	8
N colleges	106	106	106	106	106
N students	735,714	735,714	735,714	735,714	735,714

Note: All models include variables for student background characteristics. Standard errors are shown in parentheses. *** p<0.001, ** p<0.01, * p<0.05