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Bridging College and Careers

Using Dual Enrollment to Enhance Career and Technical Education Pathways

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Abstract

The Concurrent Courses Initiative (CCI), funded by The James Irvine Foundation from 2008 until 2011, comprised eight secondary/postsecondary partnerships across California that offered dual enrollment programs with supplemental student supports. The goal of the CCI was to expand access to supportive, career-focused dual enrollment for students often underserved by such programs and underrepresented in higher education, with the expectation that participating students would prosper in college subsequently. We use longitudinal administrative data on individual students who participated in 2008–09 and 2009–10, compared with data on other students from their districts, to test for evidence of differences in outcomes. Relative to comparison students, CCI dual enrollees had similar GPAs but higher graduation rates in high school. CCI dual enrollees entered college at similar rates to the comparison group, but entered four-year institutions and persisted at higher rates. Notably, CCI dual enrollees accumulated more college credits than the comparison group, and this difference in credit accumulation grew over time. After two years in college, CCI dual enrollees had accumulated 20 percent more credits than their district peers. These are the results of the data pooled across the sites; we also report results for the individual sites, which vary.

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1. Introduction

Increasing the acquisition of college credentials among youth traditionally underrepresented in higher education is a major goal of the Obama administration as well as of many foundations and educational organizations. To reach this goal, two important educational challenges must be addressed. The first challenge is the high level of dropout among high school students. Nationally, only about three quarters of high school freshmen graduate four years later. The situation is worse for African American and Latino youth — in 2008–09, their graduation rates were 10 percentage points lower, at 63.5 percent and 65.9 percent, respectively, than the average graduation rate (Stillwell, Sable, & Plotts, 2011). The second challenge lies in the sizable proportion of those who do graduate from high school but who are, nevertheless, underprepared for college. National statistics reveal that among those entering postsecondary education, over one third take part in some form of remediation to prepare them for college-level programs of study (Aud et al., 2011). Thus, a critical step in achieving national college completion goals is to better understand programs and policies aimed at improving the educational attainment of underrepresented and underprepared youth and better preparing them for college.

The Concurrent Courses Initiative (CCI), supported by The James Irvine Foundation from 2008 to 2011, sought to do just that by funding a selection of secondary–postsecondary partnerships in California to implement or enhance career-focused dual enrollment programs, and to specifically target youth who were low-income, struggling academically, or within populations historically underrepresented in higher education. The intervention aimed to improve high school and college outcomes for the students served.

In this paper we examine the estimated effect of participation in the CCI on various student outcomes for the first two years of the initiative. We report on features of the CCI and, using both regression and propensity score matching methods, evaluate the outcomes of participants in the first two years of the initiative relative to comparison students in the same school districts. We examine high school GPA and high school graduation as well as postsecondary enrollment and performance. Our findings show that while in high school, CCI dual enrollees had similar GPAs but higher high school graduation rates when compared with their non-participating district peers. With regard to college-going, CCI dual enrollees entered college at rates similar to their district peers but persisted at higher rates. Dual enrollees also accumulated more college credits than comparison group students. And while accumulation of college credits was part of the treatment, the apparent effect[1] of

[1] We use the term "apparent effect" throughout this paper because our nonexperimental design does not control for unmeasured factors, such as motivation, that may be associated with dual enrollment participation. If the CCI dual enrollees were fundamentally different from the comparison students even

greater credit accumulation by dual enrollees increased as the students progressed through college. After one year of college, there was a difference of 10 to 18 percent in credit accumulation, and after two years in college the CCI dual enrollees had accumulated 20 percent more credits than their district peers. Thus, early momentum in terms of credit accumulation was sustained and even increased over time. The early start given to CCI dual enrollees was likely a key factor to higher rates of persistence over one and two years.

The remainder of this paper is organized as follows. In section 2, we describe the conceptual framework and review prior literature. In section 3, we describe the data used and how the CCI was implemented in each of the two academic years (2008–09 and 2009–10). This description is lengthy because of the multiple dimensions of the CCI and the heterogeneity with which colleges implemented the initiative. Next, in section 4, we present our empirical framework for identifying the apparent effects of the CCI on student outcomes. This framework emphasizes robustness testing for associations between the CCI and student outcomes. In section five we apply this empirical framework to examine high school outcomes of the CCI dual enrollees and their subsequent college enrollment decisions and performance in college. We conclude in section 6 by summarizing our findings and considering the research and policy implications with respect to both implementing dual enrollment programs and identifying their impacts.

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after controlling for observed characteristics, then the estimated effects may be attributable in part to preexisting differences. We discuss the issue of selection bias in dual enrollment participation throughout the paper.

2. Career-Focused Dual Enrollment

Conceptual Framework

A growing body of evidence suggests that providing students with a rigorous, engaging, and relevant education can improve their likelihood for success. Career and technical education (CTE), in particular, has been found to reduce the likelihood of high school dropout, and it is argued that “well-designed career-focused programs can improve employment, earnings, non-academic skills, and career choices, particularly for at-risk and low-income youth” (Kazis, 2005, p. 16; see also Stern & Stearns, 2006). A career focus can engage students through applied learning, and it can help them see pathways through college to future employment.

Policymakers and leaders in education reform, particularly in California, are once again turning to career and technical education as a powerful educational tool. The state has long encouraged and funded its Partnership Academies (called Career Academies in other states), which operate as small learning communities within larger high schools and which integrate academic and career–technical education, making use of business partnerships, mentoring, and internships. Likewise, the Linked Learning movement is promoting the combination of rigorous academics, career–technical education, and real-world experiences in its pursuit of high school reform in 10 districts across California. Its College and Career Readiness framework cites the need for skills and knowledge in the academic and career domains as well as a range of other applied skills and behaviors (ConnectEd, 2012). And, most recently, the state superintendent of public instruction unveiled a Career Readiness Initiative comprising 17 key objectives in support of career and technical education. Among other aims, the initiative calls for an increase in the number of students in CTE courses.

While career and technical education has in the past sometimes been viewed as leading students directly to the workforce, today it is widely acknowledged that all students need some additional preparation beyond high school, whether it be a short-term program at a technical or community college or a program culminating in a bachelor’s degree. What is of vital importance is helping students understand and explore their postsecondary options and helping them take the steps necessary to enroll (Roderick, Nagaoka, Coca, & Moeller, 2008). Past programs such as Tech Prep encouraged connections between high school and community college career–technical programs, and they offered some college credit-earning opportunities through articulation agreements. Yet, with research finding that few students have benefited from articulated credits (Bragg, 2001), institutions are increasingly turning to dual enrollment as a more promising alternative.

Dual enrollment allows high school students to enroll in college courses and receive college credit, often for free. While there are many explanations for patterns of college attrition, dual enrollment addresses two factors in particular that serve to help students in their early college experience: high school students' need to be academically prepared for postsecondary study, and their need to become familiar and comfortable with the college environment. Nationally and in California, there is increasing recognition and concern about the extent to which incoming college students have weak academic skills, become mired in non-college-credit developmental coursework, and never progress to college courses (Bailey, Jeong, & Cho, 2010). In addition, students also often lack a range of nonacademic skills and behaviors needed to be successful in college-level coursework. Some students are presumed to drop out of college due to lack of involvement or integration in the college community (Tinto, 2004) or because they do not feel sufficiently supported or validated (Rendon, 1994; Barnett, 2011).

Dual enrollment provides high school students with an early college experience that has the potential to help improve their academic and nonacademic skills, help them understand what will be required of them in college, and encourage their future college attendance by showing that they are indeed capable of doing college-level work. The dual enrollment classroom can be an environment in which students "try on" the role of a college student (Karp, 2006). If successful at this role rehearsal, students will learn what it is to be a college student and may even experience a shift in self-concept; that is, the dual enrollment experience may allow students to begin to view themselves as capable college students.

Previous research has found dual enrollment participation to be correlated with a range of positive high school and college outcomes, including college enrollment and persistence (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007; Speroni, 2011a, 2011b). In general, studies have found that earning college credits prior to high school graduation increases the likelihood of earning a college degree and reduces time-to-degree (Adelman, 2006; Swanson, 2008). In addition, some of the prior research that found positive outcomes for dual enrollment participants focused in particular on career–technical students. Career–technical students who participated in dual enrollment have shown higher college enrollment, grade point averages, and credit accumulation than similar career–technical students who did not take dual enrollment courses (Karp et al., 2007). Thus, the combination of rigorous career–technical education and dual enrollment has great potential to meet students' college and career readiness needs.

Concurrent Courses Initiative

In 2008, The James Irvine Foundation funded the Concurrent Courses Initiative (CCI) in support of one of the foundation's primary goals for its youth program: to increase the number of low-income youth in California who complete high school on time and attain a postsecondary credential by the age of 25. The recent report *Building a Grad Nation* (Balfanz, Bridgeland, Bruce, & Fox, 2012) names California as one of 10 states whose high school graduation rate declined from 2002 to 2009 (from 72.7 to 71 percent). Even when students do graduate from high school and enter college, postsecondary attrition without degree completion or transfer is alarmingly high, particularly in community colleges, which serve more low-income students and students of color than four-year postsecondary institutions. A 2010 study that tracked a large sample of California community college students found that, six years after enrolling, 70 percent of degree-seeking students (and 80 percent of Latino students) had neither completed a degree or certificate nor transferred; most of these students had dropped out rather than remaining enrolled (Moore & Shulock, 2010).

Pursuing an approach combining CTE and dual enrollment, the CCI provided support to eight secondary/postsecondary partnerships in California as they developed, enhanced, and expanded career-focused dual enrollment programs for three academic years starting in 2008-2009. The high school and college partnerships were to provide rigorous, supportive, and career-focused dual enrollment opportunities to the targeted students with the following desired outcomes:

- Strong student high school outcomes and smooth transitions into postsecondary education and training, including increased high school graduation and postsecondary entry and persistence rates;
- Development and implementation of rigorous and supportive pathways that integrate CTE and academic curricula through the use of dual enrollment and support services and that lead to postsecondary credentials;
- Strengthened collaboration between secondary and postsecondary institutions;
- Greater awareness of dual enrollment policy and practice statewide, as well as increased knowledge of how CTE and dual enrollment strategies may be combined to maximize the strength of each.

The CCI began operating across seven participating sites in the 2008-09 academic year, with an eighth site beginning in 2009–10 (see Appendix Table A.1). Some programs existed already but aimed to expand participation by the targeted students, while other programs were brand-new. All served high school students in CTE programs, which included Career Academy and Tech Prep models. CTE areas included health occupations, renewable energy, teaching careers, business, multimedia, and others. There was no prescribed program model: partnerships could select dual enrollment courses relevant to their particular career–technical programming, and they could deliver the courses on the high school or the college campus, based on local considerations (Edwards, Hughes, & Weisberg, 2011). In addition to dual enrollment opportunities, for which students were not charged tuition, the CCI also provided supplemental supports for the participating students. These included such things as college visits and career preparation activities (see Appendix Table A.2 for a classification of these services).

3. Data

This study uses data acquired through Cal-PASS, the California Partnership for Achieving Student Success. Cal-PASS is a voluntary, statewide data collection system that aims to spur collaboration between K-12 schools and the higher education system to improve educational outcomes in California. Since sharing data is voluntary, we worked with Cal-PASS to ensure participation by the education institutions that were part of the CCI. The K-12 data contain student background, course enrollment, and test score information, and the college dataset contains information on college enrollment and performance. College-level data are available for all public two-year and many public four-year colleges in California; between half and two thirds of the public four-year institutions participate. Private postsecondary institutions are not included. Thus, we do not have data for students who enrolled in colleges that are not within the Cal-PASS system.

In addition to these standard data files that yielded demographic and education data, we created a custom file to collect information on the students' participation in CCI activities. With assistance from Cal-PASS staff, the partnerships input the types and number of support services the participating students received as well as whether dual enrollment courses were taken on the high school or college campus. The custom files were collected for the academic years 2008-09 and 2009-10, allowing us to describe the CCI program over two years. Across these two years of implementation, we are able to describe more fully how the CCI was implemented on the ground. We are able to show the demographic characteristics and educational backgrounds of program enrollees, the number of dual enrollment courses taken, and the extent of supplementary supports that CCI students participated in. The standard file was collected over three academic years (2008–2009, 2009–2010, and 2010–2011), yielding information on CCI participants in school and then in college. This allowed us to examine the relationships between CCI participation and high school graduation and college performance for up to two years after high school.

Partners were instructed to input data for all students in the CTE pathways who participated in any CCI activity. Thus, we have data for the full population of "CCI participants," some of whom received the full treatment of dual enrollment plus support services, and some of whom participated only in support services. (It was very rare for students to enroll in dual enrollment without any supplemental service.) The subset of CCI participants who received the full treatment are referred to as "CCI dual enrollees." We are primarily concerned with this latter group, and we calculate outcomes only for them. We collected data on the full population as we wanted to be sure to capture access to support services by *potential* dual enrollees (some students would be accessing CCI-sponsored support services prior to taking dual enrollment courses, but we would not necessarily know which ones would subsequently take up the opportunity for dual enrollment).

Descriptive Information about the CCI

Table 1 describes participation in the CCI in its first two academic years. It shows a complex pattern of program implementation. There was wide variation in CCI participation across sites: two sites (B and D) had almost all students participating in at least one dual enrollment course; at the other five sites, only around one fifth of students were actually enrolled in a dual enrollment course. Two sites (A and H) offered their CCI dual enrollment courses physically at a college campus; two sites (F and G) offered CCI courses on both the high school and college campus; the rest offered them on the high school campus only. Across all sites, most of the CCI dual enrollment courses were taught by professors rather than high school teachers who were certified as adjuncts. Finally, CCI participants engaged in a range of supplemental activities and at different intensities.[2]

Across both years there was considerable variation in how the CCI was implemented across the sites. The sites vary along several factors: (a) the scale of the program (ranging from 71 students in site D up to 1,707 students in site B); (b) the percentage of students taking dual enrollment courses (ranging from 9 percent in site E up to 100 percent in site D); (c) the distribution of supplemental activities (with each site offering a different array of the eight activities); and (d) the intensity of supplemental activities (ranging from more than three fourths taking none in site A to all taking at least three in site D).

CCI implementation within a given site, on the other hand, was fairly consistent over time as the programs expanded over the two years of operation.[3] Student demographics (gender, race, and family background) were consistent. There was site-specific stability in who taught dual enrollment courses and where they were offered. While

[2] At some sites students participated in only a few activities (e.g., sites A and B); at other sites student participated in almost all the supplemental activities (e.g., sites C and F). At some sites, all CCI students participated in a particular activity (e.g., initiative orientation at site D); at other sites, CCI students were spread out across activities (e.g., site F). The heterogeneity of implementation was such that we were not able to identify the relative effectiveness of particular attributes of dual enrollment (e.g., whether courses taught by professors or on college campuses yielded greater benefits).

[3] In the first year, some sites were quite small scale: site D had only 71 participants and site C 132. Other sites were larger: site A had 958 participants and site B had 1,289. The sites grew in terms of participants (with the exception of site F), at a rate of approximately 20 percent over the academic years. However, this growth did not translate into growing percentages of students taking dual enrollment courses. In half of the sites the proportion of participants taking dual enrollment courses fell, and at three sites the average number of courses per participant fell, albeit slightly. Still, at all but one site the *number* of students enrolled in dual enrollment courses increased from the first to the second year of the initiative.

Table 1

Concurrent Courses Initiative Activities Across All Participants
Academic Years 2008–09 (unshaded) and 2009–10 (shaded)

	Site A		Site B		Site C		Site D		Site E		Site F		Site G [e]		Site H [f]	
Participants:[a]	958	1,085	1,289	1,707	132	169	71	95	360	957	483	451	215	283		67
In DE and supplements	168	209	1,141	1,277	32	54	71	95	43	83	92	56	0	44		60
In DE and no supplements	39	0	8	0	0	0	0	0	0	0	0	0	0	0		7
No DE and supplements	283	33	137	430	100	115	0	0	316	874	140	304	129	122		0
No DE and no supplements	468	843	*	0	0	0	0	0	*	0	251	91	86	127		0
Enrolled in any DE (%)	22%	19%	89%	74%	24%	32%	100%	100%	12%	9%	19%	12%	0%	16%		100%
DE courses enrolled in:																
0 courses	78%	80%	11%	25%	76%	68%	0%	0%	88%	93%	81%	87%	-	88%		0%
1 course	16%	14%	60%	53%	24%	20%	33%	27%	10%	7%	12%	10%	-	4%		*
2 courses	5%	5%	26%	20%	0%	9%	67%	24%	2%	0%	5%	2%	-	4%		12%
3 or more courses	0%	0%	3%	2%	0%	3%	0%	49%	0%	0%	2%	*	-	6%		82%
Mean DE courses enrolled in:																
All participants	0.26	0.25	1.21	0.98	0.24	0.47	1.65	2.21	0.13	0.08	0.27	0.16	-	0.25		2.76
CCI dual enrollees only	1.25	1.27	1.36	1.32	1.00	1.48	1.68	2.21	1.16	1.04	1.43	1.30	-	2.06		2.76
DE courses:																
Taught in colleges[b]	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	60%	50%	-	33%		100%
Taught by professors[c]	100%	100%	33%	34%	100%	100	100%	100%	100%	100%	60%	50%	-	100%		100%

Table 1 (continued)

	Site A		Site B		Site C		Site D		Site E		Site F		Site G [e]		Site H [f]
Supplemental activities:[d]															
Initiative orient.	-	-	-	-	-	-	99%	-	99%	100%	44%	44%	-	-	57%
College orient.	17%	18%	-	100%	5%	31%	99%	100%	10%	9%	20%	69%	56%	20%	-
Career orient.	-	-	-	-	68%	72%	-	100%	4%	7%	38%	-	-	40%	78%
Academic prep.	29%	19%	-	-	-	-	-	-	-	-	25%	-	-	12%	78%
Academic support	-	-	88%	-	100%	4%	-	-	2%	-	-	-	-	12%	-
Work-based learning	13%	11%	-	-	22%	15%	-	100%	-	-	36%	52%	26%	5%	-
Suppl. financial support	-	-	23%	8%	27%	*	-	-	-	-	20%	-	-	-	10%
Leadership activities	-	-	-	-	20%	100%	38%	-	-	-	-	-	11%	19%	-
Intensity of participation in supplemental activities:															
0	53%	78%	11%	-	-	-	1%	-	-	-	52%	20%	40%	43%	10%
1 or 2	46%	14%	89%	100%	60%	27%	61%	-	97%	93%	11%	53%	52%	57%	36%
3 or more	1%	8%	-	-	40%	73%	38%	100%	3%	7%	37%	27%	8%	-	54%

NOTES: Statistics for single years, not cumulative across the two years.

[a]All students, regardless of whether they took a DE (dual enrollment) course or any supplemental activities; enrollees are students who took a dual enrollment course.

[b]CC courses were either delivered in colleges or in high schools.

[c]CC courses were either taught by college professors or teachers certified as adjuncts.

[d]Supplemental activities could be undertaken by all participants more than once; percentages calculated per student.

[e]No CCI dual enrollment courses in 2008–09.

[f]No CCI participants in 2008–09.

*Values in the cell are suppressed due to Cal-PASS cell-size suppression rule of less than 5 (counts or percentages based upon counts less than 5).

there was significant variation in the types of supplemental supports offered each year, there was clear growth in the intensity of participation in supplemental activities.[4] At most sites, the proportion of participants engaging in these activities rose (final rows of Table 1).[5]

Table 2 describes the basic characteristics of the CCI participants and dual enrollees relative to all the students in their districts. This information is helpful for seeing which students were selected into the CCI program and which high school students enrolled in a dual enrollment course. Family background is measured as the education level of the responding parent.[6] Overall, the CCI participants and dual enrollment students at four sites came from families with lower education levels relative to the average student in their district; at the other four sites there appears to be no significant difference in parental education Table 2 also shows prior achievement measured by test scores before 11th grade.[7] Two aspects stand out. First, across seven sites the CCI participants had lower academic test scores than the average student in their district (the exception being site D). In 2009–10, CCI participants across these sites were between 0.14 and 0.33 standard deviations behind the average student in their district. This indicates negative selection into participation at the site level. Second, the test scores of the enrollees were significantly different from the participants and indeed from the rest of the district at five sites (and in two others the participants and enrollees are exactly the same persons). In sites A, B, C, E, and F, the dual enrollees' test scores were higher than those of the participants. Thus, there is negative selection by ability into the CCI program, but positive selection by ability into the CCI dual enrollment courses. These two selection effects are identifiable in both academic years. They are also identifiable if we use high school GPA data instead of test scores (not shown in table).

[4] For example, Site F had participants in six supplemental activities in 2008-09 and only three in 2009-10; for Site G the picture is exactly reversed (from three to six).

[5] We also considered students who participated in the CCI for more than one year. However, there was no clear evidence that these students received a substantially more intensive treatment.

[6] A sizeable proportion of these data are unknown: for two sites, over one third of the cases are not available (missing or refused to answer), but this is also true for the respective district student populations.

[7] Individual student test score information is available from Cal-PASS for different years and grades. Therefore, all tests were standardized to a mean score equal to zero and standard deviation equal to one. The prior test score variable is calculated as the mean score on all available tests between 8th and 10th grade.

Table 2

Concurrent Courses Initiative: Participant, Dual Enrollee, and Comparison Student Characteristics, Academic Years 2008–09 (unshaded) and 2009–10 (shaded)

	Site A		Site B		Site C		Site D		Site E		Site F		Site G		Site H
	2008–09	2009–10	2008–09	2009–10	2008–09	2009–10	2008–09	2009–10	2008–09	2009–10	2008–09	2009–10	2008–09	2009–10	2009–10
Participants' parental education:															
High school graduate or below	**64%**	50%	30%	29%	**64%**	**50%**	35%	42%	32%	**35%**	24%	39%	**53%**	**47%**	27%
Some college or above	19%	30%	61%	60%	26%	37%	15%	30%	30%	30%	24%	39%	5%	18%	60%
Refused/missing	18%	20%	10%	11%	10%	13%	52%	28%	38%	35%	53%	23%	42%	35%	13%
Dual enrollees' parental education:															
High school graduate or below	**68%**	44%	25%	27%	**56%**	**57%**	35%	42%	28%	28%	24%	39%	-	36%	27%
Some college or above	9%	45%	56%	63%	38%	38%	15%	30%	30%	37%	38%	37%	-	21%	60%
Refused/missing	23%	11%	19%	10%	6%	16%	52%	28%	42%	35%	38%	24%	-	43%	13%
District parental education:															
High school graduate or below	46%	34%	29%	29%	48%	44%	38%	40%	32%	28%	22%	37%	35%	36%	23%
Some college or above	24%	24%	61%	60%	41%	40%	19%	19%	35%	32%	17%	39%	27%	40%	61%
Refused/missing	31%	42%	11%	12%	11%	17%	44%	41%	32%	40%	61%	24%	38%	24%	16%
Prior test scores (standardized):[a]															
Participants	**−0.06**	**−0.15**	**−0.07**	**−0.14**	**−0.33**	**−0.33**	**0.89**	**0.64**	**−0.18**	**−0.22**	**−0.13**	**−0.31**	**−0.18**	**−0.32**	−0.23
(SD)	(0.74)	**(0.73)**	(0.78)	(0.81)	(0.60)	**(0.60)**	(0.90)	(0.87)	(0.64)	(0.68)	(0.70)	**(0.67)**	(0.55)	**(0.51)**	(0.09)
Dual enrollees	**0.22**	**0.29**	−0.01	**−0.03**	**−0.32**	**−0.15**	0.89	0.64	**−0.06**	**−0.06**	**0.23**	**0.21**	-	−0.33	−0.23
(SD)	(0.57)	**(0.55)**	(0.76)	(0.79)	(0.62)	**(0.55)**	(0.90)	(0.87)	(0.57)	(0.52)	(0.72)	**(0.73)**		(0.44)	(0.09)
District	0.01	−0.07	0.07	0.01	0.01	−0.01	−0.03	−0.04	−0.03	−0.03	0.01	−0.05	0.06	0.00	−0.06
(SD)	(0.88)	(0.92)	(0.91)	(0.93)	(0.88)	(0.89)	(0.87)	(0.86)	(0.89)	(0.90)	(0.88)	(0.87)	(0.90)	(0.92)	(0.01)

SOURCE*:* Cal-PASS Core, K12 Student and K12 STAR data files.

NOTES: Bold indicates a statistically significant difference between the participants and the districts ($p < .05$). Sample includes students in K12 STAR demographic data file with parental education data.

[a]Prior test scores calculated from all available test score data (grades 8–10; grades 9–10 for site C). Test scores standardized (mean 0, SD 1) by district-grade-subject (reading and math). The reported individual test score is the mean score across all available tests. Site H did not have participants in 2008–2009.

Pooling Across Sites and Years

One important issue is whether the datasets can be pooled, either across sites or years. This would be appropriate if the CCI were a consistent "treatment" or prescriptive reform. In intent, the goals of the initiative were consistent across sites and years. However, the eight sites are in different localities, with different school–college links and student demographics, and they did have flexibility in how they implemented the CCI. Across the two years of study, there were some changes in how the sites operated; at two sites, there were no dual enrollment students in the first year.

Overall, the descriptive frequencies suggest that pooling the sample across the two years may be appropriate. Within each site, the programs appear to have been implemented in a similar way in terms of dual enrollment course provision, but in a more mixed way in terms of supplemental activities. Given that the main intervention was dual enrollment, this suggests that pooling is justifiable. Moreover, there is evidence of stability in terms of student characteristics (gender and race) and family background as well as consistency in the negative and positive selection biases. Finally, it is not necessarily the case that pooling will bias the results for sites with higher proportions of students who participated in both years; these students did receive a more intensive program, but primarily because they participated in more supplemental activities.

Our approach below is to report findings from analysis in three ways: by site, by year, and pooled. Pooling has the advantage of identifying an overall apparent CCI effect and of yielding more precise estimates through larger sample sizes. However, given the site-specific and temporal variation, as well as differences in scale across sites, results from each site and year are also valuable. Therefore, these are reported where they are available.

4. Empirical Framework

Our method for identifying the apparent effects of supportive dual enrollment on student outcomes is as follows. First, we estimate a series of regression models separately by site of the form:

$$(1) \quad Y_{k,t+j} = \alpha + \beta.DE_t + \gamma_f \mathbf{X}_f + \theta_f \, TEST + \varepsilon_i$$

The dependent variables (Y_k) include measures of high school and college performance. These outcomes are predicted to be a function of a vector of basic student characteristics $\mathbf{X}_f$; these are race (four dummy variables), gender, primary language English, and parental education (grade levels are also included where appropriate). The outcomes are also expected to be strongly predicted by prior ability *TEST* (measured by test scores in high school). To indicate the influence of this variable, it is introduced in a step-wise framework. The equations are estimated using probit (for binary outcomes) or ordinary least squares (for continuous outcomes).

Additionally, when estimating the apparent influence of CCI dual enrollment on the various outcomes for the sample pooled across sites, we use the following model specification:

$$(2) \quad Y_{k,t+j} = \alpha + \beta.DE_t + \gamma_f \mathbf{X}_f + \theta_f \, TEST + SiteFE + \varepsilon_i$$

Model (2) adds to model (1) by including a vector of site fixed effects, *SiteFE*, which is important because CCI dual enrollment participation is determined by the particular policies and practices of each site. Finally, Model (3) adds a vector of cohort fixed effects, *CohortFE*, for estimating the apparent influence of CCI dual enrollment on the sample pooled across sites and cohorts.

$$(3) \quad Y_{k,t+j} = \alpha + \beta.DE_t + \gamma_f \mathbf{X}_f + \theta_f \, TEST + SiteFE + CohortFE + \varepsilon_i$$

Our interest is in the association between the high school and college outcomes and taking a CCI dual enrollment course (DE) at time t = (academic year 2008–09 and 2009–10). Our hypothesis is that the β coefficients will be positive and statistically significant. Outcomes are measured at times $t+j$, from high school up to two years into college. The sample for estimation includes CCI dual enrollees (flagged through the population-wide Cal-PASS data system) and all students in the same district and school year as the dual enrollees For some specifications of equations (1), (2), and (3), we restrict the comparison sample to students with characteristics more similar to the dual enrollees

However, to more accurately identify the apparent effects of the CCI, we must address the issue of selection bias, that is, the extent to which students who select into the CCI — both as participants and as enrollees — differ systematically from comparable students across their districts.

On balance, the selection bias could be positive or negative. If students who do participate in the CCI differ systematically from those who do not participate, a district-wide comparison group is unlikely to identify a meaningful effect of the CCI. In order to participate in the CCI, a student must have: (a) participated in a CTE pathway or program in a school that offered the CCI; (b) been offered the opportunity to participate in the CCI; and (c) have accepted that offer. The bigger concern is with positive selection, the situation in which CCI students are better prepared than their district peers such that we identify this preparedness rather than the impact of the CCI in the analysis. Regarding (a), if the school is involved in the CCI because its students are underperforming, there will be negative selection into the CCI, but if it is involved because it intends to positively differentiate itself, there may be positive selection. Regarding (b), if the CCI is offered to students who are struggling with the regular curriculum and need additional motivation, there will be negative selection, but if CCI is offered to students who already expect to attend college, positive selection is likely. Regarding (c), if students who enroll in the CCI believe that they will not achieve at a high level or get into college without participating in the CCI, then there is negative selection; alternatively, if participation simply reflects students' unobserved motivation, there will be positive selection.[8]

Ideally, (a), (b), and (c) should be modeled with respect to prior student ability for each of the sites. The sites differ in whether each selection effect is relevant. For some sites there is no school-involvement selection effect: the CCI is open to all students who are in the CTE program in the district. For other sites there is no student-offer selection effect: the CCI is open to all students in the school. For some sites, neither selection effect occurs.

Given that not all selection effects apply across all sites, the selection bias should not be overstated. Moreover, based on student test scores and family backgrounds, the CCI exhibits both negative and positive selection: negative selection because the participants are less advantaged than the average student in the district, and positive selection because the dual enrollees are more advantaged than the typical CCI participant. In theory, the "selection into dual enrollment bias" with respect to ability may be positive or negative: high-ability students might consider that the supports are sufficient to orient them toward college; alternatively, low-ability students might consider that the supports are not enough to orient them toward college.

[8] In offering students places, the school may have accurately assessed student ability to benefit from the CCI such that (c) is included in (b).

We attempt to capture these selection effects by estimating a propensity score model (Rosenbaum & Rubin, 1984). This model matches CCI dual enrollees with "observably equivalent" district students, using characteristics listed in Table 2. For each site, we create for each student a propensity score, which is a weight that increases according to the correspondence of characteristics between dual enrollees and district students. We then estimate the average treatment effect, accounting for this propensity score. We run these models only for the dual enrollees — the students with the full treatment — compared with their district peers. With exceptions as noted below, the propensity score results are similar to those using probit/ordinary least squares, so we report only the latter results.[9]

[9] The propensity score results are available from the authors. Below we discuss where the propensity score results differ from those using ordinary least squares or probit estimation.

5. Results

High School Outcomes

We are interested in knowing whether participation in supportive dual enrollment as part of a career-oriented program improved high school grades and progress toward high school graduation. As noted earlier, it is expected that affording students opportunities to take a college course — particularly one relevant to their career goals — will have an impact on their motivation, engagement, and ultimately their academic achievement. In addition, we suspect that a CTE component may give students a deeper understanding of the relevance of education, and it may engage them enough to keep them enrolled. Below, we present evidence on performance in CCI dual enrollment courses as well as results from the examination of the apparent influence of CCI dual enrollment on high school grades and graduation.

Performance in Dual Enrollment Courses

First, we report descriptive statistics on course-taking by students in CCI dual enrollment courses. Tables 3 and 4 show in more detail how the students performed in their CCI dual enrollment courses. These data are taken from the Cal-PASS community college data file, matched on individual student identification numbers. As some students took multiple dual enrollment courses sample sizes vary across the rows.

The two sites that yield the most information are site A and site B. At both sites, by far the majority of students (84 percent and 87 percent, respectively) passed their dual enrollment courses (see Table 3). Twenty-seven percent of students at site A and 42 percent of students at site B received A grades in these courses. Across both years the students appear to have been succeeding in their dual enrollment courses..[10]

Table 4 shows how performance varied across setting and instructor. Dual enrollment course completion rates are high in both settings, though slightly higher in college settings than in high school settings. That said, there is only one site where the courses are delivered exclusively in a college setting so this may be a site-specific effect. As for the type of instructor, the bottom panels of Table 4 show that there is no clear difference

[10] Unfortunately, the heterogeneity and small number of sites are such that a more nuanced analysis of what might explain differences in student performance may not be possible. For example, it would be interesting to discover whether the CCI's apparent effects are greater for courses taught by college professors or for courses offered in campus settings. However, these analyses are equivalent to testing for site-specific effects; it is therefore not possible to see whether any differences we find are driven by the instructor or by some other site-specific characteristic.

in course completion rates according to whether the course was taught by a college professor or high school instructor.

Table 3

Student Performance in Dual Enrollment Courses Pooled Across Academic Years 2008–09 and 2009–10

	Site A	**Site B**	**Site C**	**Site D**	**Site E**	**Site F**[a]	**Site G**[a]	**Site H**[b]
Grade in DE course:								-
A	27%	42%	17%	26%	47%	32%	17%	-
B	18%	22%	20%	14%	25%	14%	10%	-
C, D or pass	39%	23%	30%	5%	15%	13%	23%	
F	5%	2%	23%	7%	5%	5%	14%	-
W	7%	1%	9%	6%	*	8%	*	-
Other	5%	8%	*	42%	5%	28%	31%	
								-
Credits attempted	3.88	5.06	4.13	3.77	2.76	5.05	5.66	
	(2.80)	(3.23)	(1.14)	(1.55)	(1.06)	(2.70)	(2.66)	-
Credits passed	3.55	4.85	3.13	2.78	2.68	3.72		-
	(2.59)	(3.28)	(1.96)	(1.78)	(1.17)	(2.56)		
Number of courses	831	3,521	111	175	104	213	100	
Number of students	412	1,865	78	88	95	123	37	

SOURCE*:* Cal-PASS CCI files matched to Cal-PASS community college files.

NOTES: Standard deviations in brackets.

[a]Site did not offer CCI courses in 2008–2009.

[b]Data not provided. “Other” grades include ungraded and incomplete.

*Values in the cell are suppressed due to Cal-PASS cell-size suppression rule of less than 5 (counts or percentages based upon counts less than 5)

Table 4

Student Performance in Dual Enrollment Courses by Location of Course and Instructor
Academic Years 2008–09 and 2009–10

	Site A	Site B		Site C	Site D	Site E	Site F		Site G[b]		Site H[c]
2008–09:											
DE courses taught in	College	HS		HS	HS	HS	College	HS			
college or high school:											
Completed[a]	90%	90%		56%	50%	78%	63%	50%	-		
Failed	4%	2%		12%	14%	17%	*	11%	-		
Withdraw	5%	1%		32%	0%	0%	*	0%	-		
Other Grade	*	7%		0%	36%	*	22%	39%	-		
DE courses taught by	College	College	HS	College	College	HS	College	HS			
College Professor or	professors	profs.[b]	instruct.[b]	professors	professors	instructors	profs.	instruct.			
High School Instructor:	only			only	only	only					
Completed[a]	90%	91%	88%	56%	50%	78%	66%	57%	-		
Failed	4%	3%	2%	12%	14%	17%	*	*	-		
Withdraw	5%	1%	1%	32%	0%	0%	*	*	-		
Other Grade	*	6%	8%	-	36%	*	17%	32%	-		
Number of course units	297	1,634		25	28	23	116				
2009–10:											
DE courses taught in	College	HS		HS	HS	HS	College	HS	College	HS	
college or high school:											
Completed[a]	95%	88%		68%	44%	94%	76%	40%	42%	41%	
Failed	3%	2%		27%	5%	*	*	*	19%	25%	
Withdraw	*	1%		*	7%	*	*	*	*	8%	
Other Grade	*	9%		*	44%	0%	13%	48%	36%	25%	

Table 4 (continued)

	Site A	Site B		Site C	Site D	Site E	Site F		Site G[b]	Site H[c]
DE courses taught by College Professor or High School Instructor:	College professors only	College profs.	HS instruct.	College professors only	College professors only	College professors only	College profs.	HS instruct.	College Professors only	
Completed[a]	95%	89%	85%	68%	44%	94%	40%	76%	41%	
Failed	3%	3%	2%	27%	5%	*	*	*	20%	
Withdraw	*	1%	2%	*	7%	*	*	*	*	
Other Grade	*	7%	11%	*	44%	0%	48%	13%	34%	
Number of course units	479	1,858		82	147	77	52	45	76	

SOURCE*:* Cal-PASS CCI files matched to Cal-PASS community college files.

NOTES*:* Sample only includes students who enrolled in a CCI dual enrollment course.

[a]Completed with grade "A", "B", "C", "Pass," or "D."

[b]No dual enrollment students in 2008–09.

[c]Data not provided.

*Values in the cell are suppressed due to Cal-PASS cell-size suppression rule of less than 5 (counts or percentages based upon counts less than 5).

The Influence of the CCI on Students' Performance in High School

We examine the performance of CCI dual enrollees in high school relative to comparable students within their districts. Students' high school GPAs are available for the year in which they are participating in the CCI, so we include students in grades 9 through 12. Although these GPAs are almost contemporaneous with participation, they may have been influenced by the program: students may have enjoyed high school more; they may have had stronger social bonds in school through the supplemental services; and they may have been more motivated because they had higher expectations of attending college subsequently.

Table 5 reports estimations of the determinants of a student's GPA, comparing CCI dual enrollees and all students in the district for each site. These estimations include only dual enrollees (not all participants) and so correspond to equation (1) above. Separate estimates are reported for 2008–09 and 2009–10. Controlling for student characteristics, the upper panels of Table 5 show for each year the apparent effect of the CCI on dual enrollee student GPA compared with all other students in the district. The lower panels of Table 5 show the effect once we control for the student's standardized prior test scores; the apparent effect of dual enrollment through the CCI is therefore the gain in GPA net of prior achievement levels.

If we do not control for prior test scores, for 2008–09, dual enrollees have higher GPAs at two sites (D and F) and lower GPAs at one site (B). As shown in the lower panel, prior test scores are strongly predictive of high school GPA, and they strongly mediate the influence of the CCI. Controlling for prior test scores, a third site (C) now exhibits a statistically significant positive association with high school GPA, and the negative association at site B is no longer statistically significant. For 2009–10, dual enrollees have higher GPAs at three sites (again at sites D and F and now at site A) but lower grades at two sites (again at site B and now at site H). These correlations hold even if we control for prior test scores. Examining the influence of CCI dual enrollment using the samples pooled by site and by site and cohort, we find a consistent positive association with high school GPA even after controlling for test scores. These positive and significant results for the pooled samples, however, are sensitive to how they are modeled and do not hold using propensity scores.

Table 5

Determinants of High School GPA for Dual Enrollees
Academic Years 2008–09 and 2009–10
(OLS)

	Pooled across Sites	Site A	Site B	Site C	Site D	Site E	Site F	Site G[a]	Site H
2008–09:									
CCI Dual enrollee	0.050**	0.077	−0.070***	0.157	0.745***	0.107	0.441***	-	-
	(0.023)	(0.044)	(0.024)	(0.157)	(0.118)	(0.134)	(0.093)		
R-squared	0.164	0.182	0.244	0.118	0.096	0.177	0.175	-	-
N	*158,320*	*8,856*	*6,227*	*2,392*	*100,317*	*21,934*	*13,441*		
CCI Dual enrollee	0.048**	−0.045	−0.018	0.311**	0.241**	0.124	0.333***	-	-
	(0.020)	(0.047)	(0.022)	(0.139)	(0.101)	(0.122)	(0.083)		
Prior test scores (std.)	0.554***	0.324***	0.445***	0.491***	0.609***	0.488***	0.503***	-	-
	(0.003)	(0.010)	(0.010)	(0.020)	(0.003)	(0.007)	(0.009)		
R-squared	0.367	0.338	0.428	0.315	0.334	0.340	0.351	-	-
N	*150,622*	*4,444*	*5,975*	*2,163*	*98,042*	*20,232*	*12,324*	-	-
2009–10:									
CCI Dual enrollee	0.035	0.154***	−0.055***	0.017	0.526***	0.026	0.441***	0.072	−0.249***
	(0.023)	(0.035)	(0.017)	(0.095)	(0.075)	(0.076)	(0.070)	(0.124)	(0.087)
R-squared	0.148	0.179	0.242	0.111	0.112	0.176	0.162	0.148	0.127
N	*183,005*	*17,026*	*12,278*	*4,897*	*270,169*	*32,654*	*18,832*	*19,158*	*5,610*
CCI Dual enrollee	−0.003	0.085***	−0.041**	0.093	0.144**	0.041	0.329***	0.070	−0.232***
	(0.020)	(0.026)	(0.015)	(0.088)	(0.065)	(0.070)	(0.063)	(0.106)	(0.080)
Prior test scores (std.)	0.553***	0.395***	0.457***	0.473***	0.573***	0.446***	0.463***	0.510***	0.334***
	(0.002)	(0.007)	(0.007)	(0.014)	(0.002)	(0.006)	(0.007)	(0.006)	(0.010)
R-squared	0.369	0.338	0.445	0.295	0.333	0.324	0.326	0.363	0.282
N	*175,0165*	*11,914*	*11,751*	*4,476*	*260,575*	*29,785*	*17,344*	*17,998*	*4,973*

NOTES*:* Sample only includes students in same grades as CCI dual enrollees. Models include variables for male, Hispanic, Black, White, Asian (other race is reference), English primary language, parental education below high school, parental education missing, grades 9–11. For each year, the top panel includes controls for background characteristics and the bottom panel adds additional controls for prior test scores. Standard errors in parentheses.

[a]No dual enrollment students in 2008–09.

****p* < .01. ***p* < .05. **p* < .1.

Across Table 5, however, it is clear that prior test scores explain a substantial amount of student GPAs. We cannot rule out the possibility that any association between GPA and dual enrollment is a result of positive selection into dual enrollment.[11]

Next, we consider high school graduation as an outcome (and so we restrict the sample to students who were in 12th grade in either of the academic years). This outcome must be interpreted cautiously. It is possible that CCI participation influences the probability a student will graduate from high school. However, it seems likely that a student who makes it to 12th grade and is enrolled in the CCI will graduate at the end of that academic year (many students who dropout do so before they enter 12th grade). Also, to find a comparison group it is necessary to sort by grade level: the matching students for a 12th grade CCI dual enrollee were also in 12th grade. So the matching students might be quite likely to graduate as well. A final concern is that, given the small samples per site, the binary graduation variable may have limited variance. Nevertheless, straightforward comparisons show that the graduation rates of the dual enrollees were much higher than the averages for their districts (except for one site; not shown). This is despite their less advantaged backgrounds and lower prior test scores. Therefore, it is worthwhile to consider whether this graduation rate difference still holds after controlling for other characteristics.

Table 6 reports the relationship between dual enrollment and the probability of graduating from high school (with and without controlling for prior test scores). For 2008–09 results are only available for four sites; for 2009–10 results are available for six sites. Sites are missing from the analysis either because they did not have any 12th graders in dual enrollment courses or because the graduation rate was 100 percent. Table 6 consistently shows that graduation rates were much higher for dual enrollees than for their peers within the districts. This relationship holds even after controlling for prior test scores and holds for both graduating classes of 2009 and 2010. At three sites (A, B, and C), the association is especially strong. However, this graduation rate association is sensitive to how it is modeled.[12]

[11] Results using propensity score matching are similar (details available from the authors). These affirm that enrollees at sites D and F have higher GPAs in both academic years. There is also support for the finding that the negative effect at site B is weak but that the negative association at site H is robust. Also, propensity score results for the pooled samples suggest that while the association of DE and GPA is positive, it is not statistically significant.

[12] We tested the relationships using a propensity score matching model. In both 2008–09 and 2009–10, only one site (C) shows a positive association between dual enrollment and high school graduation. At the other sites there is no statistically significant difference between the CCI dual enrollees and the matched control group, although the coefficients are mostly positive. It is also possible that these results are an artifact of how the data are recorded: sample attrition for the dual enrollees was lower than for the district as a whole. Also, at some sites the lack of statistical significance reflects the large standard errors, small sample sizes, and the bound of the graduation rate at 100 percent. Note that several of these limitations are ameliorated when pooling the sample across sites and across cohorts.

Table 6

Probit Estimates of Determinants of High School Graduation for Dual Enrollees
Academic Years 2008–09 and 2009–10

	Pooled across sites	**Site A**	**Site B**	**Site C**	**Site D**	**Site E**	**Site F**	**Site G**	**Site H**
2008–09:									
CCI Dual enrollees	0.845***	1.101***	0.717***	0.739*	-	−0.043	-	-	-
	(0.076)	(0.292)	(0.101)	(0.384)	-	(0.282)	-	-	-
N	*16,638*	*4,359*	*1,866*	*1,180*		*5,402*	-	-	-
CCI Dual enrollees	0.722***	1.083***	0.599***	1.013**	-	−0.148	-	-	-
	(0.089)	(0.337)	(0.113)	(0.431)	-	(0.296)			
Prior test scores (std.)	0.664***	0.861***	0.417***	0.918***	-	0.537***	-	-	-
	(0.019)	(0.157)	(0.062)	(0.074)	-	(0.029)			
N	*13,869*	*459*	*1,560*	*1,006*		*4,379*	-	-	-
2009–10:									
CCI Dual enrollees	0.674***	1.250***	0.663***	0.535**	-	0.503**	-	0.860*	0.473
	(0.098)	(0.280)	(0.083)	(0.214)	-	(0.202)	-	(0.470)	(0.518)
N	*23,871*	*9,981*	*3,133*	*2,411*	-	*10,992*	-	*6,070*	*1,838*
CCI Dual enrollees	0.580***	0.875**	0.548***	0.730**	-	0.304	-	0.792	0.352
	(0.118)	(0.292)	(0.097)	(0.240)		(0.215)		(0.501)	(0.564)
Prior test scores (std.)	0.678***	0.532***	0.563***	0.866***	-	0.596***	-	0.943***	0.448***
	(0.018)	(0.139)	(0.053)	(0.049)		(0.022)		(0.046)	(0.064)
N	*20,861*	*4,445*	*2,691*	*2,114*	-	*9,130*	-	*5,682*	*1,483*

NOTES*:* Race variables relative to other race. Models include variables for male, Hispanic, Black, White, Asian, English primary language, parental education below high school, and parental education missing. For each year, the top panel includes controls for background characteristics and the bottom panel adds additional controls for prior test scores. Results from 2008–09 are from Belfield and Rodriguez (2011, Tables 11 and 12). Sample only includes students in 12th grade in 2008–09. Site D and site G have no 12th grade enrollees. All CCI enrollee 12th graders in site F are graduates. Note also that regression for all sites includes site F. Probit coefficients reported. Standard errors in parentheses.

***$p < .01$, **$p < .05$, *$p < .1$.

We next examine the apparent influence of CCI dual enrollment on high school graduation using the sample pooled across sites and also pooled across sites and cohorts. Pooling the sample has the added benefits of increasing the sample size of treated students, and it allows us to include site F, which we previously could not include because there was no variation in the outcome since all CCI dual enrollees had graduated. For all pooled samples, we find consistent and positive associations between CCI dual enrollment and high school graduation, even after controlling for test scores. The positive and significant association is not sensitive to how it is modeled.

College-Level Outcomes

Next we present an examination of the influence of CCI dual enrollment on rates of college enrollment and performance. In the longer term, we expect to see increased rates of college entry and success due to improved academic skills and understanding of college expectations.

The Link between the CCI and College Outcomes

One of the primary goals of the CCI was to improve educational outcomes for students and specifically to enhance their opportunities for college enrollment and success. Given the initiation of the CCI in 2008–09, only a limited number of participants have graduated from high school, become eligible for college, and have made some headway into their college careers. Thus, our analysis of college-level outcomes is restricted to the first few years of college for those students who were in 12th grade in each of the academic years. For a subset of the cohort of CCI dual enrollees in 2008–09— those who were in 12th grade at that time — it is possible to examine their college-level performance in 2009–10 and in 2010–11, that is, in their first and second years in college. Five sites had such students. Similarly, for the 2009–10 cohort it is possible to examine their college-level performance in 2010–11, their first year in college. Seven sites had such students. We refer to these students as the graduating classes of 2009 and 2010, respectively.

Potentially, the CCI might improve college attendance through several means. The effect may be direct in that the CCI boosts achievement and so improves students' college readiness. Or, the effect may be more subtle, in which the CCI enhances students' motivation to attend college or persuades them that college is a fitting opportunity for them. Thus, even where no academic achievement gain is observable, the CCI might still encourage students to attend college. Once enrolled, CCI students might have greater familiarity with college experiences such that they can progress more quickly through college and perform at a higher level. Again, these performance effects may occur absent any identifiable apparent effects of the CCI on high school achievement.

For these graduating classes, we have information on whether they enrolled in college, the types of courses they took, as well as information on an array of college performance indicators. Thus, it is possible to see whether CCI participation is associated with college choices and performance in college. As with the high school outcomes, the comparison group consists of students from the district (also restricted to 12th graders).

However, as noted above, data are not available if a student enrolled in a college that is not within the Cal-PASS system; most of the Cal-PASS colleges are two-year rather than four-year colleges (and none are private institutions).[13] This leads to two types of censoring: above and below censoring. Where the CCI is effective it will lead more students to attend college than otherwise, but it may also push some students out of Cal-PASS colleges and into more selective, private institutions; this is "above" censoring. When this occurs, no apparent effect of the CCI on college enrollment could be observable. The same logic applies in reverse for "below" censoring, where the CCI leads students who would have enrolled at a four-year school to enroll at a two-year school.

For each graduating class, descriptive frequencies for each of the outcomes are given in Table 7. Overall, the college outcomes of the CCI dual enrollees are considerably above those of their district peers. Over one half of all students in the CCI graduating classes attended college, and one in six of them attended a four-year college. These rates are considerably above the average for students in their respective districts.[14] Within their first year of college, one third of the CCI dual enrollees took a basic skills course; the average rate for students from the district was 11 and 14 percentage points higher, in the class of 2009 and 2010 respectively. And the dual enrollees had higher college GPAs than their peers.

For college credits, we report the total number of such credits accumulated, which includes the credits accumulated when the students were in the CCI. The CCI was designed to provide students with the opportunity to earn college credit in high school. Thus, we would expect the CCI dual enrollees to have more college credit accumulated than the comparison students; otherwise, the initiative would not have worked as intended. Still, it is informative to know whether the early credit accumulation is sustained over time — whether dual enrollment provides continuing momentum.

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[13] Data are also missing if the student enters the labor market, leaves the state, or pursues any other path.

[14] Note that college enrollment rates varied by site. Dual enrollees' and district peers' college enrollment ranged from a low of 23 percent at site E to a high of 65 percent at site A. This compares to a low of 19 percent to a high of 60 percent for district peers (tables not shown, available upon request). Furthermore, across all sites, a smaller proportion of students in the class of 2010 enrolled in college compared to those in the class of 2009 for both dual enrollees (a decline of 11 percentage points) and district peers (a decline of 4 percentage points).

Table 7

College Outcomes: Descriptive Statistics
Graduating Class of 2009 and 2010: Pooled by Site

	Graduating Class of 2009 (Pooled across 5 sites)		Graduating Class of 2010 (Pooled across 7 sites)	
	Dual enrollees	**District 12th graders**	**Dual enrollees**	**District 12th graders**
College Enrollment:				
Enrolled in college	**62%**	48%	**51%**	44%
Enrolled in 4-year college	**15%**	6%	**17%**	9%
First Term Outcomes:				
Took basic skills course [a]	**30%**	41%	**32%**	46%
College GPA	2.07	2.00	**2.36**	2.13
	(0.05)	(0.02)	(0.07)	(0.02)
College credits	**15.34**	9.57	**14.95**	8.69
	(0.54)	(0.15)	(0.62)	(0.11)
One-Year Outcomes: [b]				
Persistence	**90%**	81%	**91%**	85%
College credits	**24.82**	16.87	**26.25**	17.20
	(0.85)	(0.25)	(1.05)	(0.19)
Two-Year Outcomes: [c]				
Persistence	**82%**	70%	-	-
College credits	**33.43**	23.37	-	-
	(1.15)	(0.35)	-	-
Total in college (N)	*430*	*4,783*	*270*	*7,408*
12th grade sample	*691*	*9,940*	*526*	*16,802*

NOTES*:* Sites A, B, C, E, and G had 12th graders in 2008–09. Sites A, B, C, E, F, G, and H had 12th graders in 2009–10. Standard errors are in parentheses. Figures in bold indicate statistically significant differences against district peers (*t*-test, 5%). For graduating class of 2009, college students are all first-time freshmen at a California public college entering in summer 2009, fall 2009, or spring 2010. For graduating class of 2010, college students are all first-time freshmen entering in summer 2010, fall 2010, or spring 2011.

[a]For graduating class of 2009, sample only includes students entering two-year colleges. For graduating class of 2010, sample only includes students entering two-year colleges.

[b]For graduating class of 2009, measured after end of second term (fall 2009 and spring 2010 entrants). For graduating class of 2010, measured after end of second term (fall 2010 entrants).

[c]For graduating class of 2009, measured at end of fourth term (fall 2009 entrants).

CCI dual enrollees typically took one or two college courses when in high school (see Table 1), such that they had accumulated 2.4 to 4.5 credits before officially entering college. Even accounting for these early starts, dual enrollees had accumulated significantly more college credits after the first year of college and in subsequent years. After two years of college, the dual enrollees from the graduating class of 2009 had, on average, 10 more college credits than the average district peer who graduated in the same year and also attended college.[15]

The Influence of the CCI on Attending College

The first college outcome we consider is a binary indicator for whether the student attended a college that is within the Cal-PASS system within one year after high school graduation. Table 8 reports results pooled across both graduating classes, split by graduating class and then by site for the 2010 graduating class. There is no consistent evidence that CCI participation had any apparent effect on enrollment in one of the Cal-PASS colleges. Point estimates vary by graduating class, by specification, and by site but they rarely reach statistical significance ($p < .05$). At this broad level, the CCI does not appear to have influenced enrollments in college, although there are no statistically significant negative associations between dual enrollment and college enrollment for the pooled samples. However, viewed by site, there does appear to be a negative association with college enrollment for the class of 2010 in site E. Unsurprisingly, high school GPA has a very strong and consistent association with college enrollment.

We also examine whether CCI dual enrollment participation is associated with a higher probability of enrollment at the partner colleges. If there is an association, this may provide extra motivation for colleges to participate in the CCI. We estimate the same equations as per Table 8, with the binary outcome as enrollment at a partner institution (again, this refers to the time immediately after completing high school). The relationships are estimated split by graduating class, pooled across classes, and separately by site. Overall, there is no consistent evidence that CCI dual enrollment participation had any apparent effect on enrollment in one of the partner colleges.[16]

[15]Across the sites the patterns are more mixed. There is a much higher rate of college-going at sites A and C but a lower rate at sites E and G. Nevertheless, these descriptive frequencies are suggestive of higher performance in college by the CCI dual enrollees. However, we caution that these sample sizes are further attenuated: the samples are restricted to 12th graders and then to those who actually enrolled in college within one year of completing high school. The sites with the largest samples of dual enrollees are A and B.

[16] Results do vary by graduating class, by specification, and by model. But the results are not consistent: at two sites the relationship changes sign across model specifications. But the null associations of the CCI hold even when high school GPA is omitted (model [1]) and when the sample is restricted to those who are likely candidates — in terms of their GPAs — for the partner colleges (model [2]). Overall, the CCI does not appear to have influenced enrollments at the partner colleges. Details are available from the authors.

Table 8

Probit Estimates of Attending College Within One Year of High School Graduation

	Pooled across graduating classes and sites	Graduating class of 2009	Graduating class of 2010	Graduating class of 2010						
		Pooled across sites	Pooled across sites	Site A	Site B	Site C	Site E	Site F	Site G	Site H
CCI dual enrollee	0.011	0.103*	−0.066	0.050	−0.040	0.566**	−0.492**	−0.426	−0.278	−0.282
	(0.042)	(0.057)	(0.061)	(0.109)	(0.102)	(0.243)	(0.214)	(0.308)	(0.254)	(0.413)
High school GPA	0.116***	0.034*	0.170***	0.041	0.098	0.282***	0.058**	0.316***	0.261***	0.107
	(0.013)	(0.019)	(0.016)	(0.062)	(0.068)	(0.052)	(0.028)	(0.115)	(0.026)	(0.063)
High school test score	−0.036***	−0.125***	−0.027*	−0.187***	−0.319***	0.260***	−0.071	0.035	−0.017	0.158
	(0.012)	(0.017)	(0.014)	(0.061)	(0.060)	(0.055)	(0.026)	(0.164)	(0.023)	(0.048)
N	*23,524*	*10,479*	*15,348*	*1,159*	*1,117*	*1,080*	*4,531*	*312*	*5,671*	*1,478*

NOTES*:* Model also includes student characteristics. For pooled equations, site-specific indicators are also included. Sample includes 12th graders from partner districts. 2008–09 data from five sites; 2009–10 data from seven sites. Site specific analyses for class of 2009 available upon request for Site A and B only. Probit coefficients reported. Standard errors in parentheses.

***$p < .01$. **$p < .05$. *$p < .1$.

While CCI dual enrollees appear to have entered college at similar rates as their nonparticipating peers, Table 9 shows there is a strongly positive association between CCI dual enrollment participation and attending a four-year college.[17] But it is only weakly identifiable for the sites in the graduating class of 2010. The substantive effect is large: controlling for student characteristics including high school GPA, dual enrollees are predicted to have enrolled at a four-year college at a rate two percentage points above that of their district peers (not shown in tables).

Table 9

Probit Estimates of Attending Four-Year College Within One Year of High School Graduation

	Pooled across graduating classes and sites	**Graduating class of 2009**	**Graduating class of 2010**	**Graduating class of 2010**			
		Pooled across sites	**Pooled across sites**	**Site A**	**Site B**	**Site C**	**Site G**
CCI dual enrollee	0.161***	0.226***	0.094	0.179	0.142	0.045	0.015
	(0.056)	(0.075)	(0.083)	(0.110)	(0.173)	(0.475)	(0.400)
High school GPA	0.520***	0.346***	0.586***	0.579***	0.222	0.757***	0.673***
	(0.025)	(0.036)	(0.031)	(0.089)	(0.155)	(0.143)	(0.043)
High school test score	0.326***	0.183***	0.311***	0.165**	0.297***	0.403***	0.275***
	(0.018)	(0.026)	(0.022)	(0.068)	(0.111)	(0.090)	(0.031)
N	*23,524*	*10,479*	*15,348*	*1,159*	*1,103*	*1,080*	*5,671*

NOTES*:* Model also includes student characteristics. For pooled equations, site-specific indicators are also included. Sample includes 12th graders from partner districts. 2008-09 data from five sites; 2009-10 data from seven sites. Site specific analyses for class of 2009 available upon request for sites A and B only. At sites E, F, and H, no dual enrollees enrolled in a four-year college within one year of high school graduation. Probit coefficients reported. Standard errors in parentheses.

*** p < .01, ** .05, * p < .1.

Overall, this evidence indicates that there is little support for an effect of the CCI on college enrollment; that is, there is little evidence that students enrolled in college because their CCI experiences made them more comfortable about enrollment regardless of ability. Although there appears to be some influence on enrollment at four-year colleges, the majority of the CCI enrollees and their district peers enrolled at two-year colleges (if they enrolled at all). Therefore, selection effects into college are unlikely to have played a strong role in mediating the apparent effects of the CCI on college performance.

[17] These results are not sensitive to the specification or model (details available from authors).

The Influence of the CCI on Students' Performance in College

For those students who did enroll in the partner colleges or other colleges in the Cal-Pass system, we examine their performance in their early years of college.[18] We compare them to 12th graders from within the district who were also first-time enrollees. Specific postsecondary outcomes examined include (a) basic skills, or remedial course-taking in the first year; (b) college credits accumulated after the first semester, one year, and two years; and (c) persistence over one and two years.[19] We might still anticipate effects from the CCI, even if does not influence students' preferences. Instead, it might influence students' understanding of what is expected in college, and this greater understanding may lead to improved performance.

Table 10 shows that CCI dual enrollees were much less likely to take a basic skills course in college. This negative association is found for the pooled sample and at the site level (with statistically significant associations at sites A and E). While *not* being enrolled in basic skills upon college entry is generally taken as a positive outcome, we cannot rule out that this finding is due to CCI students delaying remedial work, since in many institutions being referred to basic skills does not preclude students from enrolling in a wide range of other courses. It is possible that the CCI dual enrollees were more likely than comparison students to enroll in career–technical or other courses upon college matriculation that did not have academic prerequisites requiring completion of any recommended remedial courses.

[18] Students enrolled in college at different times. To maximize the sample size, we pool the entrants in the fall and spring and use information on their performance at the end of their first semester. See table notes for details of the chronology of measurements of college outcomes.
[19] We also examined college GPA. Details are available from the authors.

Table 10

Probit Estimates of Taking a Basic Skills Course Within One Year of High School Graduation

	Pooled across graduating classes and sites	Graduating class of 2009	Graduating class of 2010	Graduating class of 2010				
		Pooled across sites	Pooled across sites	Site A	Site B	Site C	Site E	Site G
CCI dual enrollee	−0.206***	−0.066	−0.391***	−0.403**	0.012	−0.102	−1.315**	0.066
	(0.062)	(0.083)	(0.099)	(0.174)	(0.164)	(0.306)	(0.542)	(0.661)
High school GPA	−0.112***	−0.243***	−0.084***	−0.424***	−0.088	−0.030	−0.183***	0.127
	(0.020)	(0.033)	(0.026)	(0.093)	(0.101)	(0.092)	(0.046)	(0.196)
High school test score	−0.644***	−0.243***	−0.619***	−0.832***	−0.787***	−0.242***	−0.611***	−1.409***
	(0.020)	(0.033)	(0.026)	(0.098)	(0.110)	(0.086)	(0.049)	(0.305)
N	*11,434*	*5,204*	*7,127*	*714*	*589*	*473*	*1,787*	*169*

NOTES*:* Model also includes student characteristics. For pooled equations, site-specific indicators are also included. Sample includes college enrollees from 12th graders from partner districts. 2008–09 data from five sites; 2009–10 data from seven sites. Site specific analyses for class of 2009 available upon request for sites A and B only. At site F and site H, no dual enrollees took basic skills within one year of high school graduation. Probit coefficients reported. Standard errors in parentheses.

***p < .01. **p < .05. *p < .1.

An equally strong association is found for college credits accumulated after one year in college, as shown in Table 11. For college credits accumulated, there were strong and consistent advantages for CCI dual enrollees. These advantages are evident after one term (results not reported here); they appear to be sustained (or even have increased) after one year in college. Table 11 shows strong gains in credit accumulation for both graduating classes which are robust to graduating class year, specification, and model. Considering the results by site, the apparent effects appear to be concentrated at site B (with large but imprecisely identified gains at site H). Results for persistence in the first year of college appear to have been weakly determined by site. Again, however, we caution against an over-interpretation of the results for individual sites because of small samples of dual enrollment students. In examining the model which pools all sites, we do, however, see that CCI dual enrollees were more likely to have persisted across one year of college, and this finding is robust to specification and model.

Finally, Table 12 reports results for the graduating class of 2009, which we can follow in our dataset for two years after graduation. Table 12 shows rates of persistence in college over two years and credits accumulated over the same period. The results indicate that there were higher rates of persistence among CCI dual enrollees, and these are statistically significant after controlling for ability. Also, these results show strong and statistically significant gains in credit accumulation for CCI dual enrollees over the two-year period. For both outcomes, the associations are identifiable across models. For both persistence and credit accumulated after two years in college, the gains for CCI dual enrollees appear to be strongest at sites B and G.

The apparent effects on credit accumulation are large. For the graduating classes of 2009 and 2010, the comparison group college students had accumulated 9.6 and 8.7 credits after one semester, respectively. The dual enrollees had accumulated 1.2 and 1.3 credits more than these amounts (results not reported elsewhere). The gains are greater as the students progressed through college. After one year of college, the comparison groups had accumulated on average 16.9 and 17.2 credits (graduating classes 2009 and 2010, respectively); the dual enrollees had 1.7 and 3.0 more credits (Table 11). This is a difference of 10 to 18 percent in credit accumulation. Moreover, this apparent effect is detectable over the medium term: after two years in college the comparison groups had accumulated an average of 23.4 credits; the CCI dual enrollees had accumulated an additional 4.6 credits (Table 12). This is a difference of 20 percent more credits than their district peers.

Table 11

Probit Estimates of Persistence in College at End of First Year (Panel A), and Additional College Credits Accumulated at End of First Year (Panel B: OLS Estimation)

	Pooled across graduating classes and sites	Graduating class of 2009	Graduating class of 2010	Graduating class of 2010						
		Pooled across sites	Pooled across sites	Site A	Site B	Site C	Site E	Site F	Site G	Site H[a]
A. Persistence in College:										
CCI dual enrollee	0.166**	0.038	0.020	0.036	0.087	-0.326	0.160	-0.141	0.065	-
	(0.079)	(0.101)	(0.125)	(0.240)	(0.202)	(0.341)	(0.589)	(0.848)	(0.577)	
High school GPA	0.330***	0.305***	0.320***	0.350***	0.197	0.472***	0.278***	0.942***	0.350***	-
	(0.024)	(0.039)	(0.032)	(0.122)	(0.127)	(0.122)	(0.054)	(0.324)	(0.055)	
High school test score	0.190***	0.123***	0.247***	0.100	0.147	0.415***	0.150***	-0.698	0.327***	-
	(0.023)	(0.035)	(0.032)	(0.129)	(0.123)	(0.127)	(0.055)	(0.487)	(0.052)	
N	*10,478*	*4,598*	*6,295*	*679*	*552*	*430*	*1,538*	*143*	*2,663*	-
B. Additional College Credits Accumulated:										
CCI dual enrollee	2.99***	1.69**	3.04***	0.60	5.65***	-3.32	4.62	0.55	-4.49	11.03
	(0.58)	(0.79)	(0.86)	(1.59)	(1.65)	(2.74)	(4.92)	(4.66)	(3.57)	(13.10)
High school GPA	5.71***	5.52***	5.65***	6.59***	6.63***	5.37***	4.42***	5.40***	5.86***	7.46***
	(0.21)	(0.34)	(0.26)	(1.01)	(1.10)	(0.88)	(0.50)	(1.46)	(0.33)	(1.97)
High school test score	7.97***	6.98**	8.28***	12.59***	8.91***	8.50***	6.70***	5.97***	7.10***	11.66***
	(0.19)	(0.29)	(0.24)	(0.96)	(1.00)	(0.76)	(0.48)	(1.92)	(0.29)	(1.53)
R-squared	0.333	0.312	0.353	0.420	0.300	0.415	0.305	0.266	0.372	0.366
N	*10,478*	*4,598*	*6,295*	*679*	*552*	*430*	*1,538*	*143*	*2,663*	*290*

NOTES*:* Model also includes student characteristics. For pooled equations, site-specific indicators are also included. Sample includes college enrollees from 12th graders from partner districts. 2008–09 data from five sites; 2009–10 data from seven sites. Site specific analyses for class of 2009 available upon request for sites A and B only. [a]There was no variation in the outcome for treated students in site H; all persisted. Standard errors in parentheses.

***p < .01. **p < .05. *p < .1.

Table 12

Probit Estimates of Persistence in College After Two Years (Panel A), and Additional College Credits Accumulated After Two Years (Panel B: OLS Estimation) Graduating Class of 2009: Pooled and By Site

	Pooled across sites	**Site A**	**Site B**	**Site C**	**Site E**	**Site F**
A. Persistence in College:						
CCI dual enrollee	0.315***	0.082	0.320***	0.086	0.163	0.752**
	(0.094)	(0.204)	(0.122)	(0.400)	(0.636)	(0.340)
High school GPA	0.406***	0.372***	0.460***	0.506***	0.321***	0.703***
	(0.038)	(0.115)	(0.095)	(0.105)	(0.055)	(0.129)
High school test score	0.250***	0.196*	0.101	0.347***	0.314***	0.076
	(0.034)	(0.103)	(0.078)	(0.096)	(0.050)	(0.175)
N	*3,745*	*664*	*789*	*460*	*1,482*	*350*
B. Additional College Credits Accumulated:						
CCI dual enrollee	4.632***	2.943	5.397***	−1.379	−3.527	12.440***
	(1.119)	(2.165)	(1.685)	(4.647)	(8.259)	(3.021)
High school GPA	9.325***	10.589***	10.570***	12.376***	7.314***	9.891***
	(0.518)	(1.462)	(1.371)	(1.185)	(0.756)	(1.347)
High school test score	10.321***	15.468***	10.819***	6.362***	8.854***	6.122***
	(0.459)	(1.223)	(1.153)	(1.072)	(0.669)	(1.832)
R-squared	0.320	*0.426*	0.290	*0.364*	*0.243*	*0.269*
N	*3,745*	*664*	*789*	*460*	*1,482*	*350*

NOTES: Model also includes student characteristics. For pooled equations, site-specific indicators are also included. For panel A, probit coefficients reported. Standard errors in parentheses.

***p < .01. **p < .05, *p < .1.

In addition, it is important to note that it is possible that the data reported here are not fully capturing total credit accumulation of dual enrollees. While conducting the analyses, we found that not all CCI dual enrollees were transferring their dual enrollment credits to the postsecondary institution they enrolled in after high school graduation. Students who enrolled in four-year colleges were more likely to transfer their credits than students who enrolled in a community college different from the one where they took their dual enrollment courses. While we cannot be sure of the exact reason for this, we hypothesize two possibilities. First, students enrolling in four-year institutions may be more motivated to transfer the credits since their potential savings in terms of tuition will be greater. Second, if a student entering a different two-year college plans to transfer to a four-year college in the future, she may wait to transfer all her two-year credits at once.

Thus, there is persuasive evidence that the CCI helped students to accumulate credits faster and earlier in their college careers. This early momentum in terms of credit accumulation was sustained and it even increased over time. The early start given to CCI dual enrollees was likely a key factor in higher rates of persistence over one and two years.

6. Discussion and Conclusion

In 2008, the Concurrent Courses Initiative began to provide access to supportive, career-focused dual enrollment courses to many students who had not previously had these opportunities. Our analysis of the CCI, which used data from cohorts of students in California high schools, examined how dual enrollment influenced high school and college outcomes, and it employed a range of empirical approaches to identify these influences. As there was reasonable consistency in the CCI enrollment patterns and activities over time, we pooled groups of students at each grade level (for example, 12th graders from 2009–10 plus those from 2010–11). We tracked participating seniors through high school graduation and their early college years (for example, 12th graders from 2009–10 who were in college in 2010–11); this is especially important because the sample sizes for the college-bound groups are constrained by the time interval for study (and potentially because of above/below censoring). Also, we extended the analysis of college success both over time (freshman and sophomore years of college) and across students in more colleges in California. Finally, we pooled our analysis across sites, allowing us to identify an overall CCI apparent effect.

These approaches have somewhat mitigated the empirical challenge of identifying apparent dual enrollment effects from small samples where student assignment to the CCI was not random. With increased sample sizes and additional years of data across cohorts, as well as robustness checks across specifications and models, our results are more valid.

We find considerable stability in implementation of the CCI over time at each site, as well as in the characteristics of the students, even as there is variability (in dual enrollment courses, supports, scale, and student demographics) across sites. The CCI expanded by approximately one fifth across the two years of study, but much of this growth was through participation in supplemental activities rather than through dual enrollment course-taking. Overall, CCI participants were less advantaged than their peers within their districts: their family backgrounds were less advantaged, and their prior test scores were lower.

Our analysis of the apparent effects of the CCI includes outcomes both at the high school level and at the college level. This analysis is unavoidably constrained to 12th graders in high school and then to those old enough to enter college. Regarding high school GPA for the class of 2010, CCI dual enrollees had higher GPAs at three sites and lower GPAs at two sites. These correlations hold even when we control for prior test scores, but they are not maintained when we use an alternative model specification (propensity score matching). Regarding high school graduation rates, the graduation rates of the CCI dual enrollees and the CCI participants were higher than the averages for their district (except at one site), despite their more disadvantaged backgrounds. Thus, in the short-term, we do find some evidence of improved grades and progress toward high school graduation. However, for all achievement studies undertaken, we are mindful of selection bias: our analysis suggests that, relative to the district, there is negative selection — the CCI was located in schools where prior test scores were lower — and there is positive selection — more able students within the CCI enrolled in the dual enrollment courses.

Our analysis also yields evidence on the apparent effects of the CCI on college success. We expected to see increased rates of college entry and success due to improved academic skills and understanding of college expectations. This is particularly important for establishing both academic and economic benefits from the CCI over the longer term. Again with cautions about sample sizes and selection effects, there is no clear evidence that CCI participation had any influence on enrollment in college in general, although the first cohort of dual enrollees were statistically significantly more likely to enroll in four-year institutions compared with their district peers. In addition, there is strong evidence that CCI dual enrollees had greater persistence and accumulated more credits in their first and second years in college; their accumulation exceeded their peers in their school districts. This result is promising and suggestive for further analysis.

Thus, overall, the results show the potential of the CCI — as it was implemented across the eight sites — to achieve both goals of high school and college success. Given these results, policymakers should consider including dual enrollment as an important part of any college readiness strategy, and specifically, they may want to eliminate any policies that discourage dual enrollment. While some states have funding, credit-earning, student eligibility, and other policies that encourage institutional and student participation, California dual enrollment policy is not as supportive. At the very least, state policy could waive dual enrollment tuition for disadvantaged students who most need a supportive early college experience.

State support to sustain dual enrollment partnerships is critical. Of the eight CCI programs that received support from The James Irvine Foundation, two could not continue once the funds were depleted. While the others continue to offer these experiences to their students, the financial challenges are severe. Given the generally positive results found by this and other studies, dual enrollment participation should be encouraged and supported whenever possible, particularly for those students who might otherwise be unlikely to pursue postsecondary education.

Appendix

Table A.1

Partnership Overview

Site	Lead Partner	Career Focus	Course Options	Credit Earning
Site A	College	Multiple	Academic/CTE	Dual credit**
Site B	College	Multiple	CTE	Dual credit
Site C	HS	Nursing	Academic/CTE	Dual credit
Site D	College	Multimedia	CTE	Dual credit
Site E	ROP*	Teaching	Academic/CTE	College credit
Site F	HS	Health	Academic/CTE	Dual credit
Site G	HS	Architecture, Construction & Engineering	Academic/CTE	College credit
Site H	HS	Technology	CTE	Dual credit

*ROP refers to Regional Occupational Program—these programs provide career and workforce preparation for high school students and adults.
**Dual Credit refers to the students' ability to earn both high school and college credit for the same course.

Table A.2

Supplemental Activities

Activity	Description
Initiative orientation	Activities intended to orient students to Concurrent Courses Initiative-funded activities (i.e., the academy or pathway); activities that provide an overview of the broad spectrum of college- and career-preparation activities in which students might participate.
College orientation	Activities intended to orient students to college, including the application process, campus life, course expectations, and administrative procedures.
Career orientation activities	Activities intended to provide students with broad exposure to occupations in the career area emphasized by the career pathway/Concurrent Courses initiative.
Academic preparation for concurrent enrollment	Activities that help students get ready for success in college-credit courses.
Academic support for concurrent enrollment	Activities that help students be successful in college-credit courses, once they are enrolled in those courses.
Work-based learning	Activities that expose students to the occupations in their career pathway through hands-on experience in the field.
Supplemental financial support	Additional funding for concurrent enrollment classes, given directly to students.

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