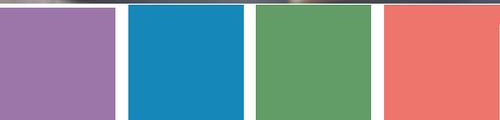




Annual Report on Dual Credit, 2023

Enrollment and Credit Earning



Authorizing Legislation:
[RCW 28A.600.280: Dual credit programs](#)

Education Research and Data Center
Forecasting and Research
Office of Financial Management

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About the ERDC

The research presented here uses data from the Education Research and Data Center, located in the Washington State Office of Financial Management. ERDC works with partner agencies to conduct powerful analyses of learning that can help inform the decision-making of Washington legislators, parents and education providers. ERDC's data system is a statewide longitudinal data system that includes de-identified data about people's preschool, educational and workforce experiences.

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Executive Summary

Dual credit courses give high school students the potential to earn both college and high school credit. There are six primary dual credit programs in Washington state that were included in this report (Table 1). This report and the accompanying dashboard examine dual credit enrollment and K-12 credit earned.

It is important to note that access to different types of dual credit courses varies across Washington state and that schools with high rates of low-income and students of color have more limited access, which may impact enrollment rates.¹ For College Preparatory Programs with Exams (CPPE) dual credit courses (defined in Appendix B), a student must opt to take an exam, get a specific score on the exam to be eligible to earn postsecondary credit, and matriculate at a university or community college that accepts the credit. The different enrollment criteria for each dual credit type and varied access to these opportunities across Washington state must be considered when interpreting the results of this report.

This report has two primary sections. First, we introduce new analysis related to dual credit in Washington. Then, we address the recommendations from the [2022 ERDC Dual Credit Report](#).

¹ [Increasing Equitable Access, Participation, and Success for Students in Dual Credit Legislative Report from the Dual Credit Task Force](#). December 2021, Washington Student Achievement Council.

Key Findings:

- (1) 88% of students enrolled in at least one dual credit course and the majority enrolled in more than one type before exiting high school. As the total student population has increased over time, the rate of enrollment in dual credit has been maintained or increased for all dual credit types since the 2015 cohort. College in the High School experienced the largest increase.
- (2) Four of the six dual credit types experienced nearly continual growth in the average total K-12 credits earned per student over time. However, students identified as low income, multilingual learners, or experiencing homelessness as well as those participating in migrant education, special education, or a 504 plan continue to earn fewer K-12 credits across all dual credit course types.
- (3) The collection of detailed race and ethnicity data in K-12 allows for deeper exploration of student identities beyond the required federal race categories. There are differences in the dual credit enrollment experience of students who identify as American Indian/Alaska Native (AI/AN) only, students who identify as AI/AN and Hispanic, and students who identify as AI/AN and another race. This highlights a limitation of identifying students only using the federal categories.
- (4) Regression analysis found that past educational achievement and student circumstances drive some of the racial differences seen in dual credit enrollment, indicating areas of focus for future policy changes.
- (5) Data availability and quality continue to limit research on dual credit enrollment² and earning of postsecondary credits.

What's New in this Report

- [Dual Credit Dashboard](#) on ERDC's Website
- Updated recommendations for 2024 Report
- Spotlight on dual credit enrollment and K-12 dual credits earned for Native American students using detailed race and ethnicity data
- Descriptive analysis on number of dual credit types students enroll in and what combinations are most common
- Regression analysis of factors related to dual credit enrollment
- Key findings from ERDC report on [Career and Technical Education Dual Credit](#)

² This impacts data for Running Start at the public four-year institutions the most, and caution should be taken when interpreting results. For more detail, see the [2022 ERDC Dual Credit Report](#).

Overview

This report focuses on addressing the requirements in [RCW 28A.600.280](#) and the recommendations made in last year's 2022 Dual Credit Report. The additional analysis and recommendations included in this report were informed by the Dual Credit Workgroup consisting of members listed in the RCW 28A.600.280. Analysis of enrollment by dependency status and earning of postsecondary credit based on dual credit are not included in this report.

The analysis contained in this report and the accompanying dashboard is done by following eight **cohorts of students** who were expected to graduate from Washington public schools in 2015 through 2022. Their course enrollment in the six primary dual credit types (Table 1) were used for analysis to address the following:

This report fulfills the reporting requirement in Chapter 75, Laws of 2022 (Substitute House Bill 1867). The required measures include dual credit enrollment and earning of high school credit. Each measure must be presented by dual credit type and by student categories and subcategories described in RCW 28A.300.042.

- (1) What can we learn about enrollment in dual credit using a maximum representation technique for analysis?**
- (2) What are the most frequent combinations of enrollment across dual credit types?**
- (3) What can regression analysis tell us about the likelihood of enrollment in dual credit?**
- (4) How many K-12 credits are earned from dual credit?**

The following recommendations from the 2022 ERDC Dual Credit Report are also addressed in this report:

- (1) Develop a Dual Credit Dashboard on ERDC's website.**
- (2) Perform a case study to understand challenges in collecting data on the use of dual credit courses to meet certificate and degree requirements.**
- (3) Provide an update on progress to address accuracy and completeness of postsecondary credit earning data.**
- (4) Make recommendations for different measures of academic achievement; and**
- (5) Develop a list of prioritized research questions that will address specific topics.**

Finally, this report continues to identify opportunities for collaboration around refinements to current data collections that would position Washington state to better understand the impact of dual credit course enrollment and achievement on future student outcomes.

Table 1: Category and Type of Dual Credit Taken by Students in Washington State

Category	Dual Credit Type ³	Included in Analysis
College Preparatory Programs with Exams (CPPE)	Advanced Placement (AP)	✓
	Cambridge International (CI)	
	International Baccalaureate (IB)	
Concurrent Enrollment / Course-Based	Running Start (RS)	✓
	College in the High School (CiHS)	
Articulated Dual Credit / Course-Based	Career and Technical Education Dual Credit (CTE-DC)	✓
Other ⁴	Direct-Funded/Technical High School	✗
	Open Doors 1418 Youth Reengagement Dual Credit	
	District/Local dual credit	
	Dual credit enrollment at out-of-state institutions or private colleges or at the Northwest Indian College	

Data and Analytical Approach

Similar to the 2022 ERDC Dual Credit Report, this report uses an analytical approach that follows each cohort over time. It should be noted that this is different from the approach taken in the Office of Superintendent of Public Instruction’s (OSPI) annual reports to the Legislature on dual credit⁵ and the OSPI Report Card⁶. OSPI’s prior reports looked at a specific school year and identified all students in that school year who enrolled in dual credit courses. This “annual

³ See Appendix B for descriptions and the process by which postsecondary credit is earned.

⁴ These dual credit types were not included in the analysis due to limited data availability.

⁵ [OSPI Reports to the Legislature | OSPI \(ospi.k12.wa.us\)](https://ospi.k12.wa.us)

⁶ [Report Card - Washington State Report Card \(ospi.k12.wa.us\)](https://ospi.k12.wa.us)

snapshot” approach allows for monitoring school and student performance and enrollment in dual credit in a timely manner. However, it is not suited to following students over time (a longitudinal approach) to understand the role of dual credit as students move from high school into postsecondary education. Since the longitudinal approach covers student course enrollment throughout their high school career as opposed to just one year (in the snapshot approach), the dual credit enrollment rates in this report will be higher than those reported in OSPI’s annual reports.

Because a student can enroll in multiple dual credit types during their high school career, a student may be counted in more than one type. This means the summation across the different dual credit types would exceed the count of unique students in the Any Dual Credit category.

Data Sources. The data for this report and the dashboard came from the ERDC P20W data system. This data system links administrative records from several education state agencies. Data sources for this report include:

- Office of Superintendent of Public Instruction (OSPI): Comprehensive Education Data and Research System (CEDARS) — For data on enrollment and high school completion for AP, IB, CI, CiHS and CTE-DC, average final grade point average, student characteristics and K-12 program participation.
- Washington State Board for Community and Technical Colleges (SBCTC) — For data on enrollment and completion for RS and credit earning for CTE-DC, CiHS and RS in a CTC.
- Public Centralized Higher Education Enrollment System (PCHEES) housed at the Office of Financial Management (OFM) — For data on enrollment and completion for RS and credit earning for AP, IB, CiHS and RS at Washington public 4-year institutions.

Cohort Description for the Report and

Dashboard. The cohort includes *all* students who attended a Washington public high school between ninth and 12th grades and who were expected to graduate between 2015 and 2022.⁷ Only students who were confirmed to have transferred out of the Washington public school system and for whom high school outcomes are not known are excluded from this analysis. Most of the included students graduated on time (about 85%), although some dropped out or graduated early or late. This report bases cohort membership on the year of graduation requirements they are held to regardless of students’ final status or length of time it takes them to graduate. This report refers to each group of students as “the 20xx cohort.” The ERDC count of students in each cohort will not match the OSPI graduation cohorts because of different business rules used to include or exclude students.

⁷ This is defined as students with graduation requirements between the years of 2015 and 2022. Students are expected to meet the requirements of graduation that are in place for their expected graduation year, which is set upon entry into ninth grade or transfer in from outside of the Washington state public school system. For example, a student entering ninth grade in the 2014-2015 school year would be expected to meet the graduation requirements for the class of 2018 (2017-2018) even if they took longer or fewer than four years to graduate.

Table 2: Students by Cohort (Headcount)

Cohort Year	2015	2016	2017	2018	2019	2020	2021	2022
Student Count	80,914	82,138	83,733	84,733	85,129	84,340	85,397	85,821

At the request of the Legislature⁸, the data presented in this report is disaggregated by the following student characteristics or program participation⁹ categories:

- (1) Gender;
- (2) Students who are homeless as defined in RCW 43.330.702; and
- (3) Multilingual/English learners who are in the Transitional Bilingual Instruction Program (TBIP).

ERDC is uniquely positioned to follow students over time and across different education sectors to understand dual credit access and enrollment, K-12 dual credit earned in Washington public schools, postsecondary credit earned, and long-term student outcomes such as postsecondary retention or degree attainment. It is important to note that there are different ways to analyze data to understand the role of dual credit enrollment in K-12 and the impact on postsecondary outcomes for students. Each of the education sectors report on their unique, sector-specific aspects of dual credit.

Throughout the dashboard and this report, dual credit enrollment rate is calculated in the following way:

Formula to calculate all student enrollment rate:

$$\frac{\text{Number of students in the cohort enrolled in one or more courses of the dual credit type}}{\text{All students in the (2015-2022) cohort}}$$

Example of formula to calculate specific student group enrollment rate:

$$\frac{\text{Number of homeless students in the cohort enrolled in one or more courses of the dual credit type}}{\text{All homeless students in the (2015-2022) cohort}}$$

⁸ The Legislature asked that the data be disaggregated by dependency status pursuant to Chapter 13.34 RCW but this data was not available at the time this report was prepared.

⁹ See Appendix A for list and definitions.

2023 Analysis of Dual Credit

To take a deeper dive into evaluating dual credit types in Washington, ERDC consulted with the Dual Credit Workgroup to investigate the following four research questions.

1. What can we learn about enrollment in dual credit using a maximum representation technique for analysis?

The 2022 ERDC Dual Credit Report spotlighted students identified under the Asian federal race category and did further disaggregation into additional race groups as allowed by the CEDARS data collection started in 2010-11.¹⁰ This year, ERDC focused on American Indian/Alaskan Native (AI/AN) students using further detailed race and ethnic values (see side bar) and enhanced the precision of the analysis by following the principles of maximum representation.

The federal reporting standards require that an individual is reported as either a single race, as "Two or More" races, or Hispanic. An individual is reported as Hispanic irrespective of racial group(s) identified. This practice simplifies the federal reporting but masks the variability in the "Two or More" and Hispanic groupings. Alternatively, the approach of maximum representation counts an individual as a member of each race or ethnic group that the individual reports at the time the

Background on the Collection of Detailed Race and Ethnicity Data

Starting in 2009-10, OSPI began collecting ethnicity and race separately and increased the options for race and ethnicity identification. This approach became mandatory in the 2010-11 school year.

In 2016, the Legislature established the Race and Ethnicity Student Data Task Force. Its work resulted in expanding the race and ethnic categories to:

- 35 categories for students who identified as American Indian or Alaska Native,
- 26 categories for students who identified as Asian,
- 20 categories for students who identified as Native Hawaiian or Pacific Islander,
- 93 categories for students who identified as Black/African American, and
- 34 categories for students who identified as white.

In all, the categories for race expanded from 59 to 229 and ethnicity from 11 to 30 categories.

School districts could start using these new categories starting in the 2017-18 school year, but their use was not required until 2022-23. Each year, more districts have adopted the new data categories. Due to this multi-year transition, the available data contains a mix of new and legacy data categories. For this reason, the analysis in this report only looks at the 2022 cohort.

¹⁰ Data Notes: 1) Students can report their race/ethnicity each year. The most recent race/ethnicity records for each student were used for this analysis. 2) Count of students for whom detailed race or ethnicity data is missing = 989. These students were removed from the analysis 3) "Other" was an option for students/families to choose from if they did not identify with any of the listed groups on the OSPI data collection form.

information is collected. By counting individuals in each reported group, analysis more accurately represents the race and ethnic identities of individuals and allows for additional insights.¹¹

For the 2022 cohort, there were 1,096 students who identified as *AI/AN only* and would be categorized as AI/AN under the federal reporting standards. However, there were 1,979 students identified as *both AI/AN and Hispanic* and an additional 1,395 students that identified as *AI/AN plus another race*, while not selecting Hispanic as their ethnicity. Given that the AI/AN only group represents just 25% of the total number of students who identified as AI/AN, the approach of maximum representation is one way to allow for more comprehensive analysis of this student group and provide additional context that is important for policymakers to consider.

Figure 1 shows enrollment rates across all dual credit types for students disaggregated by AI/AN racial identity combinations. The number of students in each identity combination vary and it is important to take the size of the student group into account to interpret and compare the rates appropriately. The corresponding data table with student counts can be found in Appendix F.

Figure 1: Percent Enrollment in Any Dual Credit by AI/AN Racial Identity Combinations

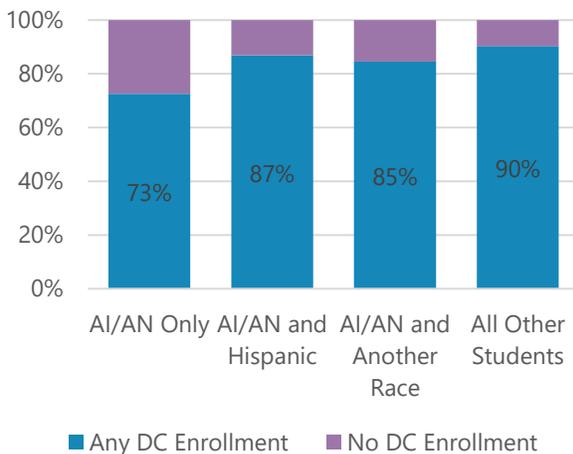
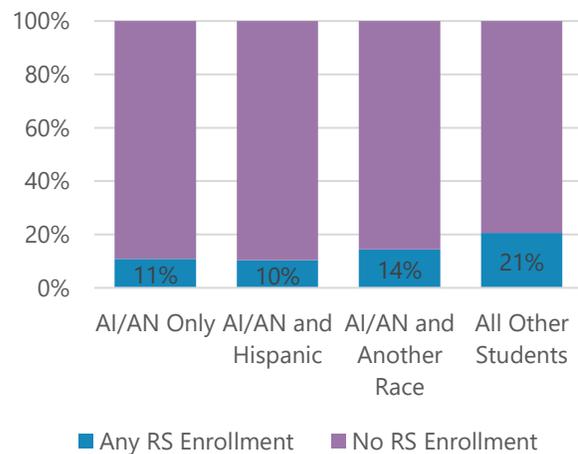


Figure 2: Percent Enrollment in RS by AI/AN Racial Identity Combinations



Students identifying as AI/AN only had the lowest rate of enrollment in any dual credit type. Those identifying as AI/AN and Hispanic or AI/AN and another race had enrollment rates 12-14 percentage points higher than the rate of AI/AN only students and 3-5 percentage points below the rate for all other students not identifying as AI/AN. When individual dual credit types are separated, a similar pattern is present for AP, IB, CiHS and CTE-DC, with some variation among

¹¹ [Maximum Representation | Assessment and Research at Office of Minority Affairs and Diversity \(washington.edu\)](https://www.wa.gov/education/assessment-research-office-of-minority-affairs-and-diversity)

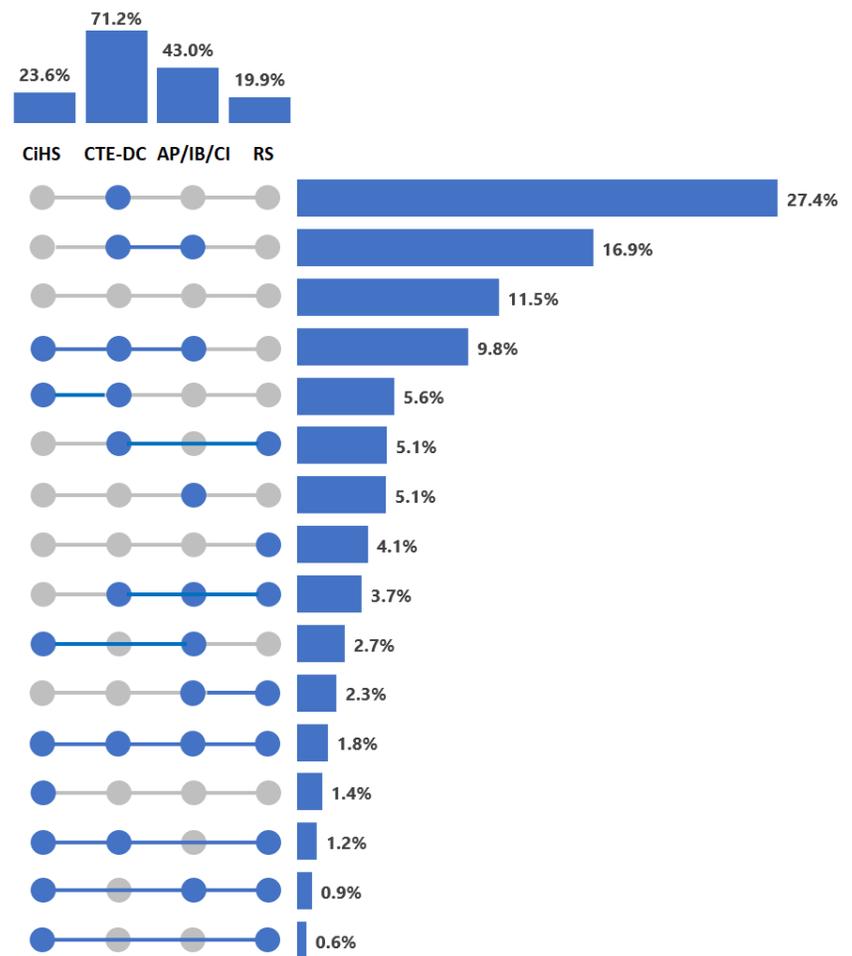
types of dual credit. RS was the only dual credit type where the AI/AN only group did not have the lowest rate of enrollment (Figure 2). However, this group was only 1 percentage point behind the group with the lowest enrollment (AI/AN and Hispanic) and all AI/AN combinations enrolled in RS at rates 7-10 percentage points below students not identifying as AI/AN.

2. What are the most frequent combinations of enrollment across dual credit types?

Figure 3 shows the different combinations of dual credit that students in the 2015-2022 cohorts enrolled in while in high school. It is important to note that a number of factors may impact dual credit enrollment, including: (1) each dual credit type has unique entry criteria (see Appendix B); (2) CTE credit, of which CTE-DC is a subset, is required for graduation, (3) other dual credit courses can count towards students' graduation pathway requirements.¹²; and (4) access to specific types of dual credit varies across schools.

- CTE-DC is the most frequent type, and it is also the most frequently taken alone, with 27.3% of students enrolling in only CTE-DC.
- The most frequent combination is CTE-DC and one or more of AP, IB or CI types, with 16.7% of students.
- Only a relatively small percentage (11.7%) of students in the cohorts did not enroll in any dual credit courses.
- Overall, about half of high school students in our cohorts (50.3%) enrolled in

Figure 3: Enrollment Combinations of Dual Credit for 2015-2022 Cohorts



¹² [Graduation Requirements | SBE \(wa.gov\)](https://www.sbe.wa.gov/Graduation-Requirements)

multiple types of dual credit, while 38.0% enrolled in only one type (if exam-based AP, IB and CI are grouped together).

3. What can regression analysis tell us about the likelihood of enrollment in dual credit?

Regression analysis can help identify which student characteristics are most predictive of dual credit enrollment and what factors might explain racial differences in dual credit and dual enrollment. To better understand the factors that predict dual credit course enrollment, we developed regression models that contained a number of additional factors including race, gender, cohort, eighth grade test scores, free or reduced-price meals receipt, special education services receipt, 504 plan receipt, multilingual learner status, and homelessness experience. Results from the full model are compared to results from a basic model that includes only race, gender, and cohort to understand how test scores and other student characteristics might explain racial differences in dual credit enrollment.¹³ Results from the full regression model are in Appendix D.

Key findings of Regression Analysis

The results suggest that past educational achievement and student circumstances are different across racial groups which drives some of the racial differences in dual credit enrollment. Racial differences in dual credit enrollment may be effectively addressed by actions that affect earlier student performance as well as student characteristics such as income status.

As Figure 4 below shows, in many cases accounting for these additional characteristics reduces the observed gaps in dual credit enrollment across racial groups.¹⁴ For example, results from a basic regression including race, gender, and cohort indicates that the percentage of AI/AN students enrolled in at least one AP course is 17 percentage points lower than that of the reference group (see the purple bar of Figure 4).¹⁵ However, if we include eighth grade test results and the additional student characteristics listed above, the difference in the likelihood of enrolling in an AP course between AI/AN students and the reference group drops to 10

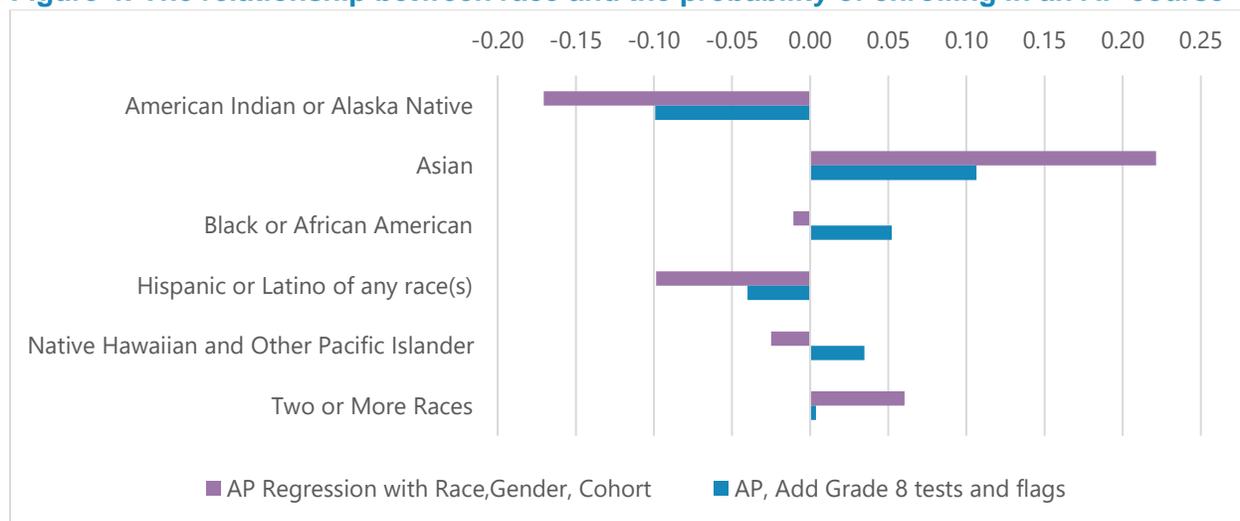
¹³ Preliminary results suggest that including school level characteristics may further reduce the associations between race and dual credit course enrollment; however, more work needs to be done before reliably including school-level data.

¹⁴ No figure for CTE dual credit is shown – the results for this credit type did not change much when including eighth grade tests and flags.

¹⁵ Regression analysis including categorical variables such as the racial category variables requires identifying a reference group. Marginal effects, reported in Figure 4 and in Appendix D, are then the difference in the predicted probability of dual credit course enrollment for each racial group as compared to the reference group. Analyses often define the largest group as the reference group. This analysis follows that approach and defines White students as the reference category because it is the largest racial group in the analysis.

percentage points (blue bar of Figure 4). Relatedly, data shows that Asian students are much more likely to enroll in AP courses than the reference group. When considering Asian students with similar test scores and other characteristics to the reference group this difference drops by about half (see purple and blue bars in Figure 4, respectively).

Figure 4: The relationship between race and the probability of enrolling in an AP course



Notably in some cases, accounting for test scores and other student characteristics results in a change in the direction of the gap. For example, observed rates of AP course enrollment are lower for Black students than the reference group (blue bar of Figure 4). However, regression results suggest that Black students who share similar test scores and similar characteristics to the reference group are five percentage points more likely to enroll in AP courses than similar students in the reference group. This finding shows a significant change in the direction of the difference between Black students and the reference group which suggests that there are other factors such as access to dual credit programs, prior achievement, and family income that drive racial gaps in dual credit enrollment. Solutions that effectively address these other factors could also reduce racial gaps in dual credit course enrollment.

Regression results also show substantial variation across racial groups in other types of dual credit enrollment controlling for eighth grade test scores and student characteristics. Compared to reference group students with similar test scores and other characteristics, Asian students are more likely to enroll in all types of dual credit, Black students are more likely than the reference group to enroll in all types of dual credit except CiHS. Native Hawaiian/ Pacific Islander (NH/PI) students are more likely to enroll in CTE-DC and less likely to enroll in CiHS and RS. Hispanic/Latino students have lower rates of RS enrollment and higher rates of CiHS enrollment. Multiracial students are slightly less likely to enroll in CiHS, CTE-DC, and IB courses and more likely to enroll in RS when compared to similar students from the reference group.

Moreover, on average, female students, students with higher eighth grade test scores, and students who are not receiving special education services are more likely than male students, students with lower eighth grade test scores, students who receive special education services, respectively, to enroll in all types of dual credit courses except CTE-DC. Multilingual students are more likely to enroll in all dual credit types than students who are not multilingual. Students from families with lower incomes or those who have experienced homelessness are, on average, less likely to enroll in all types of dual credit as compared to similar students with higher incomes or those who have not experienced homelessness, respectively. There is less consistency in the relationship between dual credit enrollment for students with a 504 plan. These students have higher rates of CiHS and CTE-DC enrollment, lower rates of RS enrollment, and no difference in AP or IB enrollment as compared to students without a 504 plan. Finally, results also show enrollment in dual credit courses has generally increased over time. The full table of regression coefficients is shown in Appendix D.

4. How many K-12 credits are earned from dual credit?

Most students who enroll in a dual credit course complete the course and earn high school credit. Figures 5-10 show the total average number of K-12 credits earned over the students' high school career for each dual credit type along with the percentage of students who enrolled in that type.¹⁶ For one dual credit type, RS, credits are taken from postsecondary data sources and are therefore not on the same scale as those from the K-12 data source. It should be noted that there are different eligibility criteria for each type and that not all types are available at every school. For example, only a small number of schools offer IB and CI and therefore there is higher variability in the data due to the small number of students enrolled.

As the total student population has increased over time, the rate of enrollment in dual credit has been maintained or increased. The rate of enrollment in CiHS has shown a steady increase since the 2018 cohort. Even with some types showing a steady enrollment rate over time there has been a nearly continual growth in the average total K-12 credits students earned in the four largest dual credit types. This indicates that recent cohorts of students are more likely to enroll in multiple courses of the same type of dual credit than more historical cohorts were.

¹⁶ Since some courses can be designated as more than one type, the credits cannot be summed across course types.

Figure 5: Percentage of Students Enrolled by Cohort and Average Credits Earned in AP

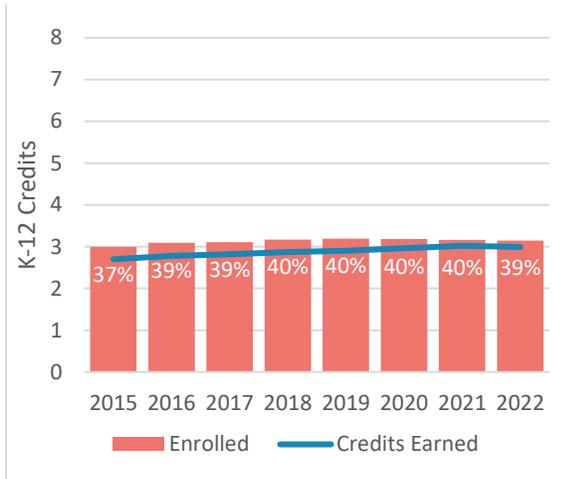


Figure 6: Percentage of Students Enrolled by Cohort and Average Credits Earned in IB

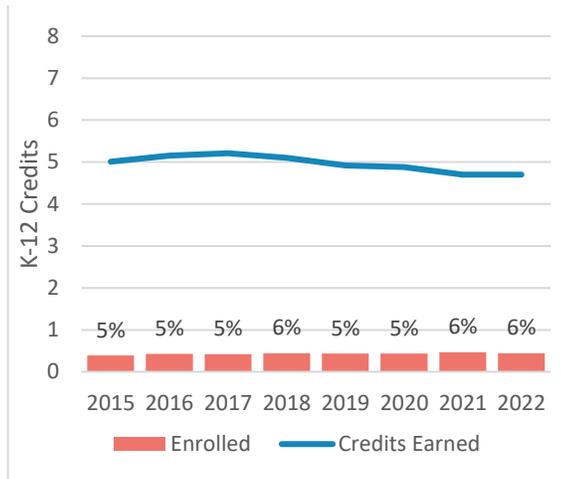


Figure 7: Percentage of Students Enrolled by Cohort and Average Credits Earned in CiHS

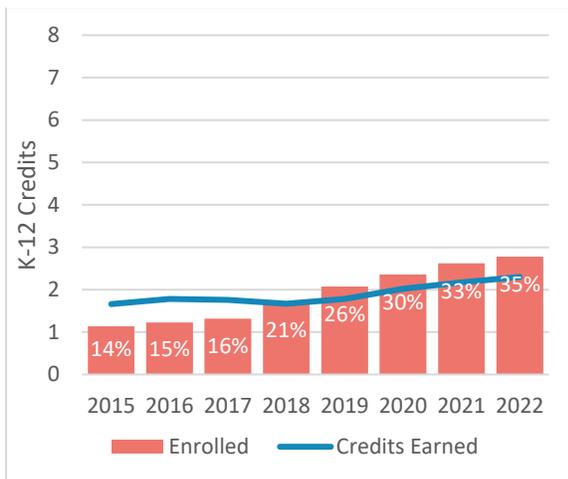


Figure 8: Percentage of Students Enrolled by Cohort and Average Credits Earned in CI

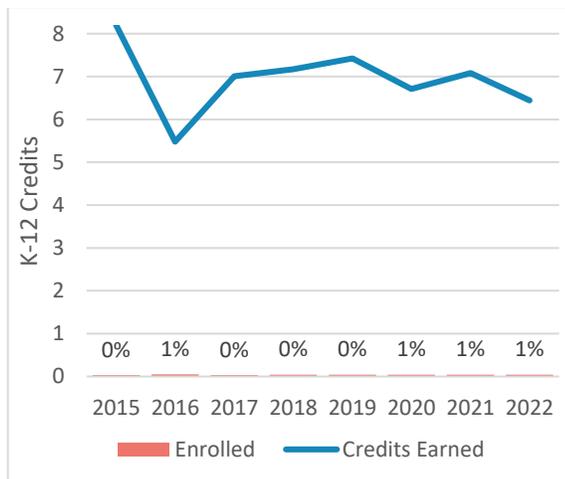


Figure 9: Percentage of Students Enrolled by Cohort and Average Credits Earned in RS

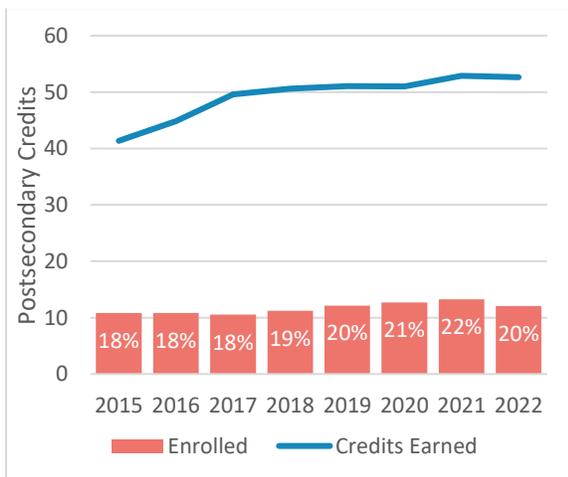
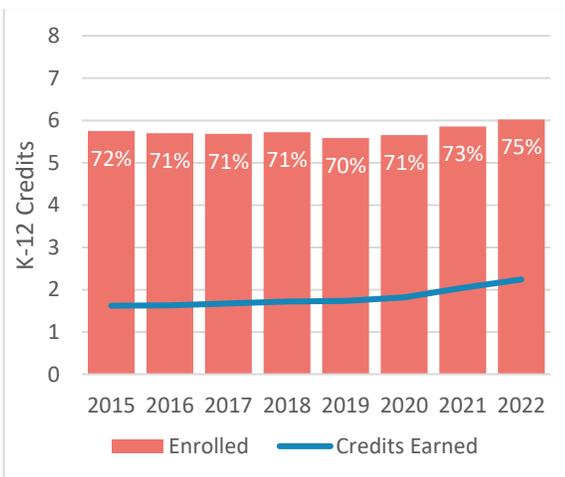


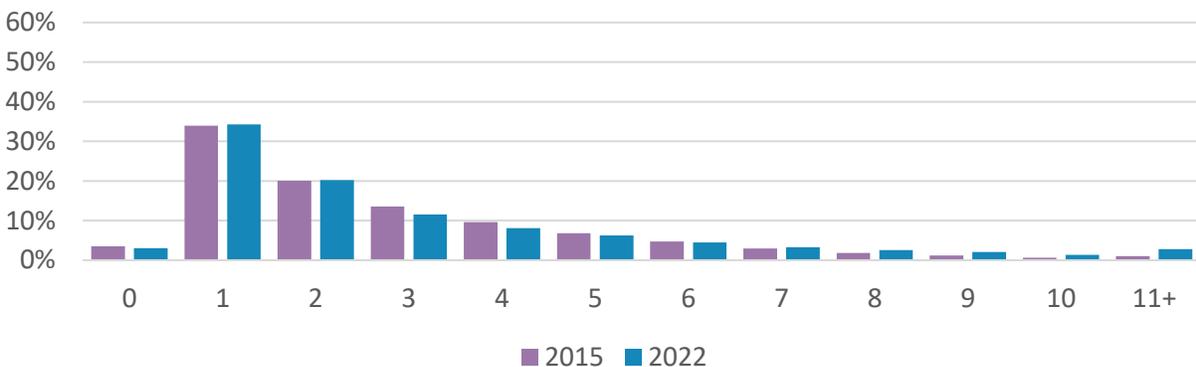
Figure 10: Percentage of Students Enrolled by Cohort and Average Credits Earned in CTE-DC



To further highlight the change in credit earning over time, Figures 11-15 show the distribution of K-12 credits earned by students in the 2015 and 2022 cohorts who enrolled. Figure 16 shows the postsecondary credits earned by students in RS for the 2017 and 2022 cohorts.

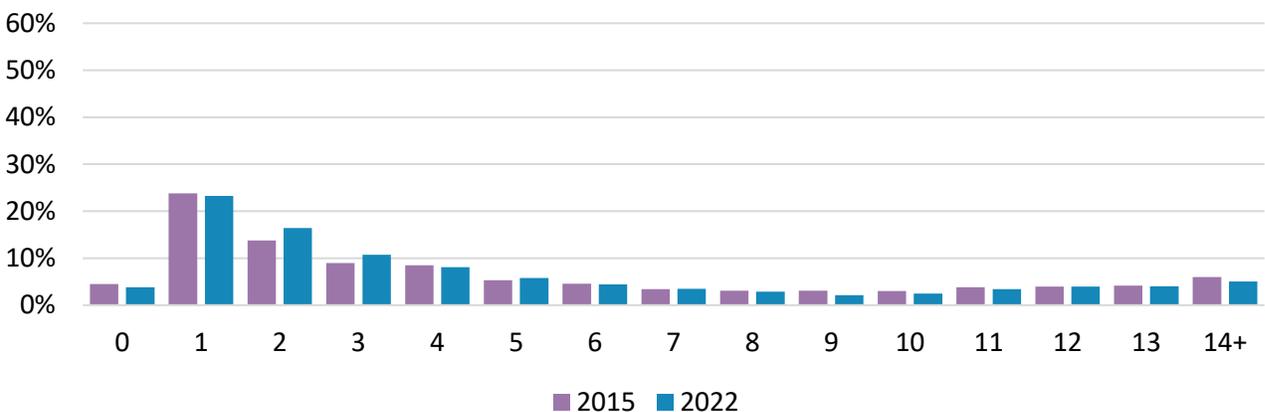
For students who enrolled in AP, there is a large drop off in the percentage of students who earn one K-12 credit to those earning two credits (34% and 20%, respectively). This has been the pattern across all cohorts.

Figure 11: Total K-12 Credits Earned in AP



For students who enrolled in IB, there is a similar drop off between one and two credits (24% and 15%, respectively). While the overall distribution has not changed much since the 2015 cohort, there has been a shift toward more students earning fewer total K-12 credits.

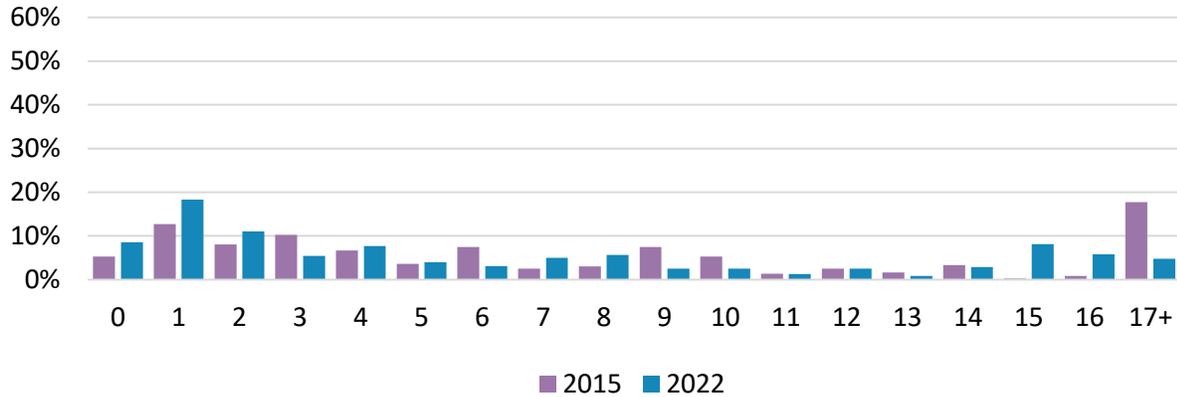
Figure 12: Total K-12 Credits Earned in IB



For students who enrolled in CI, the distribution is multimodal, with a cluster of students earning one K-12 credit as well as clusters around nine credits and 15 credits. This may be a function of the program design, which allows for students to complete specific degree tracks as well as stand-alone courses. The total K-12 credits earned varies considerably among all cohorts in the

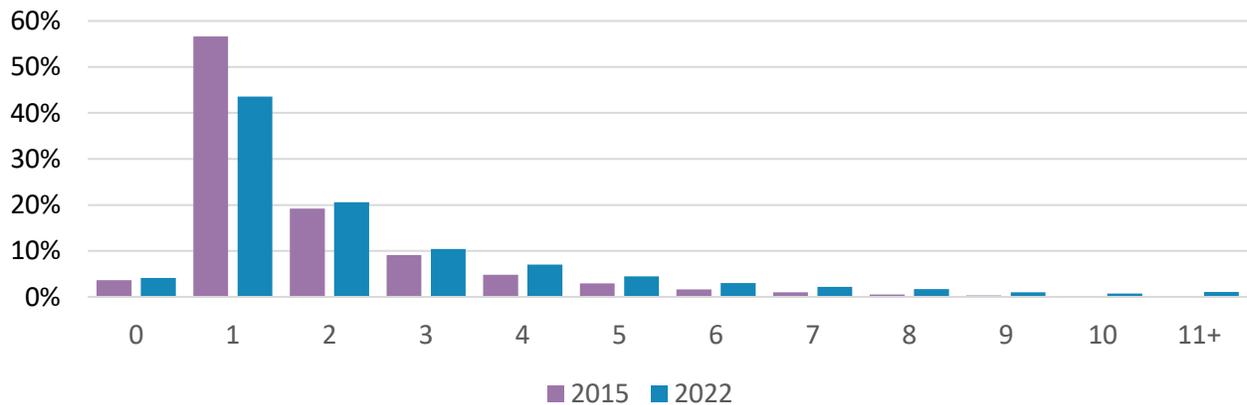
analysis, possibly due to changes in the capacity of the program sites and the small number of students enrolled.

Figure 13: Total K-12 Credits Earned in CI

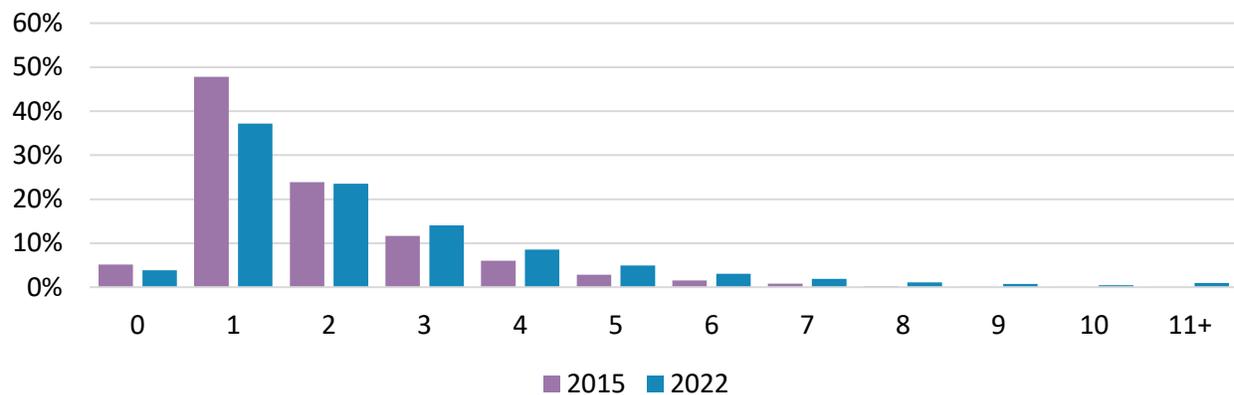


For students who enrolled in CiHS, the drop off between one credit and two credits is more stark than other dual credit types (57% and 19%, respectively for the 2015 cohort). While the overall distribution has not changed much since the 2015 cohort, there has been a shift toward a larger percentage of students earning more total K-12 credits, making the initial credit drop off slightly less pronounced (44% and 21%, respectfully for the 2022 cohort).

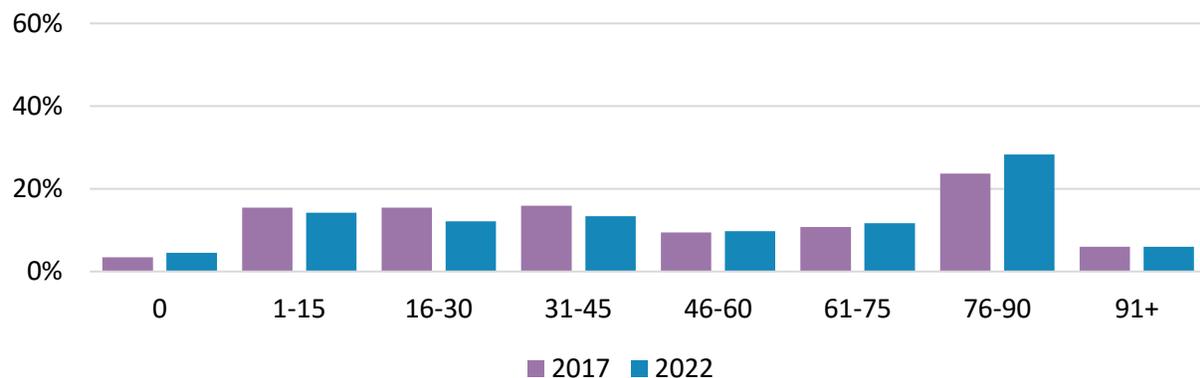
Figure 14: Total K-12 Credits Earned in CiHS



Similar to AP, IB and CiHS, students who enrolled in CTE-DC are most likely to earn one high school credit. The drop off to two credits is less pronounced than it was historically (48% to 24% for the 2015 cohort, 37% to 23% for the 2022 cohort). This comes as a larger percentage of students are earning three or more credits (23% for the 2015 cohort, 35% for the 2022 cohort).

Figure 15: Total K-12 Credits Earned in CTE-DC

Due to data limitations, we cannot display K-12 credits earned in RS as we can for the other dual credit types. As an alternative, we analyzed the postsecondary credits earned in RS. Further, the 2015 cohort had higher than expected counts of dual credit course records with zero credits attempted. Therefore, the 2017 cohort is used to minimize the impact of this potential data quality issue.

Figure 16: Total Postsecondary Credits Earned in RS

For those students who enrolled in RS, there is not the pronounced drop off at the low end of total postsecondary credits earned¹⁷. The distribution of students is relatively flat at 12-15% between one and 45 credits earned at the enrolling postsecondary institution. There is a small drop to 9-10% after 45 credits with a subsequent increase to 24-28% near 90 credits. There has been a gradual increase in the percentage of students who are earning the higher level of credits. There remain very few students who earned more than 90 total credits, which aligns with

¹⁷ Running Start credits are taken from postsecondary data sources and are therefore not on the same scale as those from the K-12 data source.

taking two years of the full 45-credit annual maximum before a student must pay additional fees. It is also the minimum credits required to earn a two-year associate degree.

When K-12 credit earning in dual credit is analyzed, there are indications of differences among some student subgroups for some dual credit types and not for others (see Appendix E). Of the students across 2015-2022 cohorts who enroll in each dual credit type¹⁸:

- Female students earn slightly more K-12 credits (ranging from 4 to 8% across dual credit type)¹⁹ than male students for all types, except for AP and CTE-DC.
- Based on the federal racial categories, Asian students earn more credits than the average for all students for each dual credit type except for CTE-DC (ranging from 13 to 43% across dual credit types). IB had the largest differences across racial groups (between -46 and 43% from the average). CTE-DC had the smallest differences across racial groups (between -20% and 2% from the average). Students identifying as AI/AN and NH/PI earned the fewest K-12 credits for HS-based course types, except for CiHS.
- Students who transferred into Washington public schools after ninth grade earned fewer K-12 credit for all dual credit types (ranging from 21 to 33% across dual credit types), but only a small difference for RS (2%). Transfer course data are incomplete for dual credit designations and therefore are not considered for this analysis.
- Students who drop out or graduate early or late earn fewer K-12 credits than those graduating on time (ranging from 19 to 40% across dual credit types). For the early group it may be due to fewer years in high school and therefore reduced opportunity for these courses.
- Generally, students identified as low income, multilingual learners, or experiencing homelessness, as well as those participating in migrant education, special education, or a 504 plan earn fewer K-12 credits across all dual credit course types. There is variation among the subgroups in the size of the difference, but generally, the difference is more pronounced in AP, IB and CiHS, and less pronounced or not different in RS and CTE-DC.
- Students participating in the gifted program earn more credits across all high school based course types (ranging from 43 to 97% across dual credit types), except for CTE-DC where there is no difference. These students earn slightly more credits in RS (11%).

¹⁸ CI course type excluded due to the small number of enrolled students within the subgroup (<150 across all cohorts).

¹⁹ A 10% difference equates to approximately 0.29 K-12 credits and 4.98 RS postsecondary credits.

Recommendations from 2022 Dual Credit Report

Recommendation I: Dual Credit Dashboard

In the 2022 ERDC Dual Credit Report, the workgroup recommended that a dashboard be created to fulfill several of the reporting requirements of RCW 28A.600.280, while allowing the written report to focus on complex or emerging topics of interest. Three of the questions from last year's report are answered by the new dual credit dashboard, accessible at ERDC's website:

- What are student enrollment rates in dual credit types?
- What can intersectional analysis tell us about enrollment trends in dual credit types?
- What is the total number and percentage of students in each cohort who have earned school K-12 credit?

[Access the Dashboard](#)

Recommendation II: Case study

There is substantial interest in understanding how enrollment in dual credit programs impacts the graduation and degree trajectories of students. However, each postsecondary institution establishes its own policies and practices for accepting and determining the course equivalencies of transferred dual credit courses. Each institution also collects and stores different data relating to the high school courses. This makes it difficult to accurately identify which dual credits are transferrable to an institution, whether full credit equivalency will be given, and whether they will apply toward program or degree requirements.

For more information about the State Auditor Office's Report [PA overview Dual Credit Programs.pdf \(wa.gov\)](#)

The 2022 ERDC Dual Credit Report recommended that the 2023 report include a case study to understand these challenges better. Since then, the State Auditor's Office (SAO) initiated an audit to assess to what extent credits earned in high school from dual credit courses are transferrable at postsecondary institutions. This project is now underway with a focus on Running Start and College in the High School courses with eight institutions of higher education in Washington state participating. Data for this project will be provided by participating institutions of higher education and ERDC.

The SAO report is expected to be complete in mid-2024. Recent legislation²⁰ also required postsecondary institutions to post transferability of College in the High School credits on their

²⁰ [SB5048](#) (Laws of 2023)

websites and report on the award of postsecondary credits among other items. The Dual Credit Workgroup will determine what information from these reports can be incorporated and expanded upon in a future ERDC Dual Credit Annual Report.

Recommendation III: Update on data quality

The 2022 ERDC Dual Credit Report recommended a focus on improving the quality and completeness of existing data collections and to not require additional categories of data reporting and disaggregation. Some small progress has been made in the area of data quality and completeness and this will be an ongoing effort supported by OSPI, community colleges, four-year institutions, and ERDC.

Advanced Placement, International Baccalaureate and Cambridge International

ERDC has been working with SBCTC to extract data on postsecondary credits earned from AP, IB and CI from the student data that SBCTC provides to ERDC. ERDC is working with OSPI to revise an existing data sharing agreement to gain access to AP, IB and CI score data to determine whether students met the exam-based criteria to be eligible for college credit.

College in the High School and Running Start

ERDC worked with the public four-year institutions to correct PCHEES reporting errors in relation to enrollment and postsecondary credits earned in CiHS and RS courses. Correct reporting was implemented in August 2023 and is expected to be reflected in the PCHEES data for the 2023-24 academic year. The upcoming 2024 SAO report is expected to shed light on how earned credits from CiHS and RS are transferred and utilized by students in their postsecondary education.

Career and Technical Education Dual Credit

Using funding from ERDC's 2019 Statewide Longitudinal Data System (SLDS), ERDC conducted a separate study²¹ of CTE-DC through analysis of data from the [Statewide Enrollment and Reporting System](#) (SERS). This project sought to better understand data limitations, how the data can be used for research, and provide a limited examination of the long-term outcomes of students who enrolled in CTE-DC.

²¹ The [full CTE-DC report](#) is available on the ERDC website.

Key findings from CTE-DC Study

- *Data from the SERS can be used for statewide research on CTE-DC, for limited years (2010-11 through 2014-15).*
- *Nearly three quarters of the cohort enrolled in one or more CTE-DC courses and nearly a third of them completed the courses and earned college credit.*
- *Students who identify as American Indian/Alaska Native are least likely to enroll in and earn college credit.*
- *Black students are most likely to enroll in CTE-DC courses; they are among the least likely to earn college credit.*
- *Male students are more likely than female students to enroll in CTE-DC, but female students are more likely to earn college credit.*
- *CTE-DC participants who earn college credits are more likely to enroll in postsecondary institutions than those who enrolled but do not earn college credits.*

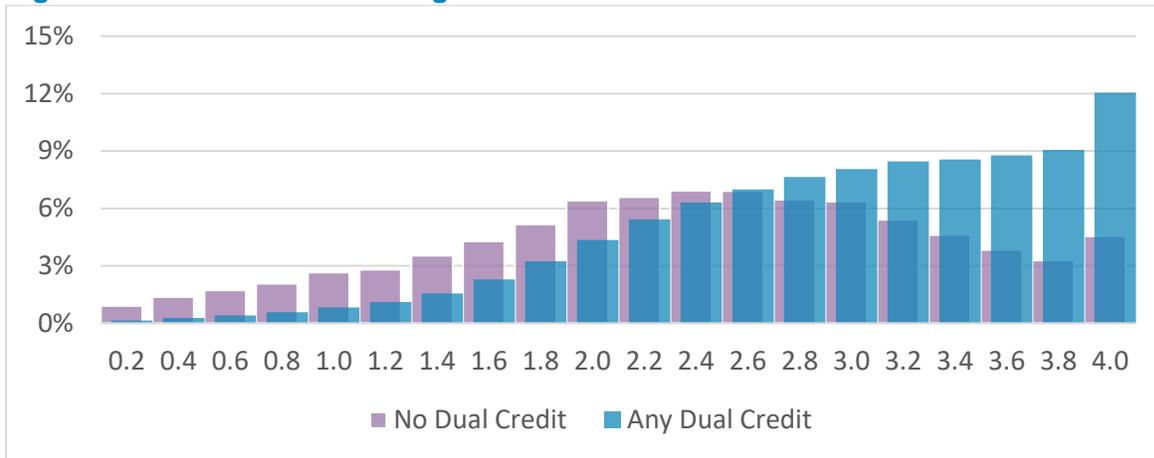
Recommendation IV: Measures of academic achievement

The measure of academic achievement used in the 2022 ERDC Dual Credit Report was the students' final high school grade-point average (GPA). The recommendation was to explore other measures for use in future reports that may highlight achievement that could otherwise be masked by the GPA.

Various other measures were discussed by the Dual Credit Workgroup. However, the workgroup believed that overall high school GPA is a useful measure of academic achievement. It is broadly understood by stakeholders and the public without specialized knowledge, and it is required to be reported for most students.²² This report expands how GPA is reported by presenting it as a distribution rather than as an overall average. This allows for the examination of variation within and among the groups enrolled in each dual credit type.

Figure 17 shows the percentage of students across the 2015-2022 cohorts and the final cumulative high school GPA for students who enrolled in a dual credit course, compared to students who did not enroll. The GPA is unweighted and includes all courses (dual credit and non-dual credit) as well as students who have earned differing amounts of credit from dual credit courses in high school.

²² Students with a final cumulative GPA that is missing or 0.0 were excluded from this analysis (n=34,363; 5% of all cohorts). There are a small set of schools that evaluate students' progress through non-graded processes, such as [Big Picture Schools](#).

Figure 17: Distribution Final High School GPA for Students in 2015-2022 Cohorts

In general, students who enrolled in any of the dual credit types achieved a higher GPA than those who did not enroll. When dual credit types are separated, the highest GPAs are among students who enrolled in Running Start followed by those who enrolled in AP. CI and IB are excluded from this analysis due to small student counts and limited implementation of these programs across the state (see Appendix C).

Recommendation V: List of prioritized research questions

The workgroup discussed many research questions related to dual credit. Per the workgroup's recommendation, ERDC will address the following research question outside of the dual credit report cycle:

What proportion of students who enroll in dual credit subsequently enroll in postsecondary education after exiting K-12? This question will be examined by institution type, dual credit type, and student group.

Additionally, ERDC will identify a subset of the below questions to examine over the next year for potential inclusion in the 2024 Dual Credit report:

- 1) How does dual credit type availability and enrollment vary by school geography and other school characteristics?
- 2) Do school characteristics predict differences in dual credit type availability?
- 3) How does dual credit enrollment in high school predict postsecondary enrollment, postsecondary achievement, degree completion, and time to degree? How do postsecondary outcomes vary by postsecondary institution type and location?

- 4) What is the impact of recent legislation to expand access to dual credit types on dual credit enrollment?²³
- 5) Who is enrolling in Running Start during summer quarter and what are their outcomes?
- 6) How many students have credits from their dual credit courses transcribed at a postsecondary institution? Does transcription rate differ by institution type or course type?²⁴

Conclusion and recommendations

The analysis of dual credit combinations made it clear that most students enroll in at least one dual credit course and that the majority enroll in multiple types of dual credit over their high school career. There has been a steady increase in the enrollment rate for CiHS since the 2017 cohort. Other dual credit types have also experienced more limited growth over time. Students who enrolled in dual credit had higher final cumulative high school GPAs than those who did not enroll.

Most students who enroll in a dual credit course also earn high school credit. However, the total number of K-12 credits earned varies based on dual credit type. There has been a gradual increase in the total average credits earned per student for AP, CiHS, RS, and CTE-DC over time. However, students who identified as low income, multilingual learners, or experiencing homelessness, as well as those participating in migrant education, special education, or a 504 plan continue to earn fewer K-12 credits across all dual credit course types.

Disaggregation of the federal race categories indicates different experiences among students and the limitation of identifying students only using the federal categories. Applying maximum representation using student identity response data allowed for analysis of different racial identity combinations by looking at students who identify as AI/AN only and comparing their outcomes with students that identify as AI/AN and Hispanic or AI/AN and another race. The results highlight that those who identify as AI/AN in combination with another race or ethnicity response have higher enrollment rates in dual credit than those who identify as AI/AN only.

The regression analysis examined which student characteristics are most predictive of dual credit enrollment while accounting for other student differences. This looks deeper than the descriptive metrics found on the Dual Credit Dashboard. The analysis found that there are other factors such as access to dual credit courses, prior achievement, and family income that drive

²³ See [SB5048](#) and [HB1316](#).

²⁴ ERDC's role in addressing this question will depend on the findings from the SAO report discussed above.

racial gaps in dual credit enrollment. This indicates that policy changes targeting these factors might also help to close racial gaps.

Data availability and quality continue to be limitations of research on dual credit. Identification of enrollment in dual credit types not included in this report, as well as how postsecondary institutions of higher education transcribe credits from dual credit courses remain challenging. However, some progress has been made and it is expected that future reports on dual credit will be able to include this data.

The workgroup makes the following recommendations for the 2024 Annual Dual Credit Report:

1. Conduct a regression analysis to look at the relationship between dual credit enrollment and post-high school outcomes. This will help us better understand the impact of dual credit enrollment on post-high school outcomes such as college enrollment. A substantial challenge in this type of analysis is how to capture the effect of dual credit enrollment rather than the relationship between the types of students who enroll in dual credit and the types of students who enroll in college.
2. Update the dashboard with another cohort / year of data and determine if additional measures should be included in the dashboard.
3. Review annual snapshot data available on the OSPI Report Card to analyze the impact of recent dual credit policy changes on dual credit enrollment.
4. Analysis of *access/availability* to dual credit courses based on student and school characteristics.
5. Choose one or more of the prioritized research questions to pursue.

Appendix A: Student characteristics and K-12 program participation definitions

Gender is taken from the student’s final high school enrollment record. Nonbinary student data is not available for this cohort. Numerators: Students in the subgroup who enrolled in one or more courses of the dual credit type. Denominators: All students in the cohort identified as either male or female.

Low income is defined as eligible for free or reduced-price meals at any time during their enrollment in grades 9-12 in a Washington public school. Numerators: Students in the subgroup who enrolled in one or more courses of the dual credit type. Denominators: All students in the cohort identified as either eligible or not eligible for free or reduced-price meals.

Race and Ethnicity AI/AN = American Indian or Alaskan Native. Black/AA = Black/African American. NH/PI = Native Hawaiian or Pacific Islander. Race and ethnicity are taken from the student’s final high school enrollment record. Data on the dashboard reflects the aggregated race and ethnicity of the student into the federally required race categories performed by OSPI before providing to ERDC. The analysis in this report uses the disaggregated race and ethnicity data that are self-reported separately. Numerators: all students in the race or ethnic category who enrolled in one or more courses of the dual credit type. Denominators: All students in the cohort in the race or ethnic category.

A student is defined as participating in [Special Education](#) if they received the services at any time during their enrollment in grades 9–12 in a Washington public school. Numerators: Students in the subgroup who earned high school credit in one or more courses of the dual credit type. Denominators: All students in the cohort who are identified as either participating or not participating in Special Education.

A student is defined as participating in [Migrant Education](#) if they received the services at any time during their enrollment in grades 9–12 in a Washington public school. Numerators: Students in the subgroup who earned high school credit in one or more courses of the dual credit type. Denominators: All students in the cohort who are identified as either participating or not participating in the Migrant Education program.

A student is defined as a multilingual learner in this report if they receive services through the [Transitional Bilingual Instructional Program](#), excluding students served under Title III services, at any time during their enrollment in grades 9–12 in a Washington public school..

A student is identified as experiencing homelessness if they were identified in CEDARS data as homeless, as defined in the McKinney–Vento Act, Section 725(2), at any time during their enrollment in grades 9–12 in a Washington public school. Numerators: Students in the subgroup who earned high school credit in one or more courses of the dual credit type. Denominators: All students in the cohort identified as either experiencing homelessness or not.

The GPA is categorized as “Unk” if the GPA was 0.0 or missing. Most of these students have multiple years of enrollments and nearly half graduated from the public K-12 system. There are

about five percent of K-12 enrollment records for high school students that are missing a Cumulative GPA value and an additional three percent that have a Cumulative GPA of 0. These zeros may be reflective of schools who evaluate students' progress through non-graded processes, but there can also be errors in data entry, data processing, or data management. The ERDC warehouse process converts missing values to zero. This means that the small number of true zeros are obscured. Students with a GPA of "Unk" remain in the denominator for the measure – percent of students at each GPA level.

Appendix B: Description of dual credit types

Table B-1: Dual credit types by Category

Dual Credit Category	Dual Credit Type(s)	Postsecondary Credit Attainment
I. College Preparatory Programs with Exams (CPPE)	<p>Advanced Placement (AP), Cambridge International (CI) and International Baccalaureate (IB) are taught at high schools by high school teachers. Students may earn college credit through established standardized exams.</p> <p>Note: CI and IB are offered at a very limited number of Washington schools.</p>	Colleges determine the type and amount of postsecondary credit earned based on the exam score. Taking the exam is voluntary, but necessary to earn college credit. Postsecondary credit for these programs will only be transcribed once the student enrolls in the postsecondary institution. Credits are accepted at all public WA postsecondary institutions and most WA private institutions and out-of-state institutions. Exam score must meet threshold established in statute by the WA public institutions of higher education (RCW 28B.10.054)
II. Concurrent Enrollment / Course-Based	<p>The Running Start program (RS) is open to 11th and 12th grade students to take college courses at WA community and technical colleges and some four-year baccalaureate institutions.²⁵</p>	High school and postsecondary credit are earned when the student completes the course for credit and, in the case of CiHS the fee is paid. ²⁶ The credit and grades students earn are added to their high school and college transcripts. Postsecondary credit is transcribed by the college or university where the student enrolled and earned the postsecondary credit. If a student enrolls in dual credit courses at multiple colleges or universities, they will have multiple college transcripts.
	<p>The College in the High School Program (CiHS) is open to ninth to 12th grade students to take courses taught by high school teachers at the high school, with college curriculum and textbooks, and oversight by college faculty and staff.</p>	

²⁵ [2SHB 1316](#) (Laws of 2023) expanded the availability of Running Start funding for courses taken during the summer term.

²⁶ [2SSB 5048](#) (Laws of 2023) removed the fees for College in the High School starting in the 2023-2024 academic year for students attending a public high school or charter school and enrolled in a public WA institution of higher education.

Dual Credit Category	Dual Credit Type(s)	Postsecondary Credit Attainment
<p>III. Articulation Dual Credit / Course-Based</p>	<p>Career and Technical Education Dual Credit (CTE-DC) courses integrate academics with technical skill development related to professional-technical occupations to prepare students for advanced education and careers. Courses are taught by high school teachers at the high schools but are a cooperative effort between K-12 schools, technical colleges and the community.</p>	<p>Requirements for earning credit vary among the articulation agreements between school districts and community and technical colleges. Students must meet the minimum grade level for a course that is offered with a CTE-DC articulation agreement. College credit transcription varies. In some cases, credits are automatically awarded and transcribed upon student attainment of a qualifying end-of-course grade. Other programs require students to submit a formal request for credits to be added to their transcript.</p>
<p>IV. Other</p>	<p>Direct-funded/technical high school are high school programs located at a community and technical college,</p> <p>Open Doors 1418 Youth Reengagement Dual Credit serves students in grades 9-12, offered through an articulation commitment between high school and college programs for courses at or above the 100 level. It may be taken at or under the authority of Washington’s community and technical colleges, and is a new designation in CEDARS as of the 2019-2020 academic year.</p> <p>District/Local dual credit is attendance at certain institutions of higher education, and is a new designation in CEDARS as of the 2019-2020 academic year.</p>	<p>Requirements for earning credit vary. Direct-funded/technical high school requirements are similar to Concurrent Enrollment types. Open Doors 1418 Youth Reengagement Dual Credit and District/Local dual credit requirements will vary among the articulation agreements between school districts and community and technical colleges.</p>

Appendix C: Cumulative high school GPA

Table C-1: Cumulative High School GPA Distribution by Dual Credit Enrollment

GPA	Any DC Enrollment		No DC Enrollment		AP Enrollment		No AP Enrollment	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Unk²⁷	23,451	4%	10,912	14%	6,958	3%	27,405	7%
0.2	875	0%	699	1%	27	0%	1,547	0%
0.4	1,618	0%	1,059	1%	88	0%	2,589	1%
0.6	2,445	0%	1,339	2%	127	0%	3,657	1%
0.8	3,449	1%	1,610	2%	217	0%	4,842	1%
1.0	4,919	1%	2,048	3%	348	0%	6,619	2%
1.2	6,573	1%	2,166	3%	615	0%	8,124	2%
1.4	9,283	2%	2,737	4%	1,026	0%	10,994	3%
1.6	13,630	2%	3,314	4%	1,875	1%	15,069	4%
1.8	19,194	3%	4,000	5%	3,294	1%	19,900	5%
2.0	25,864	4%	4,966	6%	5,466	2%	25,364	6%
2.2	32,317	5%	5,102	7%	8,056	3%	29,363	7%
2.4	37,486	6%	5,364	7%	10,851	4%	31,999	8%
2.6	41,591	7%	5,345	7%	13,893	5%	33,043	8%
2.8	45,413	8%	4,999	6%	17,295	7%	33,117	8%
3.0	47,867	8%	4,918	6%	20,421	8%	32,364	8%
3.2	50,245	8%	4,190	5%	24,012	9%	30,423	7%
3.4	50,855	9%	3,576	5%	27,284	10%	27,147	7%
3.6	52,114	9%	2,966	4%	31,120	12%	23,960	6%
3.8	53,797	9%	2,541	3%	35,608	14%	20,730	5%
4.0	71,591	12%	3,517	5%	54,479	21%	20,629	5%
Total	594,577		77,368		263,060		408,885	

*=Student counts were rounded to the nearest 10 to protect student privacy.

Table C-1 (continued)

GPA	IB Enrollment		No IB Enrollment		CI Enrollment		No CI Enrollment	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Unk	2,433	7%	31,930	5%	41	1%	34,322	5%
0.2	13	0%	1,561	0%	N<10	0%	1,573	0%
0.4	41	0%	2,636	0%	10*	0%	2,671	0%
0.6	50	0%	3,734	1%	6	0%	3,778	1%
0.8	90	0%	4,969	1%	11	0%	5,048	1%
1.0	135	0%	6,832	1%	16	0%	6,951	1%
1.2	198	1%	8,541	1%	14	0%	8,725	1%

²⁷ Unk=Unknown. Students with a final cumulative GPA that is missing or 0.0 were excluded from this analysis (n=34,363; 5% of all cohorts). There are a small set of schools that evaluate students' progress through non-graded processes, such as [Big Picture Schools](#).

GPA	IB Enrollment		No IB Enrollment		CI Enrollment		No CI Enrollment	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1.4	311	1%	11,709	2%	39	1%	11,981	2%
1.6	479	1%	16,465	3%	47	1%	16,897	3%
1.8	737	2%	22,457	4%	68	2%	23,126	3%
2.0	1,118	3%	29,712	5%	103	3%	30,727	5%
2.2	1,596	4%	35,823	6%	140	4%	37,279	6%
2.4	1,990	5%	40,860	6%	206	6%	42,644	6%
2.6	2,190	6%	44,746	7%	252	7%	46,684	7%
2.8	2,439	7%	47,973	8%	273	8%	50,139	8%
3.0	2,673	7%	50,112	8%	269	8%	52,516	8%
3.2	2,979	8%	51,456	8%	345	10%	54,090	8%
3.4	3,191	9%	51,240	8%	341	10%	54,090	8%
3.6	3,458	10%	51,622	8%	357	10%	54,723	8%
3.8	3,996	11%	52,342	8%	368	11%	55,970	8%
4.0	6,107	17%	69,001	11%	561	16%	74,547	11%
Total	36,224		635,721		3,464		668,481	

*=Student counts were rounded to the nearest 10 to protect student privacy.

Table C-1 (continued)

GPA	CiHS Enrollment		No CiHS Enrollment		RS Enrollment		No RS Enrollment	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Unk	6,296	4%	28,067	5%	3,868	3%	30,495	6%
0.2	27	0%	1,547	0%	7	0%	1,567	0%
0.4	80	0%	2,597	1%	17	0%	2,660	0%
0.6	123	0%	3,661	1%	21	0%	3,763	1%
0.8	239	0%	4,820	1%	78	0%	4,981	1%
1.0	379	0%	6,588	1%	117	0%	6,850	1%
1.2	678	0%	8,061	2%	230	0%	8,509	2%
1.4	1,048	1%	10,972	2%	366	0%	11,654	2%
1.6	1,704	1%	15,240	3%	681	1%	16,263	3%
1.8	2,665	2%	20,529	4%	1,301	1%	21,893	4%
2.0	4,024	3%	26,806	5%	2,265	2%	28,565	5%
2.2	5,649	4%	31,770	6%	3,717	3%	33,702	6%
2.4	7,223	5%	35,627	7%	5,449	4%	37,401	7%
2.6	8,854	6%	38,082	7%	7,430	6%	39,506	7%
2.8	10,493	7%	39,919	8%	9,760	7%	40,652	8%
3.0	12,249	8%	40,536	8%	11,828	9%	40,957	8%
3.2	14,129	9%	40,306	8%	14,042	11%	40,393	7%
3.4	15,878	10%	38,553	8%	15,283	12%	39,148	7%
3.6	17,674	11%	37,406	7%	16,717	13%	38,363	7%
3.8	20,255	13%	36,083	7%	17,518	13%	38,820	7%

GPA	CiHS Enrollment		No CiHS Enrollment		RS Enrollment		No RS Enrollment	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
4.0	30,776	19%	44,332	9%	20,500	16%	54,608	10%
Total	160,443		511,502		131,195		540,750	

*=Student counts were rounded to the nearest 10 to protect student privacy.

Table C-1 (continued)

GPA	CTE-DC Enrollment		No CTE_DC Enrollment	
	Count	Percent	Count	Percent
Unk	19,417	4%	14,946	8%
0.2	854	0%	720	0%
0.4	1,553	0%	1,124	1%
0.6	2,369	0%	1,415	1%
0.8	3,301	1%	1,758	1%
1.0	4,729	1%	2,238	1%
1.2	6,290	1%	2,449	1%
1.4	8,819	2%	3,201	2%
1.6	12,864	3%	4,080	2%
1.8	17,894	4%	5,300	3%
2.0	23,826	5%	7,004	4%
2.2	29,178	6%	8,241	4%
2.4	33,197	7%	9,653	5%
2.6	36,027	7%	10,909	6%
2.8	38,181	8%	12,231	6%
3.0	39,036	8%	13,749	7%
3.2	39,743	8%	14,692	8%
3.4	39,108	8%	15,323	8%
3.6	38,778	8%	16,302	9%
3.8	38,811	8%	17,527	9%
4.0	48,537	10%	26,571	14%
Total	482,512		189,433	

*=Student counts were rounded to the nearest 10 to protect student privacy.

Appendix D: Regression analysis

Logistic regressions were performed on whether a student enrolled in each type of dual credit for each credit type except Cambridge International.²⁸ The calculated probability for each student for enrolling in dual credit was then used to calculate marginal effects, which provide us with the ability to use the estimated model to make predictions. Marginal effects reflect the change in the probability of the outcome occurring, in this case the probability of enrolling in a dual credit course. Since the marginal effects are expressed in proportions, they are an easier way to interpret the model in a more standard way.

Regressions were built up from the simplest specifications (for example, including only race and gender), to including a full set of variables including test scores, and program enrollment and other student characteristics including free or reduced-price meals receipt, special education services receipt, 504 plan receipt, multilingual learner status and whether student experienced homelessness. This approach allowed for assessment of the robustness of the estimates across models.

The full model results are provided below. The coefficients show how much of an increase/decrease is associated between a variable and the probability of enrolling in dual credit. The reference group for race and ethnic categories is white, reference for female is male, reference for all flags are students that do not have those characteristics, and reference for student cohort are students in the 2015 cohort.

²⁸ Cambridge International is only available in a handful of schools and was therefore excluded from regression analysis at this time.

Table D-1: Regression Results: Probability of enrolling in a dual credit course from full model

	AP	CiHS	CTE-DC	IB	RS
Intercept	-0.005 *	-0.307 ***	0.214 ***	-0.172 ***	-0.278 ***
American Indian or Alaska Native	-0.099 ***	-0.002	-0.137 ***	-0.046 ***	-0.022 ***
Asian	0.106 ***	0.049 ***	0.043 ***	0.034 ***	0.044 ***
Black or African American	0.052 ***	-0.010 ***	0.056 ***	0.047 ***	0.034 ***
Hispanic or Latino of any race(s)	-0.040 ***	0.042 ***	0.002	0.002	-0.013 ***
Native Hawaiian and Other Pacific Islander	0.035 ***	-0.071 ***	0.061 ***	0.001	-0.080 ***
Two or More Races	0.004	-0.007 ***	-0.005 *	-0.005 ***	0.012 ***
Female Student	0.020 ***	0.005 ***	-0.021 ***	0.001 *	0.039 ***
Eighth grade Math Level 2	-0.056 ***	-0.024 ***	0.038 ***	-0.005 ***	-0.021 ***
Eighth grade Math Level 3	0.020 ***	0.018 ***	0.010 ***	-0.001	0.036 ***
Eighth grade Math Level 4	0.146 ***	0.061 ***	-0.025 ***	0.024 ***	0.053 ***
Eighth grade Math Level missing	-0.002	0.003	-0.056 ***	-0.007	0.027 ***
Eighth grade ELA Level 2	-0.044 ***	-0.008 ***	0.025 ***	-0.006 ***	-0.026 ***
Eighth grade ELA Level 3	0.032 ***	0.019 ***	0.007 ***	-0.003 **	0.045 ***
Eighth grade ELA Level 4	0.105 ***	0.052 ***	-0.024 ***	0.011 ***	0.064 ***
Eighth grade ELA Level missing	0.014 **	-0.013 **	-0.020 ***	0.007 *	0.031 ***
Free or reduced price meal eligibility	-0.091 ***	-0.060 ***	-0.003 **	-0.005 ***	-0.004 ***
Special education services receipt	-0.206 ***	-0.101 ***	0.005 *	-0.031 ***	-0.184 ***
Multilingual learner	0.010 ***	0.010 ***	0.010 ***	0.005 ***	0.005 ***
Has a 504 plan	-0.002	0.008 ***	0.029 ***	0.002	-0.033 ***
Experienced homelessness	-0.031 ***	-0.026 ***	-0.007 **	-0.004 *	-0.091 ***
2016 Cohort	0.006 **	0.017 ***	-0.006 **	0.004 **	-0.003
2017 Cohort	0.011 ***	0.034 ***	-0.006 ***	0.003	-0.005 *
2018 Cohort	0.026 ***	0.105 ***	0.027 ***	0.007 ***	0.004 *
2019 Cohort	0.044 ***	0.159 ***	-0.029 ***	0.008 ***	0.042 ***
2020 Cohort	0.032 ***	0.192 ***	-0.018 ***	0.006 ***	0.052 ***
2021 Cohort	0.030 ***	0.223 ***	0.007 ***	0.009 ***	0.068 ***
2022 Cohort	0.027 ***	0.241 ***	0.034 ***	0.004 **	0.049 ***
Number of Observations Used	529,851	527,638	531,071	425,296	530,374

The dependent variable in each regression is whether a student enrolled in *any* course in the specific type of dual credit.

Data includes only students who graduated on time, and excludes gender X, grade 8 test results 'Basic', and students with race='not provided'. These groups were too small to get meaningful estimates for.

Students at schools where no student received a certain dual credit were excluded from the regression, as students at those schools are presumed to lack access to that type of dual credit.

Marginal effects were calculated from odds ratios resulting from logistic regressions. Marginal effects are expressed in percentages.

Significance levels were taken from the logistic regressions and are shown for the corresponding marginal effects. Three stars: significant to 1% level, two stars: 5% level, one star: 10% level.

Regression analysis was also used to examine how eighth grade test scores and other student characteristics might explain racial gaps in dual credit enrollment. Figures D-1 through D-3 illustrate changes in observed racial gaps in enrollment in CiHS, RS, and IB courses employing a basic regression model that includes only race, gender, and cohort and the full regression model. The figures report marginal effects — or the estimated change in the probability of enrolling in each dual credit type — for students in each racial group compared to the largest group of students (White students). As noted in the main text, basic observed gaps (purple bars) are larger than gaps that account for eighth grade test scores and other student characteristics, or even in the opposite direction.

Figure D-1: The relationship between race and the probability of enrolling in a CiHS course

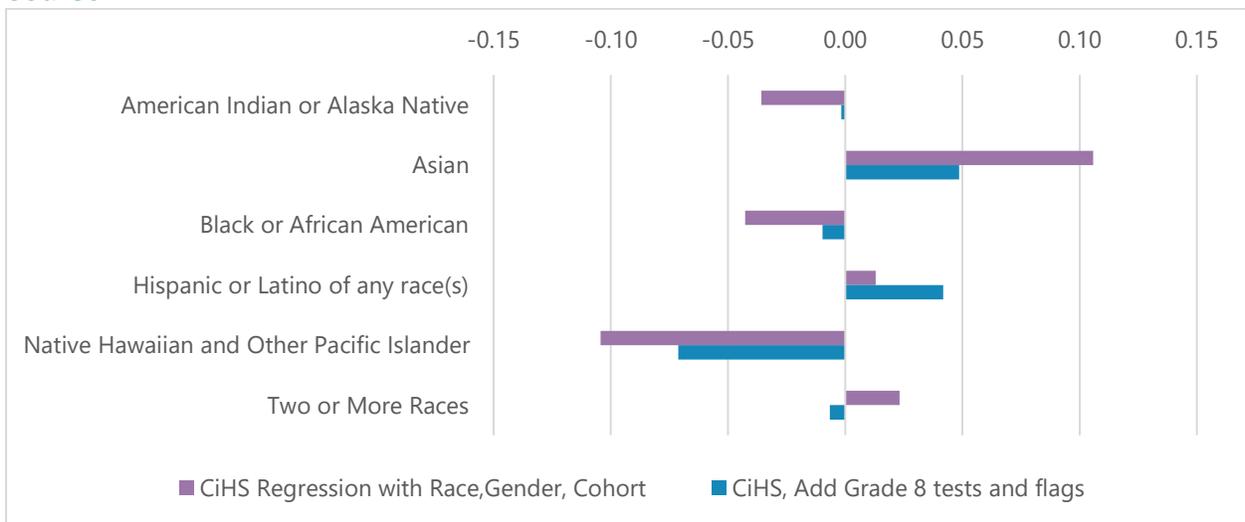


Figure D-2: The relationship between race and the probability of enrolling in an RS course

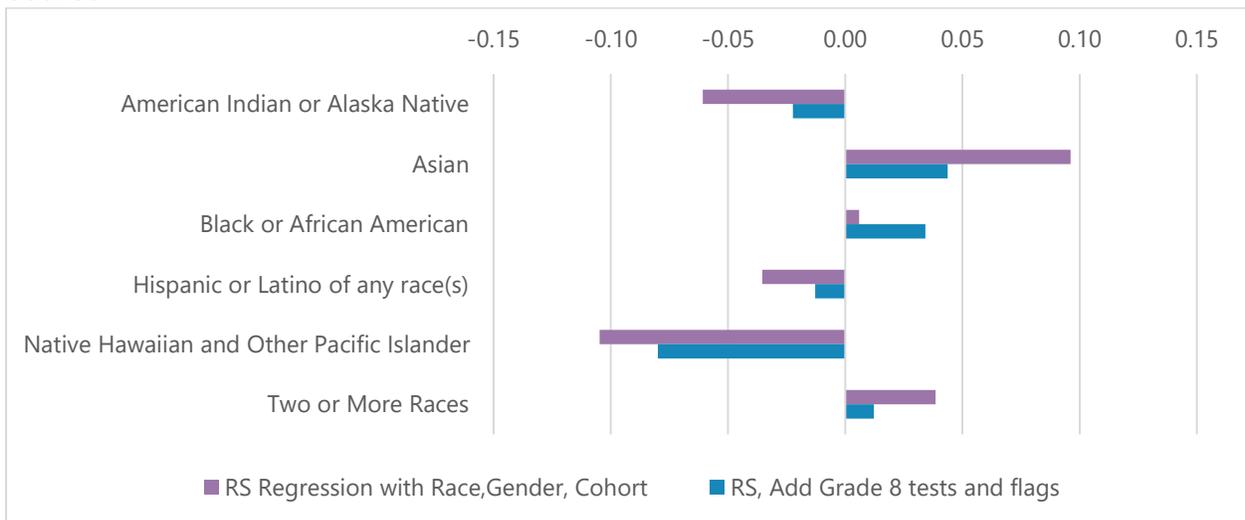


Figure D-3: The relationship between race and the probability of enrolling in an IB course

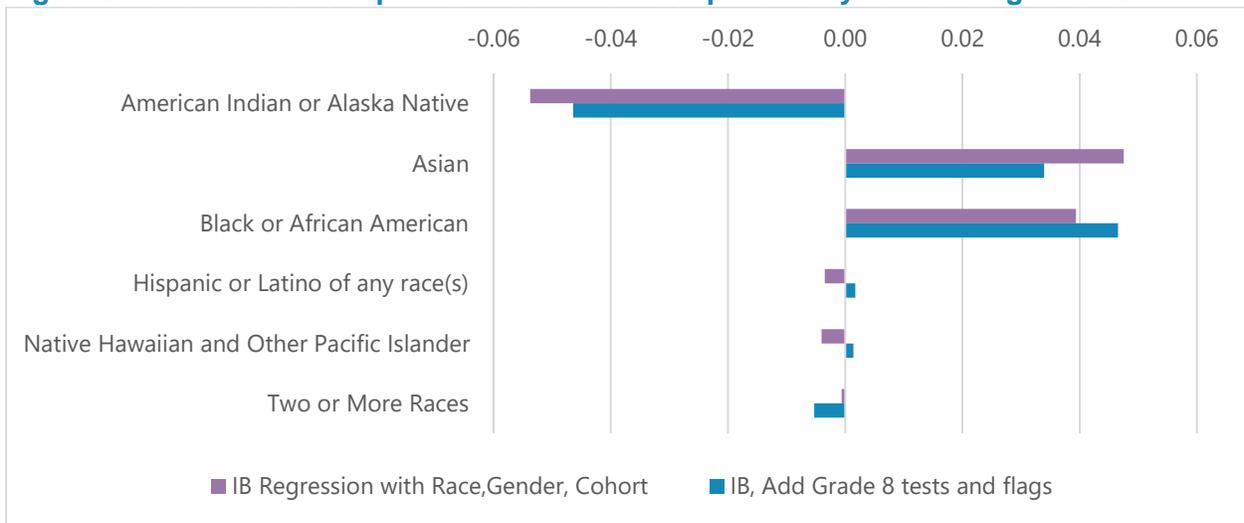


Figure D-4: The relationship between gender and eighth grade tests and the probability of enrolling in dual credit courses

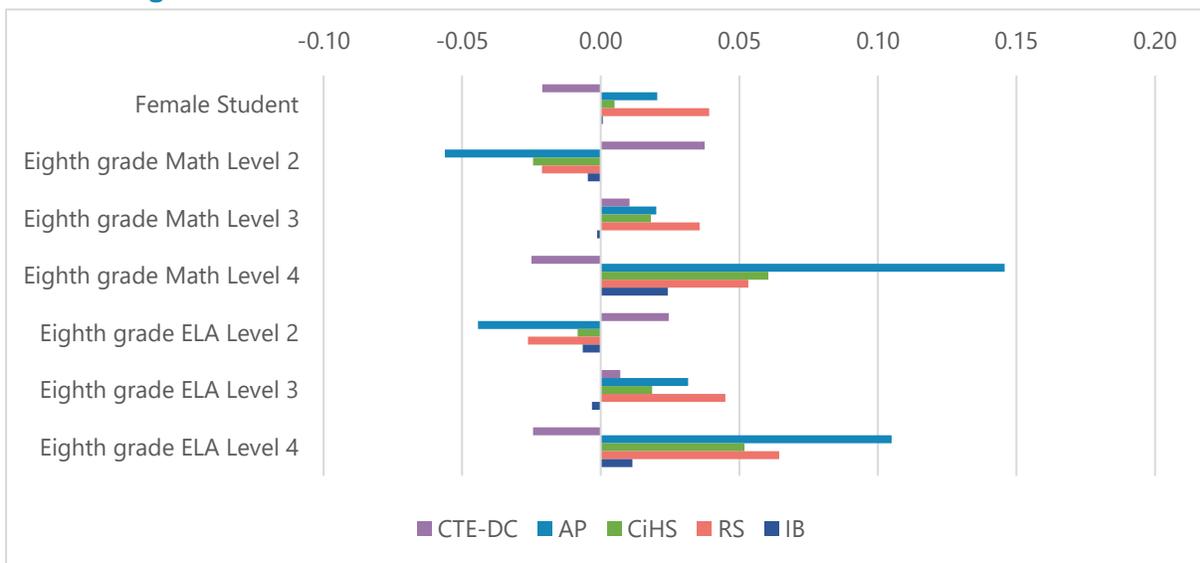
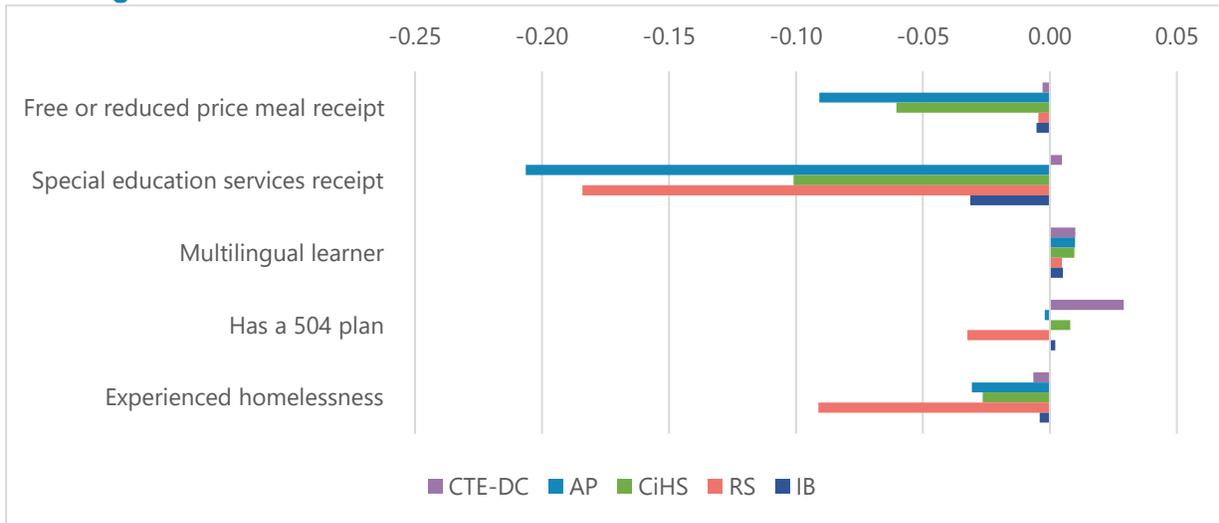


Figure D-5: The relationship between certain student attributes and the probability of enrolling in dual credit courses



Appendix E: Credits earned

Credit earned relates to those applied to the student's K-12 transcript. The exception to this is that RS credits are taken from postsecondary data sources and are therefore not on the same scale as those from the K-12 data source.

Table E-1: Percent Enrolled and Average Credits Earned by Cohort

Cohort	2015	2016	2017	2018	2019	2020	2021	2022
AP	37% 2.7	39% 2.8	39% 2.8	40% 2.9	40% 2.9	40% 3.0	40% 3.0	39% 3.0
IB	5% 5.0	5% 5.2	5% 5.2	6% 5.1	5% 4.9	5% 4.9	6% 4.7	6% 4.7
CI	0.4% 8.2	0.6% 5.5	0.4% 7.0	0.5% 7.2	0.5% 7.4	0.6% 6.7	0.5% 7.1	0.6% 6.4
CiHS	14% 1.7	15% 1.8	16% 1.8	21% 1.7	26% 1.8	30% 2.0	33% 2.2	35% 2.3
RS	18% 41.4	18% 44.9	18% 49.6	19% 50.6	20% 51.0	21% 51.0	22% 52.9	20% 52.7
CTE-DC	72% 1.6	71% 1.6	71% 1.7	71% 1.7	70% 1.7	71% 1.8	73% 2.0	75% 2.2

Table E-2: K-12 Credits Earned from AP

K-12 Credits Earned	2015 Cohort		2022 Cohort	
	Count	Percent	Count	Percent
0	1,076	4%	1,018	3%
1	10,282	34%	11,570	34%
2	6,069	20%	6,829	20%
3	4,097	14%	3,911	12%
4	2,914	10%	2,749	8%
5	2,074	7%	2,110	6%
6	1,440	5%	1,509	4%
7	909	3%	1,098	3%
8	546	2%	871	3%
9	352	1%	691	2%
10	203	1%	472	1%
11+	318	1%	934	3%
Total	30,280		33,762	

Table E-3: K-12 Credits Earned from IB

K-12 Credits Earned	2015 Cohort		2022 Cohort	
	Count	Percent	Count	Percent
0	176	4%	180	4%
1	933	24%	1,102	23%
2	541	14%	778	16%
3	352	9%	509	11%
4	334	9%	384	8%
5	209	5%	275	6%
6	180	5%	210	4%
7	134	3%	164	3%
8	121	3%	136	3%
9	121	3%	102	2%
10	118	3%	116	2%
11	149	4%	162	3%
12	155	4%	187	4%
13	163	4%	190	4%
14+	236	6%	239	5%
Total	3,922		4,734	

Table E-4: K-12 Credits Earned from CI

K-12 Credits Earned	2015 Cohort		2022 Cohort	
	Count	Percent	Count	Percent
0	19	5%	41	9%
1	46	13%	88	18%
2	29	8%	53	11%
3	37	10%	26	5%
4	24	7%	37	8%
5	13	4%	19	4%
6	27	7%	15	3%
7	9	2%	24	5%
8	11	3%	27	6%
9	27	7%	12	3%
10	19	5%	12	3%
11	5	1%	6	1%
12	9	2%	12	3%
13	6	2%	4	1%
14	12	3%	14	3%
15	N<10	0%	39	8%
16	N<10	1%	28	6%
17+	64	18%	23	5%
Total	361		480	

Table E-5: K-12 Credits Earned from CiHS

K-12 Credits Earned	2015 Cohort		2022 Cohort	
	Count	Percent	Count	Percent
0	422	4%	1,236	4%
1	6,506	57%	12,973	44%
2	2,209	19%	6,145	21%
3	1,043	9%	3,112	10%
4	550	5%	2,096	7%
5	336	3%	1,325	4%
6	184	2%	899	3%
7	119	1%	659	2%
8	64	1%	513	2%
9	34	0%	292	1%
10	16	0%	227	1%
11+	6	0%	326	1%
Total	11,489		29,803	

Table E-6: K-12 Credits Earned from CTE-DC

K-12 Credits Earned	2015 Cohort		2022 Cohort	
	Count	Percent	Count	Percent
0	2,979	5%	2,463	4%
1	27,797	48%	24,001	37%
2	13,899	24%	15,161	23%
3	6,758	12%	9,073	14%
4	3,506	6%	5,497	9%
5	1,642	3%	3,166	5%
6	883	2%	1,964	3%
7	459	1%	1,201	2%
8	131	0%	689	1%
9	57	0%	455	1%
10	18	0%	296	0%
11+	24	0%	594	1%
Total	58,153		64,560	

Table E-7: Postsecondary Credits Earned from RS

Postsecondary Credits Earned	2017 Cohort		2022 Cohort	
	Count	Percent	Count	Percent
0	501	3%	785	5%
1-15	2,262	15%	2,466	14%
16-30	2,259	15%	2,098	12%
31-45	2,329	16%	2,313	13%
46-60	1,379	9%	1,694	10%
61-75	1,578	11%	2,023	12%
76-90	3,476	24%	4,895	28%
91+	872	6%	1,033	6%
Total	14,656		17,307	

Table E-8: Comparison of Credits Earned by Student Category Tables

		AP		IB		CI		CiHS		CTE-DC		RS	
		Count	Average Credits	Count	Average Credits	Count	Average Credits	Count	Average Credits	Count	Average Credits	Count	Average Credits
All Students	Overall		2.88		4.95		6.87		1.96		1.81		49.52
Gender	Female	141,803	2.88	18,610*	5.16	1,828	7.21	83,237	2.00	229,474	1.75	61,789	52.60
	Male	121,211	2.89	17,610*	4.73	1,636	6.50	77,186	1.91	252,986	1.88	39,976	49.49
	X	46	2.32	N<10	4.50	N/A	N/A	20	1.21	52	1.54	18	36.00
Federal Race Category ²⁹	American Indian or Alaska Native	2,009	1.90	212	2.65	21	5.86	1,414	1.51	5,796	1.45	718	40.19
	Asian	33,268	4.12	6,870	7.09	482	9.57	17,823	2.40	40,911	1.83	11,738	56.16
	Black or African American	11,243	2.14	3,513	3.50	420	4.77	5,414	1.53	24,528	1.68	4,136	45.21
	Hispanic or Latino of any race(s)	39,665	2.15	7,761	3.53	840	4.73	30,665	1.68	103,143	1.79	14,080	48.88
	Native Hawaiian and Other Pacific Islander	2,435	2.07	451	2.79	201	4.70	1,001	1.49	5,557	1.80	548	49.20
	Two or More Races	18,888	2.95	2,593	5.18	313	6.78	10,304	1.93	31,606	1.85	6,933	50.33
	White	155,539	2.87	14,822	5.11	1,187	8.46	93,808	2.00	270,924	1.84	63,622	51.70
Cohort Placement	Starting in Ninth Grade	246,008	2.92	33,384	5.08	3,291	7.09	150,749	1.99	444,381	1.85	93,603	51.67
	Transfer-In	17,052	2.32	2,840	3.41	173	2.80	9,694	1.52	38,131	1.39	8,180	47.98
Graduation Timing	Early	645	2.14	99	4.54	N<10	3.25	292	1.57	1,495	1.44	546	40.66
	Late	4,065	1.26	990	1.64	110*	2.17	2,680	0.90	21,418	1.52	2,219	29.00
	N/A	9,499	0.96	2,280	1.17	270*	1.60	6,220	0.71	60,809	0.95	4,908	28.33
	On Time	248,851	2.98	32,855	5.32	3,080*	7.52	151,251	2.03	398,790	1.96	94,110	53.16
Low Income	No	167,042	3.32	19,368	6.15	1,429	9.79	98,685	2.18	232,730	1.89	63,947	53.34
	Yes	96,018	2.11	16,856	3.57	2,035	4.83	61,758	1.60	249,782	1.74	37,836	48.05
Multilingual Learner	No	253,645	2.92	33,053	5.18	3,210	7.25	152,375	1.99	444,295	1.83	98,952	51.64
	Yes	9,415	1.77	3,171	2.60	254	2.13	8,068	1.36	38,217	1.64	2,831	41.95

²⁹ Students with no Race/Ethnicity category provided were excluded from this analysis.

		AP		IB		CI		CiHS		CTE-DC		RS	
		Count	Average Credits	Count	Average Credits	Count	Average Credits	Count	Average Credits	Count	Average Credits	Count	Average Credits
Migrant Education	No	260,149	2.90	35,585	4.99	3,447	6.91	156,415	1.97	469,885	1.82	100,725	51.40
	Yes	2,911	1.63	639	2.69	17	0.53	4,028	1.53	12,627	1.63	1,058	48.36
Special Education	No	254,611	2.93	34,089	5.13	3,304	7.09	152,141	2.00	423,354	1.81	99,672	51.81
	Yes	8,449	1.59	2,135	2.14	160	2.45	8,302	1.26	59,158	1.83	2,111	30.92
504 Plan	No	244,107	2.90	33,780	4.98	3,318	6.90	147,905	1.96	446,361	1.81	94,642	52.10
	Yes	18,953	2.66	2,444	4.63	146	6.29	12,538	1.90	36,151	1.92	7,141	41.81
Gifted	No	219,983	2.64	30,290	4.28	2,450	5.50	137,587	1.84	440,789	1.82	88,392	50.62
	Yes	43,077	4.12	5,934	8.41	1,014	10.21	22,856	2.64	41,723	1.80	13,391	56.31
Experiencing Homelessness	No	253,276	2.93	34,339	5.09	3,282	7.10	154,050	1.99	448,172	1.84	98,818	51.96
	Yes	9,784	1.63	1,885	2.36	182	2.89	6,393	1.28	34,340	1.44	2,965	31.92

*=Student counts were rounded to the nearest 10 to protect student privacy.

Appendix F: American Indian/Alaskan Native data

Table F-1: Racial Identity Combinations by Dual Credit Enrollment

		Enrolled		Not Enrolled	
		Count	Percent	Count	Percent
Any DC	AI/AN only	795	40%	301	27%
	AI/AN and Hispanic	1,719	55%	260	13%
	AI/AN and Another Race	1,179	52%	216	15%
	All Other Students	72,625	66%	7,737	10%
AP	AI/AN only	220	20%	876	80%
	AI/AN and Hispanic	596	30%	1,383	70%
	AI/AN and Another Race	440	32%	955	68%
	All Other Students	32,144	40%	48,218	60%
IB	AI/AN only	31	3%	1,065	97%
	AI/AN and Hispanic	137	7%	1,842	93%
	AI/AN and Another Race	61	4%	1,334	96%
	All Other Students	4,498	6%	75,864	94%
AP/IB/CI	AI/AN only	245	22%	851	78%
	AI/AN and Hispanic	708	36%	1,271	64%
	AI/AN and Another Race	487	35%	908	65%
	All Other Students	35,685	44%	44,677	56%
CIHS	AI/AN only	243	22%	853	78%
	AI/AN and Hispanic	593	30%	1,386	70%
	AI/AN and Another Race	368	26%	1,027	74%
	All Other Students	28,232	35%	52,130	65%
RS	AI/AN only	118	11%	978	89%
	AI/AN and Hispanic	205	10%	1,774	90%
	AI/AN and Another Race	201	14%	1,194	86%
	All Other Students	16,586	21%	63,776	79%
CTE-DC	AI/AN only	667	61%	429	39%
	AI/AN and Hispanic	1,528	77%	451	23%
	AI/AN and Another Race	988	71%	407	29%
	All Other Students	60,605	75%	19,757	25%

Figure F-1: Percent Enrollment in AP by AI/AN Racial Identity Combinations

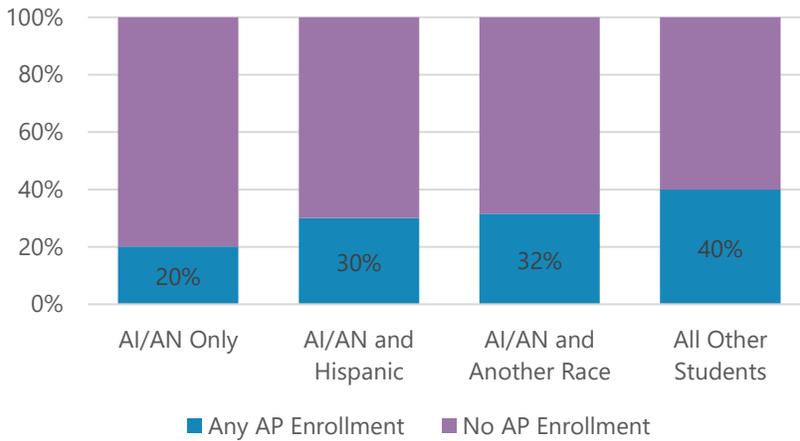


Figure F-2: Percent Enrollment in IB by AI/AN Racial Identity Combinations

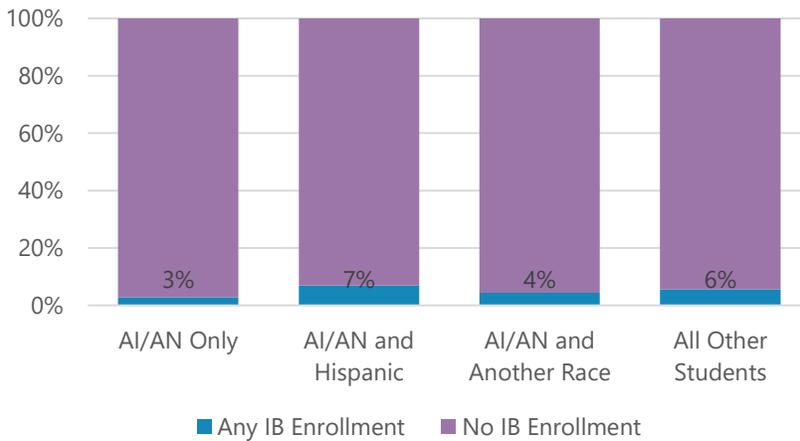


Figure F-3: Percent Enrollment in CiHS by AI/AN Racial Identity Combinations

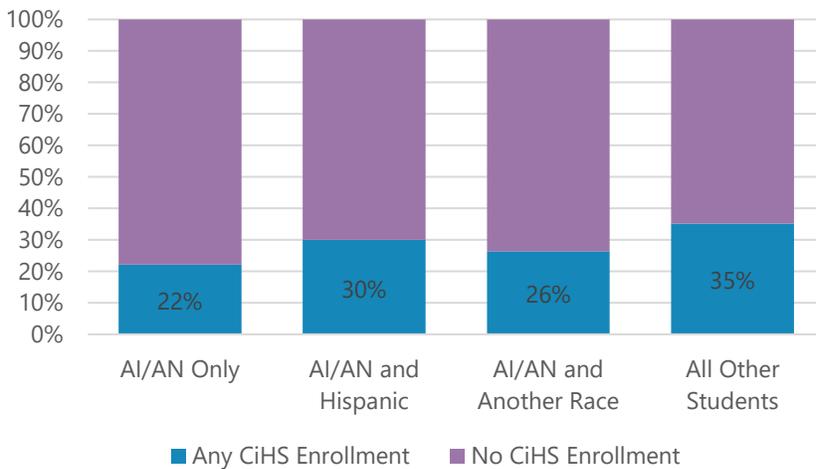


Figure F-4: Percent Enrollment in CTE-DC by AI/AN Racial Identity Combinations

