

Dual Enrollment: How Opportunity and Participation is Distributed Across

California's Schools

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California is committed to increasing college enrollment and degree attainment in order to address the impending skill shortage in the state. One avenue for improving college access and completion is by increasing participation in college-credit courses while students are still in high school. Research indicates that taking college courses in high school leads to an increased likelihood of college degree attainment, college enrollment, credit accumulation, completing high school, staying in school, and being college ready (Berger, Turk-Bicakci, Garet, Knudson, & Hoshen, 2014; Edmunds, Unlu, Glennie, Bernstein, Fesler, Furey, & Arshavsky, 2017; An, 2013; Giani, Alexander, & Reyes, 2014; Struhl & Vargas, 2012). Recognizing the potential of college courses in high school to improve student outcomes, the California Legislature adopted Assembly Bill 288, College and Career Access Pathways (CCAP), in 2015 to expand dual enrollment (DE) programs across the state through partnership agreements between K-12 school districts and community colleges (AB-288 Public schools: College and Career Access Pathways partnerships). Although dual enrollment rates have risen over recent years, the opportunity to participate is not necessarily equally distributed. Students' opportunities to take community college courses are often determined by the high school they attend, either through formal dual enrollment offerings or partnerships, or as the result of a culture of college course-taking or advising practices. The vast majority **(84%) of California public high schools** have at least one student taking a community college course while in high school, though **participation rates vary dramatically from zero to over 95% of students.**

Purpose

This work examines the full picture of DE participation across California and the extent to which students have access to college-credit courses while in high school as measured by attending schools with various participation rates. This study extends prior research, as it

investigates the patterns of community college course-taking by the census of high school students in California, both independently and through formalized dual enrollment programs, and explores patterns in participation rates across all public high schools and community colleges in the state. This work is guided by the following questions:

- What are the state-wide patterns of dual enrollment participation at the school level?
- How does dual enrollment participation vary by school characteristics?
- How does access to schools with varying levels of dual enrollment participation vary by student subgroups?

Literature Review

Extant work on dual enrollment emphasizes formally structured school-wide programming via early and middle college high schools (Berger et al. 2014; Edmunds et al., 2017) or explicit partnerships across K-12 and postsecondary sectors (Giani, Alexander, & Reyes, 2014). The strongest causal evidence for DE comes from randomized controlled trials at Early College High Schools (Berger et al., 2014, Edmunds et al., 2017). Three additional studies using quasi-experimental approaches, in particular propensity score matching, meet the What Works Clearinghouse group design standards for research, suggesting these provide high quality evidence about dual enrollment (An, 2013; Giani, Alexander, & Reyes, 2014; Struhl & Vargas, 2012). However, these studies generally use data from the late nineties and early 2000s and have also typically drawn on a limited sample of students (the total number of students included across all five studies is 77,249). An (2013) uses data from 1988-2000, Giani Alexander, and Reyes (2014) follow 9th graders in 2001-01 through 2009-10, and Struhl and Vargas use data on students who graduated in 2004. Broadly, these studies find that dual enrollment leads to a host

of postsecondary outcomes, including increased likelihood of college degree attainment, college enrollment, credit accumulation, high school completion, persistence, and being college ready.

Recent research indicates that although participation in college-credit coursework while in high school is steadily increasing in California, access to these opportunities is highly unequal, with much lower participation rates among historically underserved students and schools (Kurlander, Reed, Grosz, Mathias, & Hughes, 2021; Rodriguez & Gao, 2021; Wheelhouse, 2020). In fact, while over a four-year period participation in dual enrollment for all students grew, with the class of 2018-19 seeing an increase in participation rates by seven percentage points (18.2%) compared to the class of 2015-16 (11.3%) (Wheelhouse, 2020), gaps in these rates between students from different racial/ethnic subgroups have not changed. Even with the near doubling of participation by Black and Latinx students, their rates still lag behind their Asian peers by 10 percentage points (Wheelhouse, 2020). Moreover, only 16.3% of socioeconomically disadvantaged students and 10% of English Learners participated in community college courses in 2018-19 (Wheelhouse, 2020). Despite these historic trends, forthcoming research suggests that formal dual enrollment (DE) programs are leading to more equitable participation rates, closing gaps by race/ethnicity (Kurlander et al., 2021).

The type of school, as well as the mission and instructional model of a school, may play an important role in students' participation in dual enrollment. A recent report from the Public Policy Institute of California (Rodriguez & Gao, 2021) describes dual enrollment participation in a select group of schools known as Early and Middle College High Schools (ECHS and MCHS), where the instructional model is centered on dual enrollment courses. The authors found that 112,000 students in the 2019-2020 graduating class participated in dual enrollment. Of those 112,000 DE students, 11% participated in dual enrollment via College and Career Access

Pathways (CCAP), 9% via Early College High Schools, and 10% via Middle College High Schools. Rodriguez and Gao (2021) also note that Black and Latinx students are more equitably represented in some formal dual enrollment programs.

Theoretical Framework & Significance

In recent years, California has taken several steps to increase dual enrollment participation and access and remove earlier legislative barriers. In 2015, AB 288 was enacted to authorize community colleges and K-12 districts to develop formal partnerships via Career and College Access Pathways agreements. These partnerships were intended to increase access to dual enrollment, particularly for students from underrepresented groups, whereas prior programs limited dual enrollment access to students who were considered to be ‘college ready’ and restricted the number of courses students could take (Kurlaender et al., 2021). AB 30 (2019) extended authorization for CCAP agreements, while AB 413 (2019) identified Middle College High Schools to serve at-promise youth at schools on community college campuses and utilize career education and college preparatory curriculum (Rodriguez & Gao, 2021). These formalized opportunities provide a school-level organizational structure to support and facilitate dual enrollment, compared to informal dual enrollment, where individual students access college opportunities independently of school-support.

Economic theory suggests that students select optimal courses, which limits the benefits of rigorous course-taking programs, such as dual enrollment, to students self-selecting into such programs. Those students are also likely to have other (potentially unobservable) personal characteristics that impact their likelihood of academic achievement, such as cultural expectations or familial college goals. Students independently accessing college coursework in high school (i.e., without school support), are likely to have very different social and cultural

capital to navigate college systems and dual enrollment programs. In this case, students may have developed stronger academic skills from prior schooling or received additional supports and encouragement from those in their social networks, such as families or teachers. However, such self-selection and choice occurs in a context colored by inequality, as schools may be structurally constrained in their ability to provide rigorous course options (Kurlaender & Hibel, 2018) or the appropriate supports for particular groups. Furthermore, structural and institutional factors directly affect a student's choice to pursue opportunities like dual enrollment, such as access to information, school advising, school culture, and expectations, among others.

We theorize that school-level features are essential to the success of at-promise and underrepresented students. For example, successful dual enrollment programs are likely to have a culture of college-going behavior, high expectations for all students, counselors that understand dual enrollment processes, and specialized supports for particular groups, such as students with disabilities (Hooker, Finn, Nino, & Rice, 2021). Therefore, understanding dual enrollment patterns and disparities requires a detailed analysis of access to particular schools and the characteristics of such schools. Given the potential inequalities that bound access to rigorous college preparatory experiences and its ability to influence students' trajectories, it is critical to consider the ways in which schools can more equitably expand access to opportunities to support college-going, such as dual enrollment.

Data & Methodology

This work utilizes data from the California Department of Education's (CDE) California Longitudinal Pupil Achievement Data System (CALPADS) and Community College Chancellor's Office (CCCCO). The analytical sample was created by merging: (1) information from the CCCCCO on high school students enrolled in community college courses, and (2)

student-level data from CDE for four cohorts of California high school seniors (students expected to graduate 2015-2016, 2016-2017, 2017-2018, and 2018-2019). In particular we utilize data from the College/Career Readiness Indicator (CCI) cohort files. Nearly all of the results presented are for the 2018-2019 cohort of students, which includes 1,987 schools and 395,885 students. We also include all schools available within our sample, and do not limit schools to those with a minimum number of students in the cohort as in Kurlaender, Reed, Grosz, Mathias, & Hughes (2021). Additionally, we reviewed school names and websites for the 30 schools with the highest levels of dual enrollment participation to identify Early and Middle College High Schools (EMCHS).

Presently, California lacks a statewide longitudinal data system that crosses education sectors and thus unique student identifiers to connect students from K-12 to postsecondary data systems are unavailable. Therefore, we match students by unique non-missing name and birthdate data. We identify dual enrollment participants as those enrolling in any credits prior to the summer of their expected graduation. Notably, by merging these data, we are able to specifically describe differences in participation rates by students (e.g., race/ethnicity, socioeconomic disadvantage, among others) and schools, including location (e.g., county, urbanicity), type (e.g., traditional, alternative, charter), and key characteristics (e.g., enrollment size, racial composition) for the population of California students.

We also define additional subgroups underreported in educational research: Black, Indigenous, and people of color and students from special populations. We include Black, Latinx, Filipino, Native American or Alaskan, Native Hawaiian or Pacific Islander, and students of two or more races in Black, Indigenous, and people of color. Students in special populations are defined as any student in at least one of the following categories: students with disabilities,

English learners, foster youth, and students experiencing homelessness. The definition of special populations mirrors work from Hooker, Finn, Nino, and Rice (2021). Importantly, we also consider students in the intersection of these two groups.

To understand more about how the opportunity to participate in college courses is distributed across schools for particular subgroups in California, we categorize schools into one of five bins – described in Table 1 – based on overall dual enrollment participation rates, and define six categories of dual enrollment participation (no DE, low, below average, average, above average, and high). The number of students and schools in each category is listed in the table below. Figure 1 shows schools and students in each category as a percent of their respective groups. To understand differences in patterns of dual enrollment opportunity we calculate the share of students in particular sub-groups or types of schools that attend a school in each of the six categories.

Table 1: Schools and Cohort Students (N) by Dual Enrollment Participation Rates, 2018-19 Cohort

DE Participation Category	DE Participation Rate	Schools (N)	Students (N)
No DE participation	0	319	2,148
Low DE participation	0 to <6%	234	71,122
Below Average DE participation	6% to <12%	301	90,256
Average DE participation	12% to <18%	282	80,566
Above Average DE participation	18% to <30%	398	88,349
High DE participation	> 30%	453	63,444

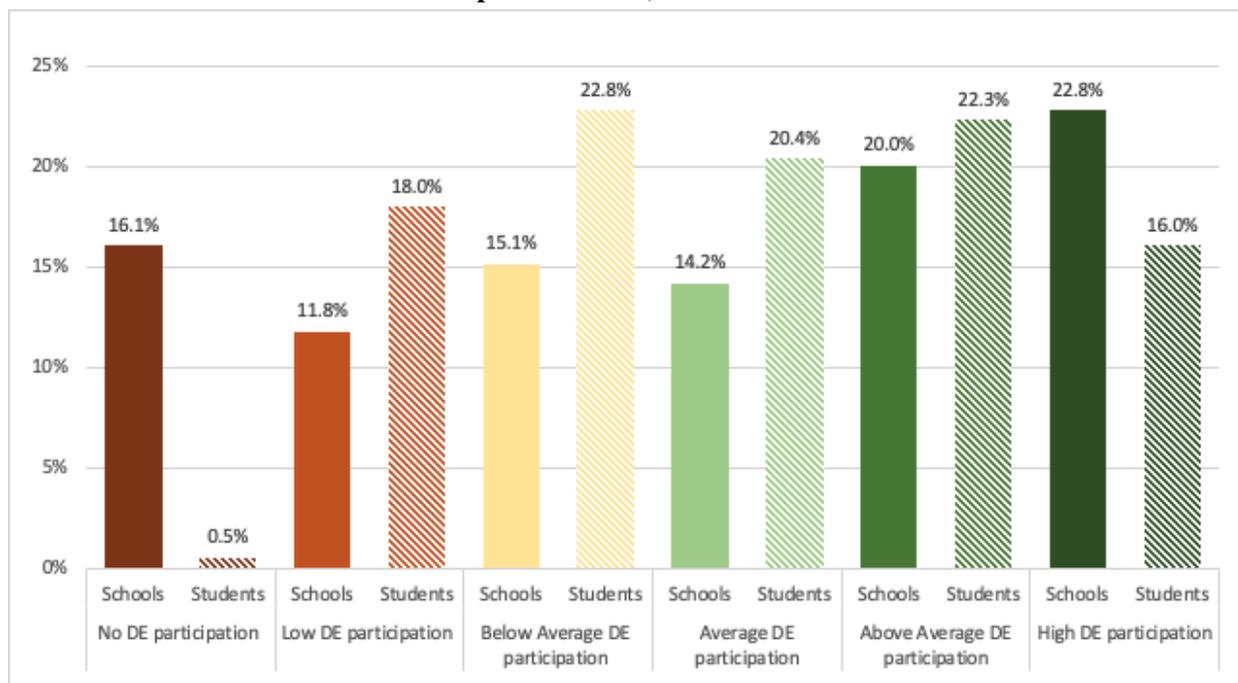
Results

Figure 1 depicts the distribution of both schools ($N = 1,987$) and students ($N = 395,885$) in the 2018-19 cohort by dual enrollment participation rates. In total, students from 1,668 schools took community college courses during high school, while in 319 schools (16%), no graduates from the same cohort participated in dual enrollment (Figure 1).

While over 300 schools have no students participating in dual enrollment, these schools serve a very small proportion (0.5%) of the statewide cohort. More than a quarter of schools (27%) have low (>0-6%) or below average (>6 to 15%) rates of dual enrollment participation, and these schools serve 41% of students. Additionally, 14% of high schools in California have average dual enrollment participation (ranging from 12% to 18% participation rates); in this case, these schools serve 20% of the students in the 2018-19 cohort. (Note that the mean dual enrollment participation rate for the cohort is 18%, but the median is 14%, as the distribution is right-skewed by schools with very high participation rates.)

Just over 40% of the state's high schools, serving 38% of the cohort students, demonstrate dual enrollment rates above the statewide average (>18%). Few schools demonstrate universal (or near universal) participation. Nearly a quarter ($n=453$) of schools have high (>30%) dual enrollment rates, though only 16% of students in the cohort attend these schools. Differences in the tails of the distribution of students and the distribution of schools are driven by small schools, where a few students participating in dual enrollment can have large effects on the school-wide dual enrollment participation rate.

Figure 1: Distribution of Schools and Students by School-Level Dual Enrollment Participation Rates, 2018-19 Cohort

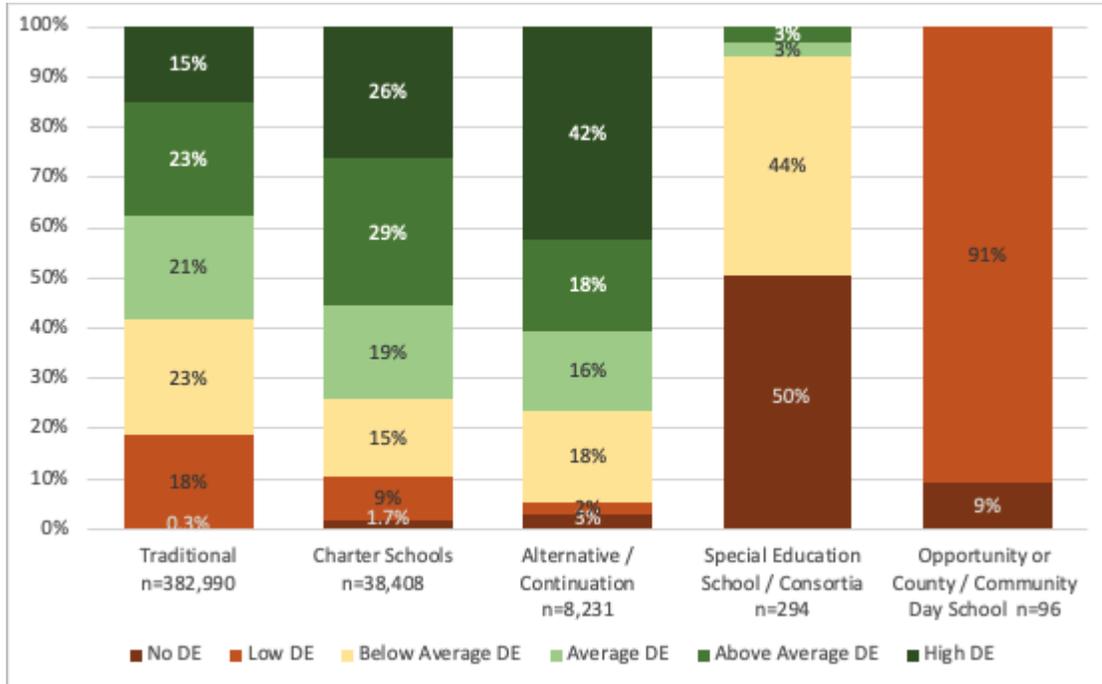


School Type

Non-traditional and charter schools have unique patterns of enrollment relative to traditional and non-charter schools. We observe high rates of dual enrollment participation in schools considered by CDE to be alternative or continuation schools, often serving students who struggle in the traditional school environment or in need of credit recovery. In Figure 2, we see that 60% of students in alternative and continuation schools in California (n=294 students) attend schools with high or above average dual enrollment participation.

Additionally, we also observe high rates of participation in ECHS and MCHS. Of the 30 schools with dual enrollment participation rates between 80-95%, at least 23 of 30 schools are Early or Middle College High Schools (based on the school name or a brief review of the school's website).

Figure 2: Dual Enrollment Participation by School Type



***A note on how to read this and the following figures:**

For the remainder of this paper we present a series of stacked bar graphs by subgroups of students or school-types, at the student level. For example, the first column of Figure 2 shows the distribution of students in traditional schools (n=382,990). So 15% of students in traditional schools attend a school with a high DE participation rate, 23% of students in traditional schools attend a school with an above average participation rate, 21% of students in traditional schools attend a school with an average DE participation rate, and so on. In the second column, 26% of students that attend charter schools attend a school that has a high DE participation rate and in the third column, 42% of students attending alternative or continuation schools attend a school that has a high DE participation rate.

A closer look at schools without dual enrollment:

The 319 high schools at which no students participate in dual enrollment are more likely to be located in rural areas and serve a particular population of students, with very high shares of students with disabilities (46%) and English learners (17%) and a unique racial composition. They also have high rates of socioeconomic disadvantage, homelessless, and large shares of foster students. In this case, 58% of students in these schools belong to special populations (i.e., students with disabilities, English learners, homeless, and/or foster) compared to only 24% of students in the 2018-2019 cohort overall. Schools without dual enrollment typically serve twice as many Black students as the population average and half as many Asian students. Additionally, students in schools without dual enrollment participation are much more likely to live in rural

communities (29% versus the state average of 6%); however urban students are overrepresented, while suburban students are very underrepresented. Schools without dual enrollment are also more likely to be special education schools or consortia, alternative or continuation schools, charter schools, and K-12 schools than traditional high schools. Interestingly, while charter and alternative and continuation schools are more likely to have no dual enrollment, they are much more likely than traditional schools to have very high levels of dual enrollment.

Looking across all four years of data available (2015-16, 2015-17, 2017-18, 2018-19), only 196 schools from the 2018-19 cohort have no dual enrollment for all cohorts of our sample. For the remaining schools with no 2018-19 enrollment, 69 have one other cohort with positive enrollment, 35 schools have two other cohorts with positive enrollment, and 19 have three other cohorts. Further, the 196 schools with no DE students in any year of our data are extremely small, with an average of 3.83 students in the cohort. This suggests that the potential for dual enrollment exists statewide for almost all students.

A closer look at schools with the highest rates of dual enrollment participation:

There are 65 schools with DE participation rates between 70 and 95% and they serve a very small student population, with 4,572 students in the 2018-19 cohort attending these schools. (Note that there are 12 additional LEAs with >95% participation, but they are very atypical. As most have only one or two students in the cohort and include five district offices of education and four closed schools, we ignore these in our examination of the top schools.)

All schools in the top 65 have at least four students in the cohort and at least three students in DE. Just over half (35) of these schools have 70-79% participation, and 30 schools have 80-95%. On average, these schools have 70 students in the cohort and 56 students in DE. A significant number of these schools are alternative or continuation schools (17) versus 46

traditional schools, and 2 LEAs are district offices of education (Dublin Unified & Pleasanton Unified). Interestingly, of the 46 traditional schools, most (27) are charter schools. Most of these schools are urban (23) or suburban (21), while nine are rural, and six are town schools.¹

School Locale²

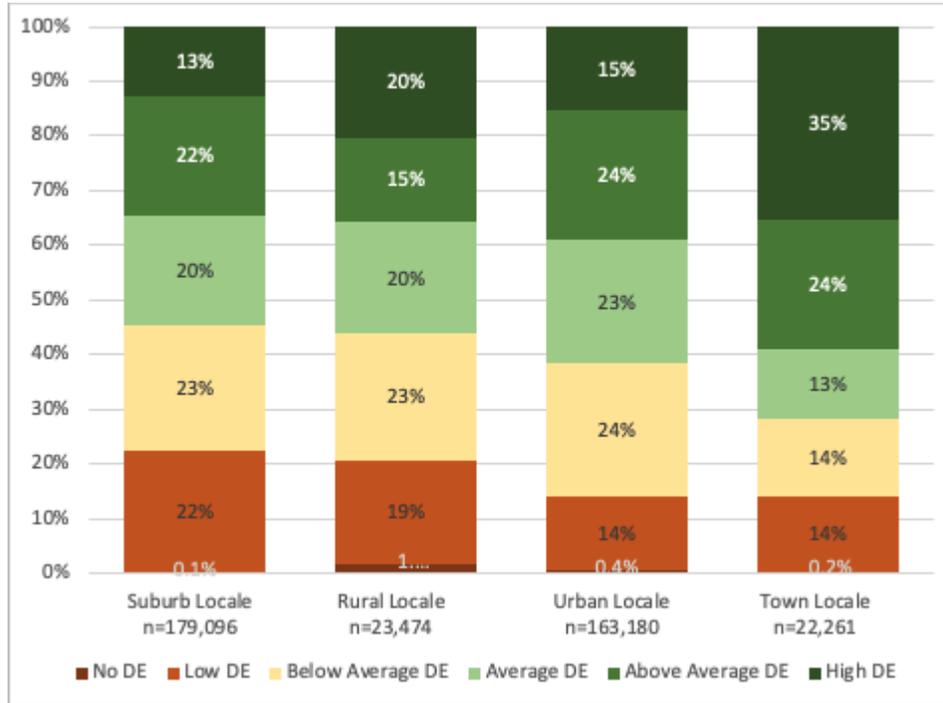
Most of the 2018-19 cohort attend suburban or urban schools (n=342,276), with slightly more attending those in suburban areas. Urban students tend to have better access to schools with average or higher dual enrollment, with fewer students in low DE schools and more in the top three categories combined (Figure 3).

Students in towns (n=155 schools and n=22,261 students) have the best access to schools with high rates of DE participation, as more than a third of town students attend schools with high rates of formal dual enrollment. Rural students have more extreme patterns of access to dual enrollment. In this case students in rural areas are the most likely to attend schools with no overall dual enrollment, but students in rural schools still see greater DE participation opportunities at schools with high participation rates than suburban or urban students.

¹ These results do not reflect information from six schools, for which geographic locale data is missing.

² The locale of a district is defined by the National Center for Education Statistics at the Institute of Education Sciences, U.S. Department of Education. Locale is a measure of location based on data from the U.S. Census Bureau and is determined by population size and distance from an urban center.

Figure 3: Dual Enrollment Participation by Geographic Locale



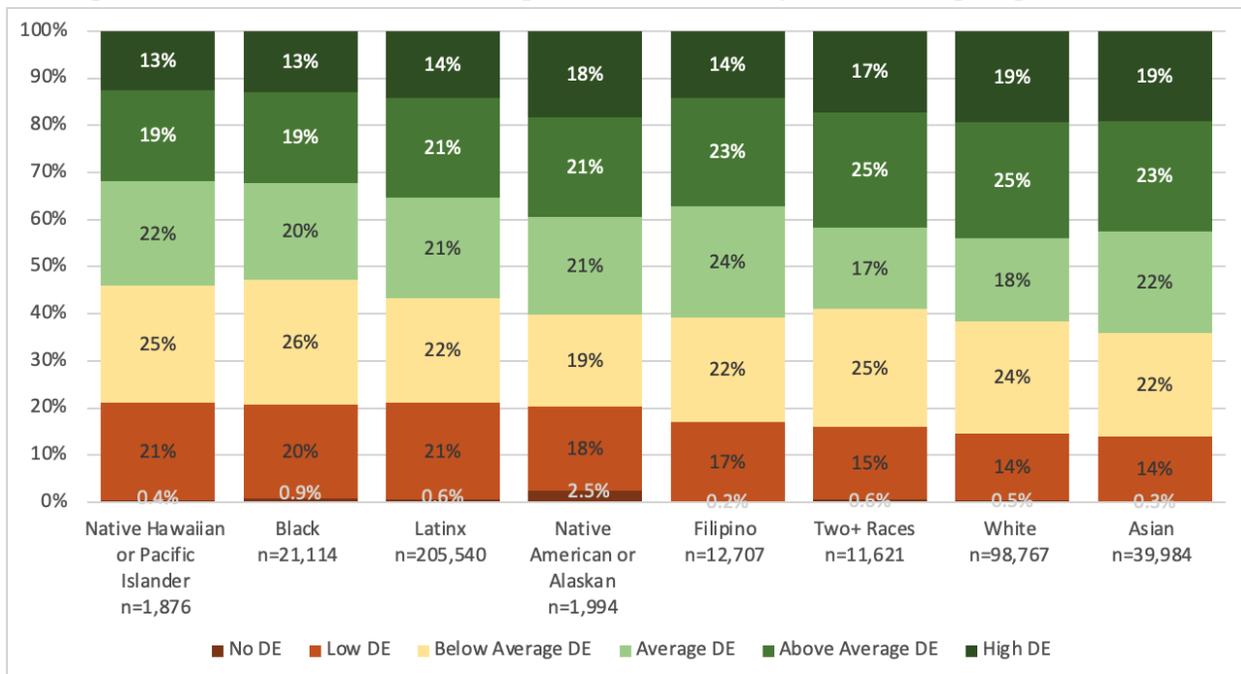
Student Characteristics

The varying rates of participation across schools suggests that access to dual enrollment opportunities is not universal. Figures 4, 5, and 6 illustrate the percent of students within each subgroup that attend schools with varying levels of dual enrollment participation. Figure 7 explores dual enrollment opportunities for Black, Indigenous, and people of color jointly (Black, Latinx, Filipino, Native American or Alaskan, Native Hawaiian or Pacific Islander, and students of two or more races), special populations (defined as any student in at least one of the following categories: students with disabilities, English learners, foster youth, and homeless students), and the intersection of these two groups.

Figure 4 maps disparities in school-level dual enrollment participation categories by race and ethnicity. Asian and White students are most likely to attend schools with high rates of dual enrollment (19% of each population attends such schools) and least likely to attend schools with low rates of dual enrollment (14% of each population attends such schools). In contrast, Black

and Native Hawaiian/Pacific Islander students are the least likely to attend schools with high DE participation (13% of each population attends such schools, a 6 percentage point gap from White and Asian students) and the most likely (with Latinx students as well) to attend schools with low rates of DE participation (about 20% of each population attends such schools, also a 6 percentage point gap from White and Asian students). Native American or Alaskan students are the most likely to attend schools with no dual enrollment opportunities, with 2.5% of the population attending such schools, which is substantially larger than the approximately 0.5% cohort average. Interestingly, Native American or Alaskan students are nearly as likely to attend schools with high dual enrollment participation rates (18%) as White and Asian students. This evidence indicates that students from historically marginalized subgroups attend schools with lower dual enrollment participation rates.

Figure 4: Dual Enrollment Participation in Schools by Racial Subgroup of Students



Similarly, as displayed in Figures 5 and 6, English learners, students with disabilities, socioeconomically disadvantaged (SED) students, homeless students, and foster youth are all both less likely to attend schools with high DE participation and are more likely to attend schools with low DE than peers that do not share these identities. There is a 5 percentage point gap between the share of English learners and the share of non-English Learners, and a 7 percentage point gap between SED and non-SED students that attend schools with low DE participation. Students with disabilities typically have similar access to DE opportunities as students without disabilities, except that they are particularly likely to attend schools with no dual enrollment relative to other subgroups. Additionally, foster students and students with disabilities are the most likely to attend schools with no dual enrollment, at 3.1% and 2.2%, respectively.

Figure 5 - Dual Enrollment Participation in Schools for English Learners, Students with Disabilities, and by Socioeconomic Disadvantage

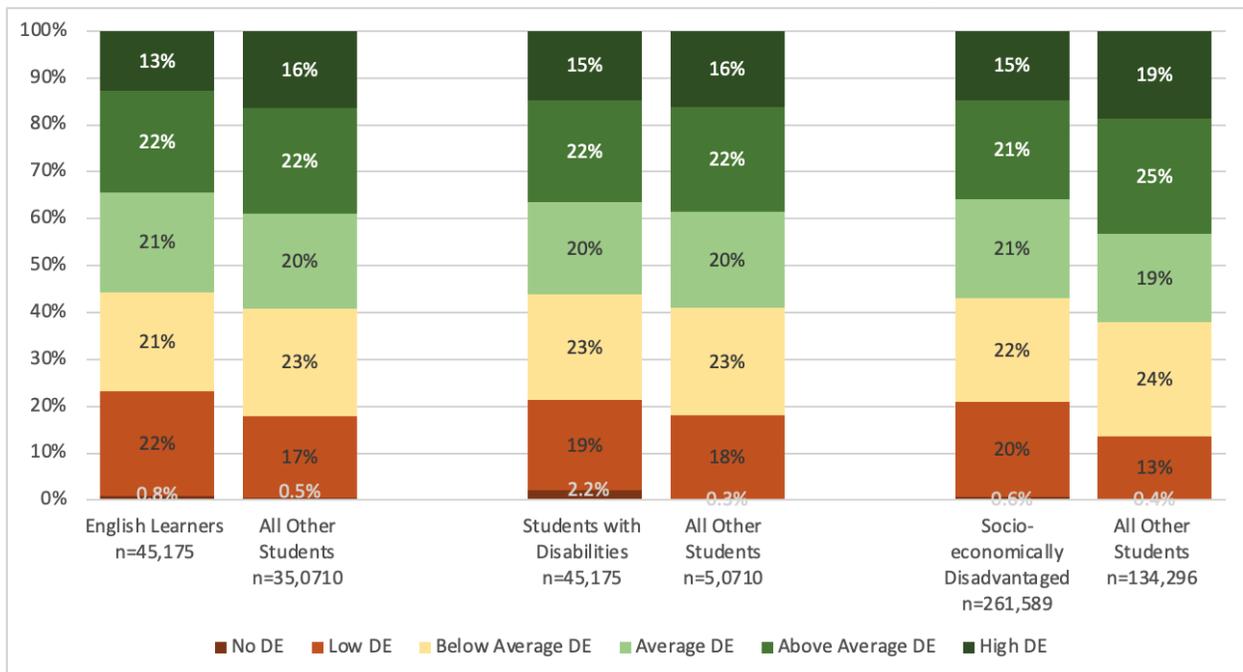
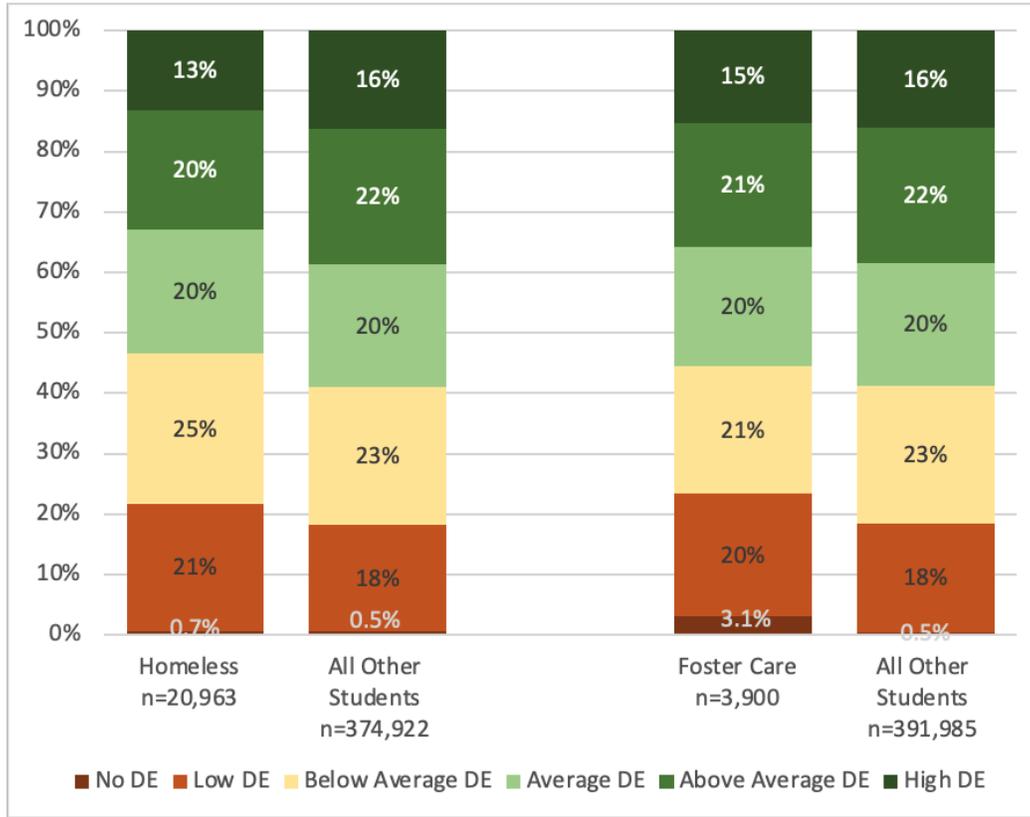
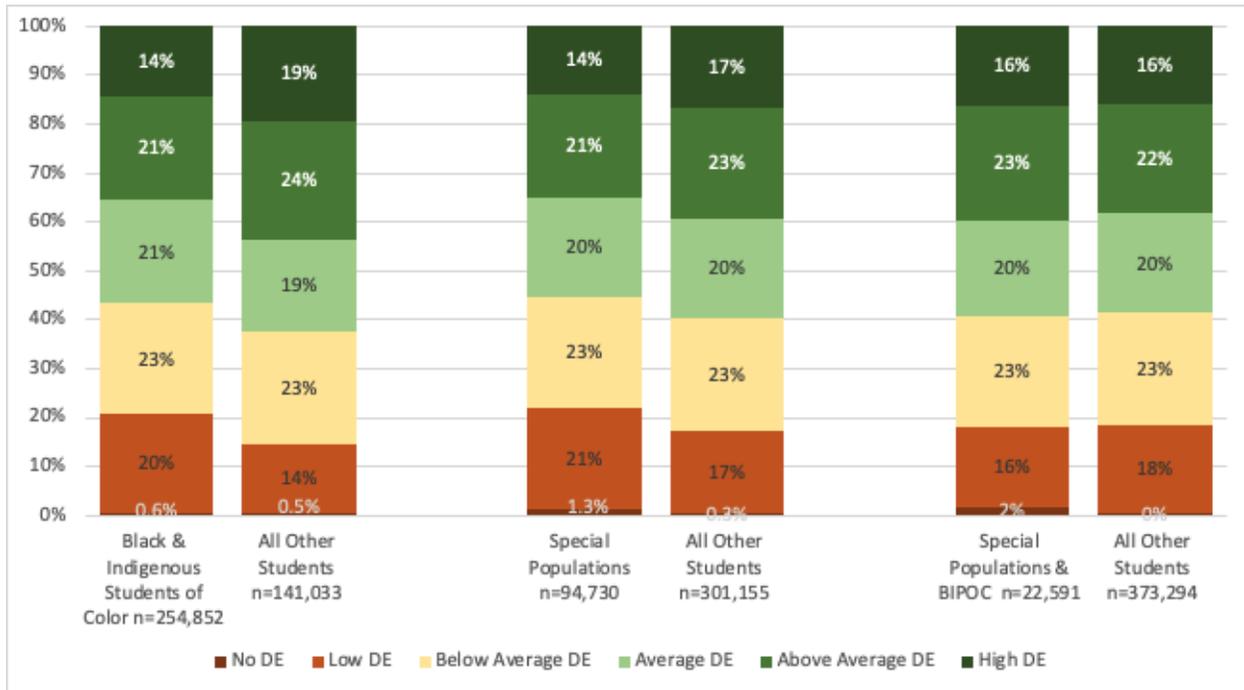


Figure 6 - Dual Enrollment Participation for Homeless and Foster Youth



Students in special populations (students with disabilities, English learners, foster youth, and homeless students) as a whole are 3 percentage points less likely to attend high DE schools, and 4 percentage points more likely to attend low DE schools relative to other students (Figure 7). Black, Indigenous, and people of color (BIPOC) as a whole are 5 percentage points less likely to attend high DE schools, and 6 percentage points more likely to attend low DE schools relative to their White and Asian peers. Interestingly, when we consider the intersection of these identities (students that are both members of a special populations group and Black, Indigenous, and people of color), we find close to parity with other students, except that this group is 2 percentage points more likely to attend schools with no dual enrollment.

Figure 7 - Dual Enrollment Participation for Special Populations and Students of Color



Discussion & Conclusion

These results have important implications for policymakers and educators seeking to improve college readiness and postsecondary outcomes. Specifically, emerging findings suggest that formalized dual enrollment programs result in more equitable participation by student race/ethnicity and socioeconomic status (Kurlaender et. al, 2021). Moreover, findings indicate that while few schools have high participation rates, these schools tend to be small, specialized high schools. By exploring how participation varies, both among subgroups of students and across high schools and community colleges, we identify opportunities for growth in dual enrollment programs.

Dual enrollment participation rates vary substantially by the type of school students attend. The findings for alternative or continuation and charter schools are promising, suggesting that a specialized school-wide focus on dual enrollment can provide high levels of access to students. Although these schools serve a small proportion of high school graduates, their high

dual enrollment participation rates may indicate concerted efforts to ensure that graduates obtain both a high school diploma and college experience, and possibly a leg up on a technical certificate or college degree, particularly in alternative or continuation schools. It is surprising that school-level dual enrollment participation rates over 30% are considered high. Even some early and middle college high schools have participation rates substantially below 100% (we identified some programs with rates as low as 72%), though nearly all of the schools with the highest levels of participation were early college and middle high schools. This aligns with prior research on the role of school-wide practices in dual enrollment success (Berger et al. 2014; Edmunds et al., 2017).

Patterns of access by locality reveal both challenges and opportunities for schools. A large share of rural schools have high rates of dual enrollment participation, but a large share also has low rates. This suggests that some rural schools are close enough to a community college to utilize classes for dual enrollment, which may also be a strategy to provide course offerings that are difficult to staff at rural schools (Goldhaber, Strunk, Brown, Naito, & Wolff, 2020). While students in rural schools are more likely than students in other localities to attend schools with no dual enrollment, that rate is still very low, suggesting that distance to community colleges is not an insurmountable hurdle. Urban students are less likely to attend schools with high rates of dual enrollment participation, which is surprising given their general proximity to community colleges. This suggests an opportunity for urban schools to better utilize community colleges via CCAP agreements.

Across all student subgroups, we find disparities in access to schools with high rates of dual enrollment participation that are most stark by race. This suggests that increasing the rate of participation in DE for students of color relies on building dual enrollment programs in the

schools that they attend. We also find that students in special populations, both as a group and by sub-group, have more limited access to dual enrollment opportunities than other students. The finding that half of students in special education schools or consortia attend schools with no dual enrollment may explain higher rates of students with disabilities and more broadly special populations attending schools without dual enrollment, though these schools represent a very small share (n=294) of students. Hooker et al. (2021) identify a number of school barriers to dual enrollment success for special populations (e.g., counseling and student services shortages, cultures of low expectations, and informational barriers) that help to explain these differences. Moreover, a particular challenge for students with disabilities and English learners is differences in laws and policy regarding specialized services between K-12 and postsecondary institutions.

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