



What's Happening

March 2017

Earning college credits in high school: Options, participation, and outcomes for Oregon students

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Key findings

- Oregon's public colleges offer many accelerated college credit options for high school students, but the cost, eligibility requirements, and geographic coverage vary greatly across institutions.
- Oregon's rate of community college dual credit participation is higher than the national average.
- Community college dual credit students are more likely to be White, female, high achievers, and not economically disadvantaged.
- Oregon high school students who take community college dual credit courses enroll and earn credit in an average of three dual credit courses.

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This report is available on the Regional Educational Laboratory website at <http://ies.ed.gov/ncee/edlabs>.

Summary

Oregon's postsecondary attainment goal for 2025, adopted in 2011, calls for 40 percent of Oregon adults to have a bachelor's degree or higher, 40 percent to have an associate's degree or postsecondary certificate, and the remaining 20 percent to have a high school diploma or equivalent (S. 253, Or. 2011). As in other states a central strategy for increasing postsecondary attainment in Oregon is to promote accelerated college credit options—such as Advanced Placement, International Baccalaureate, dual credit, and dual enrollment courses—that enable high school students to earn college credit. Oregon has invested heavily in the accelerated college credit strategy, with particular attention to student groups that have historically not had access to these courses.

The study focuses on options offered between 2005/06 and 2012/13 through Oregon community colleges, including dual credit (in which high school students earn both high school and college credit by taking a college course at their high school) and dual enrollment (in which high school students earn both high school and college credit by taking a college course at the college campus or online), and on the characteristics of the students who enroll in these classes. The study also explores the relationship between students' participation in dual credit and later education outcomes, including high school graduation, postsecondary enrollment, and postsecondary persistence.

Key findings include the following:

- Oregon public colleges have many accelerated college credit options, but their cost, eligibility requirements, and geographic coverage vary greatly across institutions.
- Oregon's rate of community college dual credit participation is higher than the national average.
- Oregon students taking dual credit courses through a community college enroll and earn credit in an average of three dual credit courses during their time in high school.
- More than 90 percent of students pass the community college dual credit courses in which they have enrolled.
- Community college dual credit students are more likely to be White, female, high achievers, and not eligible for the federal school lunch program.
- Male students in all racial/ethnic groups participate in community college dual credit at lower rates than female students do, and in each racial/ethnic group the gender gap in participation is similar.
- In each racial/ethnic group students eligible for the federal school lunch program participate in community college dual credit at lower rates than students who are not eligible.
- The rates at which students who participate in dual credit programs graduate from high school, enroll in college, and persist in the first year of college are higher than the state average.
- At the five community colleges examined in a dual enrollment analysis, participation in dual enrollment was low but grew over time. Dual enrollment students had lower achievement on state math and reading tests and higher rates of eligibility for the federal school lunch program than dual credit students had.

Oregon stakeholders can use the study results to better understand the breadth and characteristics of accelerated college credit options in the state; dual credit programs' equity

gaps—which can inform outreach efforts to students participating at lower rates, such as rural, economically disadvantaged, and racial/ethnic minority students; and data that should be reported to the state to conduct analyses that improve monitoring and evaluation of accelerated college credit programs. Nationally, this study offers an example to other states of potentially useful analyses to inform improvements to these programs.

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Why this study?

In 2009 President Obama called for an increase in the number of college graduates by 2020 to match the postsecondary attainment growth in other countries and increase overall U.S. economic competitiveness. Many states have developed similarly ambitious postsecondary degree–attainment goals in recent years. In 2011 Oregon adopted its 40–40–20 goal for 2025, calling for 100 percent of Oregon adults to hold a high school diploma or equivalent, with 40 percent of them also holding a bachelor’s degree or a higher degree and 40 percent having an associate’s degree or postsecondary certificate (S. 253, Or. 2011).

Accelerated college credit options, which enable high school students to earn college credit, have been a popular strategy for increasing postsecondary school access, both in Oregon and nationally. These programs take many forms but can be grouped into four primary categories: Advanced Placement courses, International Baccalaureate courses, dual credit courses (in which students receive high school and college credit for college courses taken at their high school), and dual enrollment courses (in which students receive high school and college credit for courses taken at a college or online through a college).

Accelerated college credit programs aim to improve students’ secondary and postsecondary education outcomes by increasing the rigor of the courses they take in high school; preparing students for college through information and direct experiences with college coursework, administrative systems, and campus interactions; and reducing the time to complete a postsecondary degree and college costs by accumulating postsecondary credits while in high school. Few rigorous studies have examined whether accelerated college credit programs achieve these objectives. However, a small but growing body of research highlights the potential of accelerated college credit to improve education outcomes such as high school grades and high school graduation (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007), postsecondary attainment (An, 2013), and time to complete a postsecondary degree (Adelman, 2004). (See appendix A for a detailed review of the literature.)

Despite the growing popularity of accelerated college credit programs and the urgency to increase the postsecondary attainment of all students, Oregon, like many other states, has little information about the accelerated college credit options its schools offer, the students these programs serve, and the education outcomes of participating students. To address this gap, the Oregon College and Career Readiness Research Alliance (which is composed of members from the Oregon Department of Education, Office of Community Colleges and Workforce Development, Higher Education Coordinating Commission, Chief Education Office, and school districts and public colleges) asked Regional Educational Laboratory Northwest to conduct a descriptive study of accelerated college credit options, participation, and outcomes in the state.

This report also addresses stakeholders’ research priorities by presenting findings on equity in participation rates. Oregon’s Chief Education Office adopted a vision statement “to clearly articulate the shared goals for our state, the intentional investments we will make to reach our goals of an equitable educational system, and to create clear accountability structures to ensure that we are actively making progress and correcting where there is not progress” (Oregon Education Investment Board, 2013, p. 4). The state has invested extensively in accelerated college credit programs that seek to increase the number of underrepresented students earning college credit. Thus a key priority of the Oregon College and

A small but growing body of research highlights the potential of accelerated college credit to improve education outcomes such as high school grades and high school graduation, postsecondary attainment, and time to complete a postsecondary degree

Career Readiness Research Alliance is to identify participation gaps for underrepresented student groups and then address these gaps with targeted outreach strategies and programs.

Accelerated college credit in Oregon

Dual credit programs in Oregon were developed independently at various colleges beginning in the 1970s (Oregon Joint Boards of Education, 2000) and were supported by legislative mandate as early as 1997 through a bill that called for exploration of accelerated learning models (S. 919, Or. 1997). Such programs are now widespread in the state. As of February 2011 all 17 Oregon community colleges and four of the seven four-year institutions in the former Oregon University System were offering dual credit courses to Oregon high school students (Oregon Department of Education, 2011).¹

Oregon again increased its investment in accelerated college credit programs in 2005 with passage of the Expanded Options Bill, which requires all high schools to offer dual enrollment opportunities (S. 300, Or. 2005; Oregon Department of Education, 2010). The bill established the Expanded Options program, which allows eligible high school students to take postsecondary courses at Oregon public colleges and community colleges. Students are eligible if they are 16 or older, in grades 11 or 12, have an education learning plan detailing how the accelerated courses are relevant for meeting their education and career goals, and have not successfully completed four years of high school.

In 2012 the Eastern Promise program began providing another accelerated college credit option for high school students in eastern Oregon. Eastern Promise is a collaboratively developed accelerated learning opportunity similar to dual credit programs that involves collaboration between several high schools and colleges in eastern Oregon. In both 2014 and 2015 the Oregon Department of Education awarded grants to expand or develop similar programs in other state regions, indicating the state's continuing interest in expanding accelerated college credit programs and in increasing access to accelerated college credit for historically disadvantaged groups. The expansion of collaboratively developed accelerated learning opportunities was part of a series of strategic investments to help Oregon reach its 40–40–20 goal. For more details on accelerated college credit programs in Oregon, as well as common terminology used in the state, see table 1.

In 2013 the state established an Accelerated Learning Committee to make recommendations for legislation on accelerated college credit (S. 222, Or. 2013). In a report submitted in October 2014, the committee recommended that the state invest at least \$15 million in 2015–17 to provide accelerated college credit access to students at all Oregon high schools, align high school and college curricula, and engage students and families in building a college-going culture (Chief Education Office, 2014).

To date, research on accelerated college credit participation in Oregon has been limited to two reports on dual credit conducted by the Oregon University System (North & Jacobs, 2008; 2010) and several reports on Advanced Placement using College Board data (College Board, 2014). According to the Oregon University System research, participation in dual credit by Oregon high school students grew from 11,855 students in 2006/07 to 15,707 students in 2007/08, an increase of 32 percent (North & Jacobs, 2010). On average, these students completed 8.5 hours of dual credit work in 2007/08. Oregon high school students who participated in dual credit courses were more likely than students who did not

As of February 2011 all 17 Oregon community colleges and four of the seven four-year institutions in the former Oregon University System were offering dual credit courses to Oregon high school students

Table 1. Accelerated college credit programs available in Oregon as of January 2016

Program	Oregon-specific term	Definition	Included in this study
Dual credit	Dual credit	Courses with credit awarded through a community college or four-year institution offered in a high school during regular school hours, and taught by approved high school teachers to award secondary and postsecondary credit. This may include lower division collegiate courses, career and technical education courses, and online courses. Eligibility requirements vary by college and school/district.	Yes. Dual credit offered through a public Oregon community college or four-year institution is included in research question 1. Community college dual credit is included in research questions 2 and 3.
Dual enrollment (also referred to as early or middle college programs)	Expanded Options	Courses offered at an eligible postsecondary institution (either on campus or online) for high school students to complete high school graduation requirements and earn college credits with costs paid by the local school district. In Oregon the Expanded Options program is available to students in grades 11 and 12 who are age 16 or older, have an education learning plan, and have not successfully completed four years of high school to earn high school and college credits at the same time by taking courses at the postsecondary institution.	Yes. Dual enrollment offered through a public Oregon community college or four-year institution is included in research question 1. Dual enrollment offered at five participating community colleges is included in research question 4.
Fifth-year program	Fifth-year/ advanced diploma programs	College-credit-bearing courses offered to high school students who have completed requirements for a high school diploma but have not yet received their diploma. Courses are taken at the college campus, and the student is typically enrolled full time in these college-credit courses; this is sometimes known as an “advanced diploma” program. Eligibility requirements vary by college, high school, and district but all students in these programs have successfully completed diploma requirements.	Yes. Fifth-year programs offered through a public Oregon community college or four-year institution are included in research question 1.
Collaboratively developed accelerated learning opportunity	Eastern Promise or Regional Promise	Courses offered in a high school during regular school hours that are developed collaboratively between a high school and college and evaluate proficiency at a college level (such as Eastern Promise credit-by-proficiency courses). These courses are taught during regular school hours by high school teachers who are authorized by the college to offer the course, for the purpose of awarding both secondary and postsecondary credit. Eligibility requirements vary by college, high school, and district.	Yes. Programs offered through a public Oregon community college or four-year institution are included in research question 1.
Advanced Placement and International Baccalaureate	Advanced Placement and International Baccalaureate	Courses in which students receive college credit or alternative college placement based on exam results. These are also known as formalized programs. Eligibility requirements for course participation vary by high school and district. Credits are awarded by the college in which a student later enrolls after high school; credit determination is at the discretion of this enrolling college.	No.

Note: The classifications and descriptions date from January 2016.

Source: Adapted from definitions created by the Accelerated Learning Committee (a seven-member task force charged with examining accelerated college credit) with input from the Oregon College and Career Readiness Research Alliance.

to enroll and persist in postsecondary education and earn a higher grade point average. However, the study did not control for key differences such as difference in academic performance between students who participated in dual credit courses and those who did not. As these differences could also influence education outcomes, the study did not estimate the causal impact of the courses.

National research

National and state research also indicates that participation in accelerated college credit programs has been increasing (Thomas, Marken, Gray, & Lewis, 2013). Some studies show that students who participate in accelerated college credit differ significantly from their peers who do not. For example, a Florida study concluded that accelerated college credit program participants were more likely to be female and White and less likely to be economically disadvantaged and English learner students (Estacion, Cotner, D'Souza, Smith, & Borman, 2011). These differences may be a result of variation in access to accelerated college credit options across schools. For example, small, rural, and low-income high schools are much less likely than large, urban, and high-income schools to have the capacity to offer accelerated college credit options (particularly Advanced Placement and International Baccalaureate; Klopfenstein & Lively, 2012; Thomas et al., 2013). These differences may also stem from eligibility criteria, which vary across programs and states and may restrict participation to higher achieving students. For example, Florida, Maine, and North Carolina have established eligibility requirements at the state level. These requirements typically include a minimum high school grade point average of 3.0 (a B average) to participate in certain accelerated college credit options (Zinth, 2015).

This study expands the knowledge base on accelerated college credit in Oregon and nationally by describing the accelerated college credit options available through public colleges across the state, investigating the characteristics and outcomes of students who participate in dual credit and in dual enrollment, and examining the relationship between participation in a dual credit course and high school and college outcomes

What the study examined

This study expands the knowledge base on accelerated college credit in Oregon and nationally by describing the accelerated college credit options available through public colleges across the state; investigating the characteristics, contexts, and outcomes of students who participate in dual credit at all Oregon community colleges and in dual enrollment at five community colleges; and examining the relationship between participation in a dual credit course at an Oregon community college and high school and college outcomes. Examining accelerated college credit options, participation, and outcomes to identify opportunity gaps among student demographic groups is important for informing state efforts to promote equitable access to accelerated college credit options. This report does not examine Advanced Placement or International Baccalaureate participation or outcomes because of data unavailability and looks only at programs available through public colleges in Oregon (see table 1).

Four research questions guided the study:

1. What accelerated college credit options are available through Oregon public colleges, and what are their key features?
2. Which students participate in community college dual credit programs, and what are their demographic, academic, and school characteristics and outcomes (passing dual credit courses, graduating from high school, enrolling in college, and persisting in college)?

3. What is the relationship between participation in dual credit programs in Oregon community colleges and outcomes such as high school graduation, college enrollment, and college persistence?
4. How do participants differ between dual enrollment and dual credit programs at selected Oregon community colleges?

The analysis for research question 1 summarizes website and interview information on accelerated college credit programs offered by public colleges. The analysis for research questions 2 and 3 linked statewide data from the Oregon Department of Education and all 17 community colleges to study community college dual credit participation and outcomes for five cohorts of students who attended an Oregon public high school and were expected to graduate between 2008/09 and 2012/13. Statewide data are available only for dual credit courses offered by the community colleges and not for other accelerated college credit options. Research question 4 compared students who participated in dual enrollment with students who participated in dual credit at five community colleges that provided institutional data for this study. The data and methods are summarized in box 1, and a full description is in appendix B.

Box 1. Data and methods

To address research question 1 on the landscape of accelerated college credit in Oregon, the study team gathered and synthesized information from two sources: online sources on available accelerated college credit programs from the websites of Oregon public colleges and semistructured interviews with dual credit coordinators at four community colleges. Appendix C describes the interviews and their findings.

To address research questions 2 and 3 the study team analyzed administrative data from secondary and post-secondary sources on five cohorts of students who attended grade 9 at an Oregon public high school in 2005/06 through 2009/10 and were expected to graduate from high school between 2008/09 and 2012/13. The study team created a single statewide database by linking high school data from the Oregon Department of Education data to community college data from Oregon's Higher Education Coordinating Commission Office of Community Colleges and Workforce Development. Oregon Department of Education data also include college enrollment data from the National Student Clearinghouse.

For research question 2 the study team identified which high school students took dual credit courses offered by Oregon community colleges and compared the characteristics (for example, race/ethnicity, gender, eligibility for the federal school lunch program, school locale, and state assessment scores) and outcomes (passing dual credit, graduating high school, enrolling in college, and persisting in college) of high school students who took dual credit courses and those who did not. Because high school grade point average data are not collected at the state level in Oregon, state assessment scores in math and reading (on the Oregon Assessment of Knowledge and Skills) were used as the student academic characteristics for this study.

For research question 3 the study team compared the outcomes of participants in dual credit with nonparticipants using regression analysis to adjust for students' demographic and academic characteristics.

For research question 4 the study team also linked individual community college data from five participating colleges¹ to the statewide database to identify which students took dual enrollment courses offered by these five colleges and compare dual enrollment participants to dual credit participants.

The study sample included 233,573 students for the dual credit portion (between 45,500 and 48,600 in each cohort) and 14,187 students for the dual enrollment portion. Appendix B has more details on the study data and methodology.

Note

1. All community colleges in Oregon were invited to participate in the study; of those invited five provided data and are considered to be participating colleges in the study.

What the study found

The study found that accelerated college credit options in Oregon vary widely among colleges, that a higher proportion of students participate in community college dual credit in Oregon than in the country overall, and that participants have higher rates of graduating high school and enrolling and persisting in college than the state average, although the study cannot determine whether participation in dual credit contributed directly to these outcomes. This section summarizes key findings related to the accelerated college credit landscape in Oregon, dual credit at all community colleges, and dual enrollment at selected community colleges. More detailed results are described in appendixes C and D.

What accelerated college credit options are offered through Oregon public colleges?

This section explores accelerated college credit options that are offered through Oregon public community colleges and four-year universities as of July 2015.

Most public colleges in Oregon offer dual credit and dual enrollment programs, but program features such as instructor qualifications, cost, and eligibility requirements vary. The number of accelerated college credit programs offered at each of Oregon's 24 public colleges ranges from two to as many as seven programs (figure 1), with 22 institutions offering dual credit and 23 offering dual enrollment as of July 2015. While exact offerings were unique to each college, most public colleges (21 of 24) offered at least one dual credit and one dual enrollment accelerated college credit program; community colleges in Oregon are required by law to offer dual enrollment (S. 300, Or. 2005; Oregon Department of Education, 2010). Some colleges offer multiple programs of the same type (such as multiple dual credit or dual enrollment programs). These programs may consist of particular course offerings, target different student groups, or partner with selected high schools. Specifically, 22 colleges (of the 24 public colleges in the state) offer 34 different dual credit programs, while 23 colleges offer 50 different dual enrollment programs (table 2). Some colleges offer additional program options, including fifth year, advanced diploma, and collaboratively developed accelerated learning opportunities (such as Eastern Promise; see table 1).

Most public colleges (21 of 24) offered at least one dual credit and one dual enrollment accelerated college credit program

More accelerated college credit programs offered through public Oregon colleges are taught by a college instructor than by a high school teacher. Specifically, as of July 2015, 30 programs were taught by high school teachers (mostly dual credit), 58 were taught by college faculty, and 5 were taught by both in a co-teaching model or a mix of high school teachers and college faculty, depending on the course and program (see table 2).

High school student enrollment in Oregon as of fall 2014 was higher in regions with nearby college campuses, which tend to be located in more densely populated areas of the state (map 1). In contrast, large and sparsely populated areas of the state, such as southeastern Oregon, have lower populations of high school students and no nearby colleges, indicating less access to certain forms of accelerated college credit such as dual enrollment.

Eligibility requirements vary within each program and across colleges, but many colleges have minimum age or grade restrictions that allow access only to older high school students. For all programs, students are generally required by the postsecondary institution to have completed prerequisite coursework or to take placement tests, similar to requirements for regular college students, with the exception of certain entry-level courses that

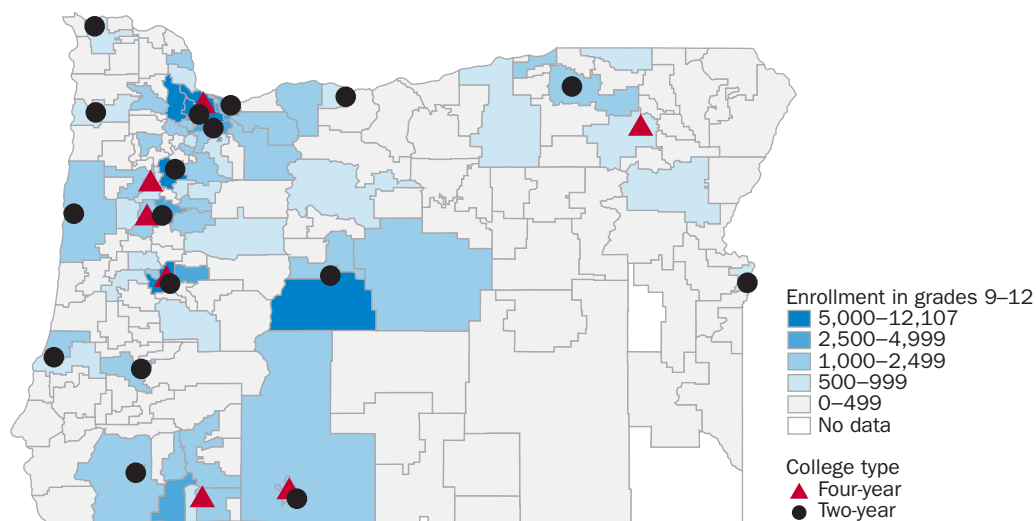
Table 2. Accelerated college credit programs offered by Oregon public colleges as of July 2015

Program	Number of colleges offering program	Total number of programs	Taught by high school teacher	Taught by college instructor	Taught by either high school teacher or college instructor or both
Dual credit	22	34	22	9	3
Dual enrollment/Expanded Options	23	50	4	45	1
Fifth year/advanced diploma	5	5	0	4	1
Collaboratively developed accelerated learning opportunities	4	4	4	0	0
Total	24	93	30	58	5

Note: Programs are defined by the college and may include multiple types (for example, a college may offer three different dual credit programs each with a different name and focus). Each program may offer multiple courses to students. Twenty-one colleges offered both a dual credit and a dual enrollment option.

Source: Authors' analysis based on data from Oregon public college websites; see appendix B.

Map 1. Oregon public colleges and accelerated college credit options as of July 2015, with fall 2014 district enrollment in grades 9–12



Source: Authors' construction based on data described in appendix B.

do not require prior coursework. Many programs also have other eligibility requirements, such as minimum age, grade level (typically grades 11 and 12), grades in prerequisite course (for example, earning a B or higher grade in an earlier course in a sequence), or minimum grade point average. In many cases these additional eligibility requirements, such as age and grade point average, are set by the high school or the school district, and college staff are unaware of the exact requirements.

The cost of accelerated college credit to students varies from free to full tuition, with many programs—particularly dual credit programs—offering a reduced rate. Overall, dual credit programs tend to be more affordable per credit than dual enrollment programs, but specific costs vary by college and program. For dual credit programs students

typically pay a small fee per course and an application or transcript fee. For dual enrollment programs, which can include both in-person and online courses, high schools often pay tuition for students through enrollment-based funding, and colleges frequently offer a reduced tuition rate to schools.

Specifically, at least 32 programs (35 percent) are offered by the college for free, while others are offered at a reduced tuition (\$10–\$73 per credit) or at a flat fee for the term or year (for example, a \$25 transcript fee). Two dual enrollment programs require students to pay full tuition. In most cases high schools and colleges work together to ensure that students can afford accelerated college credit options, with both institutions sharing costs. Colleges frequently offer discounted tuition rates to high school students, which high schools often (but not universally) pay for the student. Some programs use enrollment-based state funding provided through the high school, the college, or both.

Who participates in dual credit options at all Oregon community colleges?

This section and the next discuss results for dual credit courses offered at all 17 Oregon community colleges. Data on other accelerated college credit options, including dual enrollment offered at Oregon community colleges, is not available at a statewide level. In analyses that compare students who take community college dual credit with those who do not, it is possible that the students who do not take community college dual credit courses may take other forms of accelerated college credit (for example, Advanced Placement, International Baccalaureate, or dual enrollment) for which data were not available for this study.

From 2005/06 to 2012/13, nearly all Oregon high school students attended high schools that offered community college dual credit. Ninety-eight percent of students in grades 11 and 12 attended a high school that offered community college dual credit courses during the study period (2005/06–2012/13; students were in grades 11 and 12 in 2007/08–2012/13).² School characteristics that are positively related to dual credit participation include having a higher number of students scoring in the top 25 percent on the Oregon Assessment of Knowledge and Skills in math, higher graduation rate, higher percentage of American Indian/Alaska Native or female students, higher rate of in-school suspensions and expulsions, and higher attendance rate. School characteristics that are negatively related to dual credit participation include being a charter school, being located in a suburban or rural locale (rather than an urban locale), having a higher percentage of students who have ever switched schools, and having a higher percentage of students who were ever English learners, had ever received special education services, or were ever eligible for the federal school lunch program (a proxy for economic disadvantage). All predictive factors were statistically significantly related to offering dual credit at the 5 percent or better level of significance. (Descriptive statistics regarding school characteristics are found in table D1 in appendix D; table D3 in appendix D contains more information on these predictive characteristics.)

Only a small percentage of students attend high schools that do not offer dual credit courses, and these percentages vary slightly by school locale: 4 percent of students who ever attended high school in a rural locale do not have access to dual credit courses at their schools compared with 1 percent of students in urban locales and 2 percent of students in suburban and town locales.

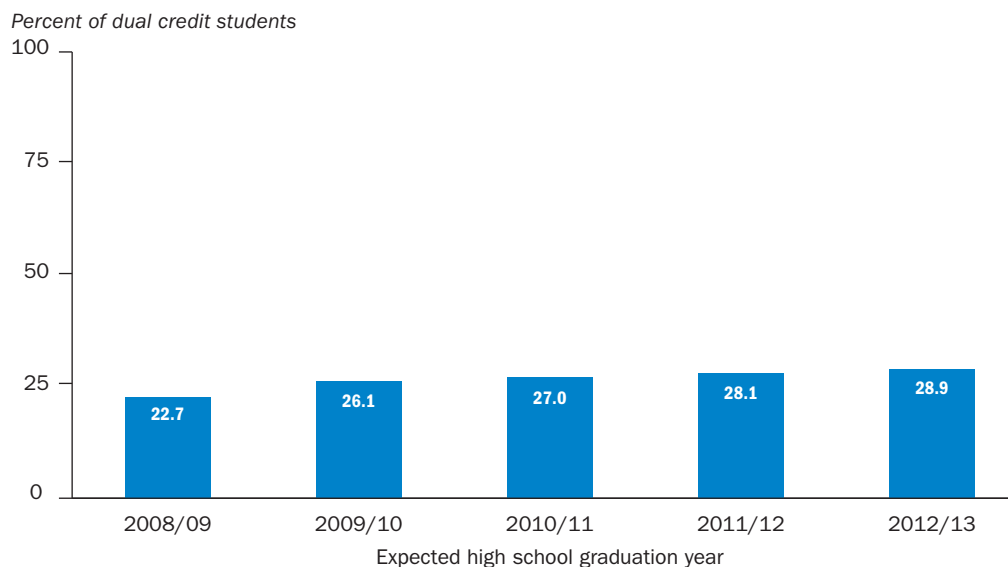
Only a small percentage of students attend high schools that do not offer dual credit courses

Oregon's rate of dual credit participation is higher than the national average, and the state rate has increased slowly over time. Twenty-nine percent of Oregon students who were expected to graduate in 2012/13 (that is, who were in the grade 9 cohort of 2009/10) participated in dual credit courses during high school. Participation increased over time compared with earlier cohorts (figure 1). These participation rates were much higher than the national rate of approximately 14 percent of high school students in the 2010/11 school year (Snyder & Dillow, 2015; Thomas et al., 2013). By grade level, 34 percent of dual credits attempted are taken in grade 11 and 42 percent in grade 12. Over the five cohorts examined, 53 percent of dual credit attempts were in grade 12 for students expected to graduate in 2008/09 (the grade 9 cohort of 2005/06) compared with 42 percent for students expected to graduate in 2012/13 (the grade 9 cohort of 2009/10), indicating a rising trend toward more dual credit coursetaking prior to grade 12.

Dual credit courses were offered and taken in a range of subjects from 2005/06 to 2012/13. Oregon community colleges offer dual credit courses in many subjects, including agriculture, art, business, education, English, health, history, math, science, social science, technology, vocational education (such as construction, mechanics, and welding), and world languages (table E1 in appendix E lists the top five courses in student enrollment overall and for each subject). Math is the most popular dual credit subject, with 18 percent of dual credit students enrolling in at least one math dual credit course (figure 2). From 2005/06 to 2012/13 College Algebra was the most popular dual credit course taken by Oregon public high school students (see table E1 in appendix E). The second most popular subject was technology, with 16 percent of dual credit students enrolling in a technology course such as computer fundamentals or keyboarding. The third most popular subject was

Twenty-nine percent of Oregon students who were expected to graduate in 2012/13 participated in dual credit courses during high school

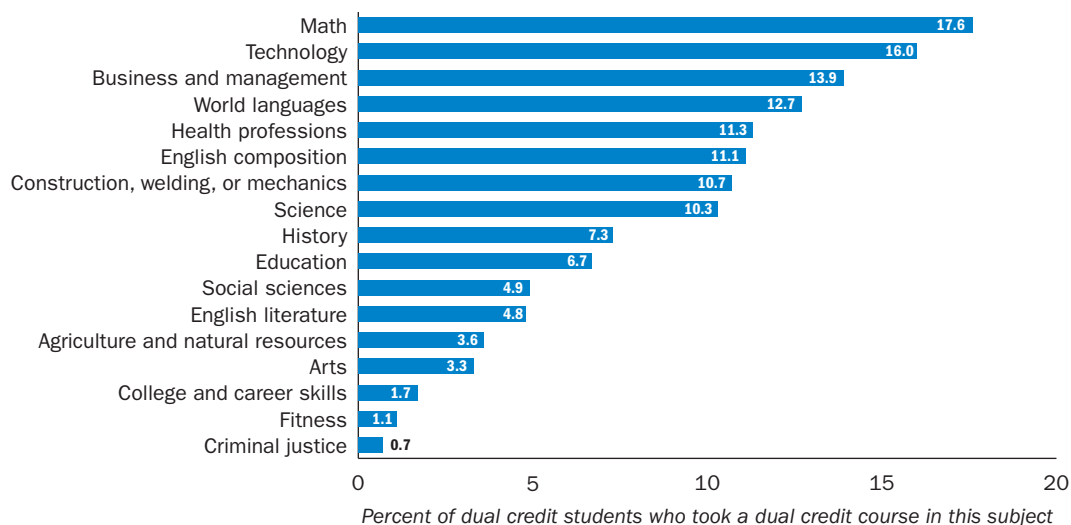
Figure 1. Dual credit participation by Oregon high school students increased over time, by expected year of graduation



Note: $n = 48,597$ for 2005/06 (expected graduation year 2008/09); 47,487 for 2006/07 (2009/10); 46,302 for 2007/08 (2010/11); 45,557 for 2008/09 (2011/12); and 45,630 for 2009/10 (2012/13). Dual credit participation rate refers to the percentage of all students in the expected high school graduation years that enrolled in a dual credit course through a community college during their time in high school. Figure includes all Oregon public high school students in the expected high school graduation years.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Figure 2. Math was the most popular dual credit subject among Oregon high school students over 2005/06–2012/13



Note: $n = 11,060$ for 2005/06 (expected graduation year 2008/09); 12,362 for 2006/07 (2009/10); 12,468 for 2007/08 (2010/11); 12,782 for 2008/09 (2011/12); and 13,209 for 2009/10 (2012/13). Figure includes all Oregon public high school students in the years indicated who attempted at least one dual credit course. Values do not sum to 100 percent as students can take coursework in multiple subjects. See table E1 in appendix E for a list of the top courses for each subject.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B].

Many districts with low dual credit participation are concentrated along the coast in the westernmost part of the state, outside of major metropolitan areas in the northwest corner of the state, and in rural regions in the central and eastern parts of the state

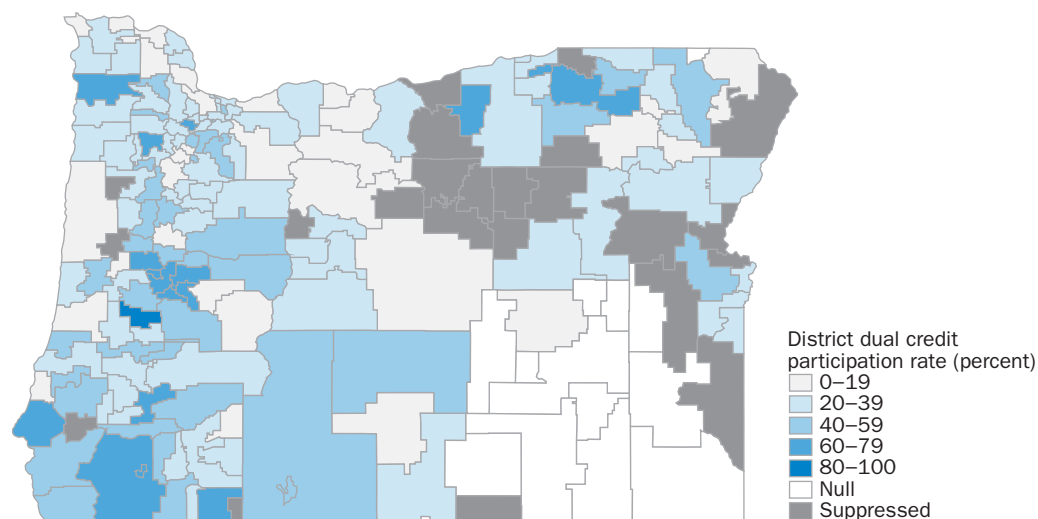
English (English composition and English literature combined), at 16 percent of dual credit students, with 11 percent of dual credit students taking an English composition course and 5 percent of dual credit students taking an English literature course.

Dual credit participation by students expected to graduate in 2012/13 varied widely by district and high school. Oregon school districts vary widely in the percentage of students in the grade 9 class of 2009/10 (expected to graduate in 2012/13) who took at least one dual credit course at any time in high school (map 2). Many of the districts with the lowest participation are concentrated along the coast in the westernmost part of the state, outside of major metropolitan areas in the northwest corner of the state, and in rural regions in the central and eastern parts of the state, particularly to the north. Only 2.5 percent of students took dual credit courses in districts in the lowest 5 percent of participation, compared with more than 58 percent of students in districts in the highest 5 percent of participation (not shown in map). The median district participation rate was 26 percent.

Similarly, examination of participation by high school shows that in schools in the lowest 5 percent of participation, less than 2.4 percent of students took dual credit courses compared with more than 64 percent of students in high schools in the highest 5 percent of participation. The median school participation rate was 28 percent.

White students, female students, high achieving students, and students who were not eligible for the federal school lunch program were overrepresented among dual credit students compared with their representation in the general student population. On the basis of the student characteristics for which data were available for this study (eligibility for

Map 2. The rate of participation in dual credit by Oregon high school students who were expected to graduate in 2012/13 varied by district



Note: $n = 38,331$ students. Null districts did not have dual credit participation data because they only had elementary schools or were missing from the dataset. To protect student privacy, data were suppressed for districts with fewer than 10 students who attempted dual credit.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

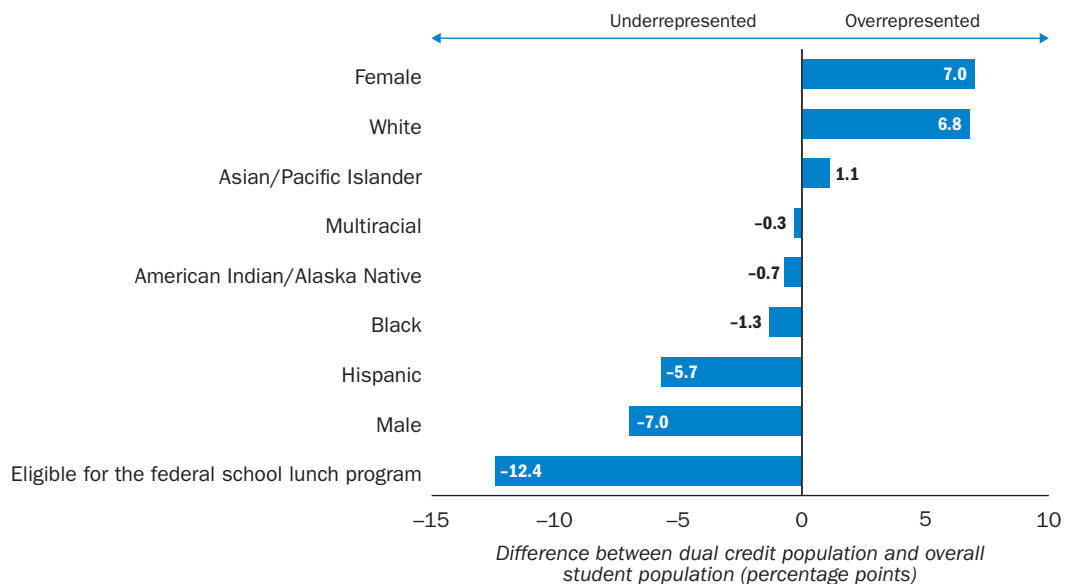
Some student groups were underrepresented in dual credit programs in Oregon community colleges compared with the groups' representation in the general population of students. Some other groups were overrepresented among the dual credit population

the federal school lunch program, achievement, gender, and race/ethnicity), some student groups were underrepresented in dual credit programs in Oregon community colleges compared with the groups' representation in the general population of students. The gap was largest for students eligible for the federal school lunch program. Of high school students expected to graduate in 2012/13, 64 percent were eligible for the federal school lunch program, but only 52 percent of dual credit students were eligible for the program, a difference of 12 percentage points (figure 3). Although students who were eligible for the federal school lunch program were underrepresented in all years, the percentage of students eligible for the federal school lunch program who took dual credit courses increased over time—up 17 percentage points between expected graduation years 2008/09 and 2012/13 (see figure D1 in appendix D). For students expected to graduate in 2012/13, male students and American Indian/Alaska Native, Black, and Hispanic students were also underrepresented among the dual credit population compared with their representation among all students.

Some other groups were overrepresented among the dual credit population. Female students made up 49 percent of high school students but constituted 56 percent of dual credit students, a 7 percentage point difference (see figure 3). White and Asian/Pacific Islander students were the only racial/ethnic groups that were overrepresented among dual credit students. White students made up 75 percent of dual credit students but 68 percent of all students, while Asian students made up 6 percent of dual credit students but 5 percent of all students.

Gaps in participation among student groups persist even when participation is measured using methods that compare students with similar background and education characteristics. Female, White, and high-achieving students and those with higher attendance rates are more likely to take dual credit. On average, female students have a 6.5 percent

Figure 3. Some student groups were underrepresented or overrepresented in the population of dual credit students compared with their representation in the overall population of Oregon high school students expected to graduate in 2012/13



Female, White, and high-achieving students and those with higher attendance rates are more likely to take dual credit

Note: Of 45,630 high school students expected to graduate in 2012/13, 13,202 took dual credit courses. This figure shows the difference between the percentage of a student group among all dual credit students compared with the percentage of that student group in the overall student body. Female students are 56 percent of the dual credit population compared with 49 percent of the overall population; White students, 75 to 68; Asian students, 6 to 5; Multiracial students, 2 to 2; American Indian/Alaska Native students, 1 to 2; Black students, 2 to 3; Hispanic students, 15 to 21; male students, 44 to 51; and students eligible for the federal school lunch program, 52 to 64.

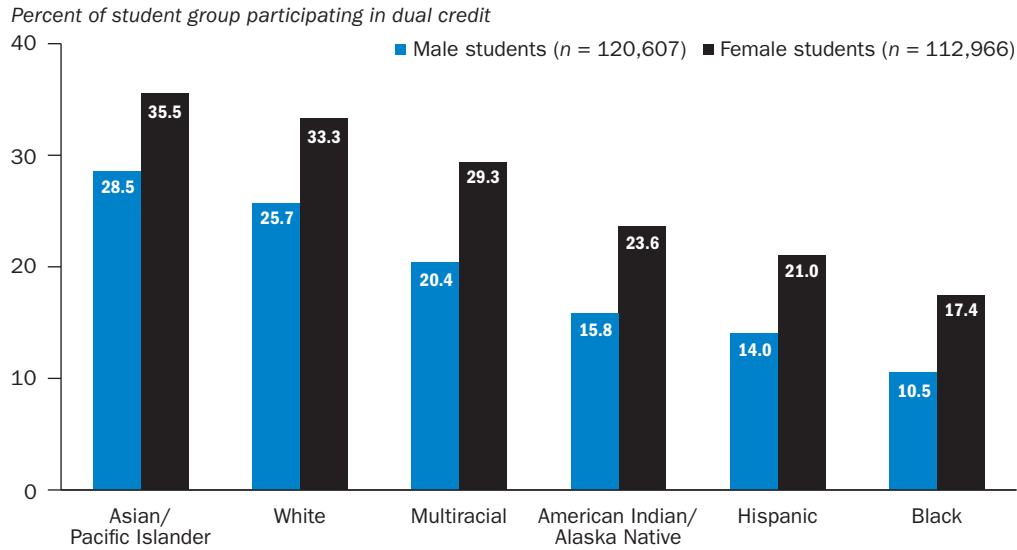
Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

higher probability of enrolling in dual credit compared with male students, while Hispanic students have a 2.9 percent lower probability of enrolling and Black students have a 6.5 percent lower probability compared with White students (see table D4 in appendix D). For each percentage point increase in attendance rate, students are 116 percent more likely to enroll in dual credit. Students with a history of switching schools or with past disciplinary incidents (expulsions or suspensions) are less likely to enroll in dual credit, as are students who were ever eligible for the federal school lunch program, English learner students, and students who had ever received special education services. (All of these results are statistically significant at the 5 percent level or better; see table D5 in appendix D.)

Within each racial/ethnic group, male students participated in dual credit at lower rates than female students and students eligible for the federal school lunch program participated at lower rates than their peers who were not eligible. The gender gap in participation was similar within each racial/ethnic group, with a 7–9 percentage point difference in participation between female and male students over 2005/06–2012/13. However, Black and Hispanic male students participated in dual credit at lower rates than other racial/ethnic groups by gender, while White and Asian/Pacific Islander female students participated at higher rates (figure 4).

Participation in dual credit courses differed by racial/ethnic group both for students who were eligible for the federal school lunch program and for students who were not eligible

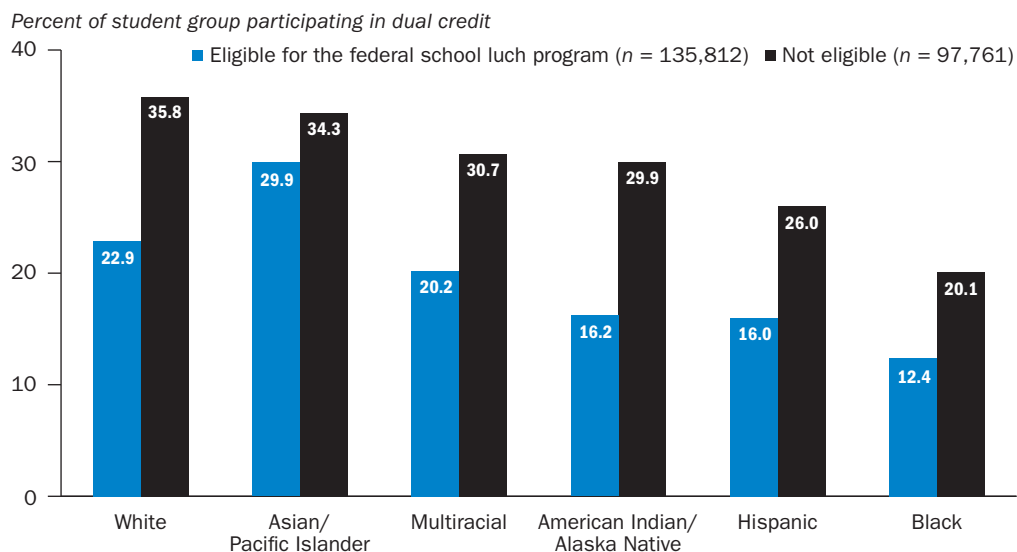
Figure 4. In all racial/ethnic groups male high school students in Oregon participated in dual credit at lower rates than female students, 2005/06–2012/13



Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

over 2005/06–2012/13 (figure 5). Black and Hispanic students who were eligible for the federal school lunch program participated in dual credit courses at lower rates than students in other racial/ethnic groups. White and Asian/Pacific Islander students eligible for the federal school lunch program participated at the highest rates. The largest gaps

Figure 5. In all racial/ethnic groups high school students in Oregon who were eligible for the federal school lunch program participated in dual credit courses at lower rates than students who were not eligible, 2005/06–2012/13



Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

between dual credit students eligible for the federal school lunch program and those who were not were for American Indian/Alaska Native students (14 percentage points) and for White students (13 percentage points); the smallest gap was for Asian/Pacific Islander students (4 percentage points).

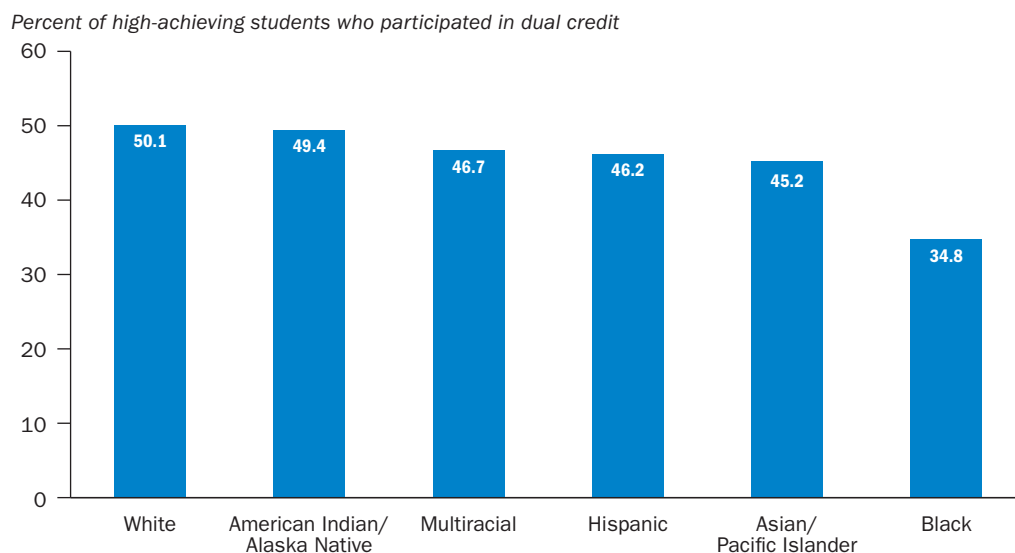
Among high and middle achievers there was a gap in dual credit participation between White and Black students. Students who exceeded proficiency on the Oregon Assessment of Knowledge and Skills in math and reading had higher participation in dual credit courses in Oregon community colleges over 2005/06–2012/13, though there were also some gaps between racial/ethnic groups. Among students who scored in the top quartile in both math and reading, 35 percent of Black students participated in dual credit compared with 50 percent of White students (figure 6). The participation gaps between high-achieving White students and high-achieving students of other racial/ethnicity groups were small, at 5 percentage points or less. Middle-achieving students—those who scored in the second or third quartile in math and reading assessments—had a smaller gap of 8 percentage points in dual credit participation between White and Black students (see figure D2 in appendix D).

Among students who scored in the top quartile in both math and reading, 35 percent of Black students participated in dual credit compared with 50 percent of White students. Middle-achieving students had a smaller gap in dual credit participation between White and Black students

What are the outcomes for dual credit students at all Oregon community colleges?

This section explores credits earned, high school graduation, college enrollment, and college persistence for students who enrolled in dual credit courses at Oregon community colleges and were expected to graduate in 2008/09–2012/13.

Figure 6. Among high-achieving high school students in Oregon, participation in dual credit courses varied by race/ethnicity, with the largest gap being between White and Black students, 2005/06–2012/13



Note: $n = 33,038$. High-achieving students are those who scored in the top 25 percent of students in both math and reading on the high school Oregon Assessment of Knowledge and Skills). Students who did not participate in dual credit might have participated in other accelerated college credit options for which data were not available.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Oregon dual credit students typically enrolled in and earned 11 college credits through dual credit courses. On average, among all Oregon high school students, each student attempted and earned close to three college credits through community college dual credit programs—equivalent to passing one college course, as each course is typically three or four credits. Among only students who have taken at least one dual credit course, the average jumps to more than 11 college credits, equivalent to passing about three college courses. Across all cohorts the average credits earned among dual credit students tends to be stable, ranging from 10.3 to 12.3.

More than 90 percent of students passed the community college dual credit courses in which they enrolled. A large majority (93 percent) of students passed all the dual credit courses in which they enrolled. Some student groups passed dual credit courses less frequently than their peers, including Hispanic, American Indian/Alaska Native, and multiracial students; students who switched schools at least once; students who had an out-of-school suspension; and students who are eligible for the federal school lunch program. The low rate of students who do not pass their dual credit courses (7 percent) may be partly due to not counting those who withdraw from a course after registering (which is not separately identified because of a lack of data) or who enroll in a dual credit course without registering to earn college credit. In many high schools, students can take a dual credit course for high school credit only.

A large majority (93 percent) of students passed all the dual credit courses in which they enrolled

When comparing students with similar background characteristics, the study finds that students who are female, are Asian/Pacific Islander, had high rates of attendance in grades 10–12, or attended a rural school for all or part of high school were more likely than their peers to pass all attempted dual credit courses. In contrast, Hispanic, American Indian/Alaska Native, and multiracial students and students who switched schools at least once, had an out-of-school suspension, were English learners, or were eligible for the federal school lunch program were less likely than their peers to pass all attempted dual credit courses. While these groups have dual credit pass rates above 90 percent, those rates were lower than those of their peers by 1–5 percentage points. Additionally, students attempting to take a higher number of dual credits are less likely to pass all courses (see table D6 in appendix D).

The rates at which students who participated in dual credit programs graduated from high school, enrolled in college, and persisted from the first to second term of the first year of college were higher than the average rates for all students in Oregon. On average, students who participated in dual credit courses over 2005/06–2012/13 were more likely to graduate high school, enroll in college, and persist from the first to the second term of college than were all students in Oregon, although this study cannot determine whether dual credit participation contributed directly to these outcomes. Simple percentages reveal that 92 percent of dual credit students graduated from high school compared with 68 percent of all students (see table D2 in appendix D). Seventy-one percent of dual credit students who graduated from high school enrolled in college compared with 59 percent of all graduates. Seventy-two percent of dual credit students who enrolled in college persisted to the second term compared with 70 percent of all graduates who enrolled in college.³

A second analysis accounted for differences in cohort, gender, race/ethnicity, eligibility for the federal school lunch program, special education status, English learner status, school locale, expulsion and suspensions, math and reading assessment scores, average high

school attendance rate, and moving to another school. These adjusted results show that participation in dual credit courses is positively and statistically significantly related (at the 0.1 percent level) to high school graduation, college enrollment, and persistence in college⁴ (see table D7 in appendix D). This relationship holds true at all levels of math and reading achievement on the Oregon Assessment of Knowledge and Skills (results not shown in table D7). Similarly, the more dual credit courses a student takes and passes, the higher the likelihood of high school graduation and of college enrollment and persistence (controlling for the same factors as above). However, other factors remain unaccounted for in these analyses, including those related to accelerated college credit participation and student outcomes. This study is not able to attribute outcome differences to dual credit participation.

How do participants in dual credit and dual enrollment programs differ at selected Oregon community colleges?

Understanding differences in dual credit participation (analyzed in the preceding section) and dual enrollment participation (analyzed in this section) is essential for considering program expansion and for setting accelerated college credit-related policy. However, because data on dual enrollment programs were not available at the state level, this section compares dual credit and dual enrollment participation and outcomes at 5 community colleges instead of at all 17. Only students in the Oregon Department of Education database who were expected to graduate in 2008/09–2012/13 and who could be matched with administrative data at the five participating community colleges were included.

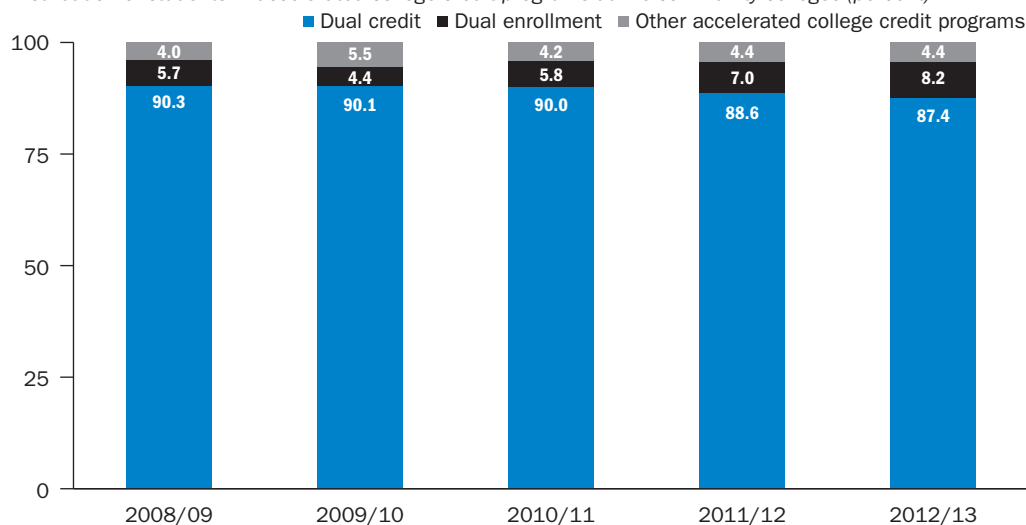
In the five community colleges in the study, participation in dual enrollment was low but grew over time. At the five participating community colleges, fewer students in accelerated college credit courses participated in dual enrollment than in dual credit (figure 7). The number of participants in dual enrollment grew from 135 in 2008/09 to 252 in 2012/13. The number of participants in dual credit also increased during this time period, from 2,122 in 2008/09 to 2,698 in 2012/13. The share of dual enrollment participants as a percentage of students in accelerated college credit programs increased from 6 percent to 8 percent.

At the five community colleges in the dual enrollment analysis, dual enrollment students differed from dual credit students in achievement and eligibility for the federal school lunch program. Among students expected to graduate in 2012/13, 8 percent of dual enrollment students scored in the top quartile of the Oregon Assessment of Knowledge and Skills in math compared with 47 percent of dual credit students. The percentages were similar for scores on the state reading test, at 11 percent for dual enrollment students and 41 percent for dual credit students (see figure D3 in appendix D). Dual enrollment students had higher rates of eligibility for the federal school lunch program than dual credit students.

Even after differences in student characteristics are accounted for, participation in dual credit courses is positively and statistically significantly related to high school graduation, college enrollment, and persistence in college

Figure 7. Participation in dual enrollment at five community colleges increased among Oregon high school students who were expected to graduate in 2008/09 to 2012/13

Distribution of students in accelerated college credit programs at five community colleges (percent)



Note: Of 14,187 matched students with a record of taking accelerated college credit at one of the five participating community colleges from 2008/09 to 2012/13, 12,653 students participated in dual credit, 892 in dual enrollment, and 642 in other accelerated college credit programs over five years. Percentages may not sum to 100 percent because of rounding.

Source: Authors' analysis based on data from the Oregon Department of Education, the Oregon Office of Community Colleges and Workforce Development, and five participating community colleges; see appendix B.

Increasing equitable student access may require a better understanding of student eligibility requirements and how different requirements set by programs and by schools can affect participation in accelerated college credit

Implications of the study findings

This study responds to growing national and state interest in accelerated college credit programs by providing a better understanding of options, access, and outcomes for Oregon public high school students participating in accelerated college credit programs offered through or at Oregon public colleges and community colleges. This study is the first to provide detailed and synthesized information on accelerated college credit options in the state and may inform state educators and policymakers looking to improve or expand current accelerated college credit programs. Descriptions of how the programs are implemented in Oregon may be of interest to decisionmakers in other states as well (see appendix C). A variety of accelerated college credit options are available in Oregon, which suggests that policymakers may want to shift their focus from expanding the number of participating schools and districts to increasing equitable student access within schools that offer these programs. Increasing equitable student access may require a better understanding of student eligibility requirements and how different requirements set by programs and by schools can affect participation in accelerated college credit.

First, stakeholders may want to use this report as a baseline picture of dual credit participation to understand equity in dual credit participation and to compare against recent expansions in dual credit and other accelerated college credit options. The finding that dual credit students are more likely to be White, female, high achieving, and not eligible for the federal school lunch program shows that there are persistent gaps in equity in dual credit participation, a finding that may spur outreach programs and innovative options to

increase the eligibility and participation of students in underrepresented groups. Additionally, the findings on the distribution of dual credit participation across Oregon districts may prompt state, district, and community college leaders to target dual credit programs to high schools and students in districts less served by college campuses and with low participation rates, such as those in the southeastern portion of the state. Districts in these regions tend to have lower student populations and lower participation rates than more urban locales.

Second, this study highlights the need for additional research on possible causal links between accelerated college credit and student success. Dual credit students tend to graduate from high school and enroll and persist in college, but it is unclear whether dual credit courses have a causal impact on education outcomes. Students are participating in dual credit programs and earning college credits in relatively large numbers in Oregon. Thus, dual credit and other accelerated college credit programs merit further investigation to understand their direct contribution to high school graduation and postsecondary enrollment and persistence.

Dual credit students tend to graduate from high school and enroll and persist in college, but it is unclear whether dual credit courses have a causal impact on education outcomes

Finally, this study highlights the need for improved data collection that would allow for standardized monitoring of overall accelerated college credit participation rates, participation rates by credit type, and gaps in equity in participation across the state and student groups. Currently, statewide participation rates can be easily calculated only for Advanced Placement exams and dual credit. Changes in data collection might include the following:

- The Oregon Department of Education might have school districts flag their Advanced Placement/International Baccalaureate, dual credit, dual enrollment, and other accelerated college credit courses in the course enrollment data they report to the state so that data on multiple types of accelerated college credit courses can be tracked and compared.
- The Higher Education Coordinating Commission might have community colleges and universities flag their dual enrollment and other accelerated college credit courses in the data they report to the state, as they already do for dual credit courses.
- The longitudinal database system operated by the Higher Education Coordinating Commission could be expanded to incorporate data on dual credit and dual enrollment from four-year public colleges in Oregon. This would give the state a more comprehensive picture of accelerated college credit participation, since the four-year colleges do not consistently report dual credit or dual enrollment at the state level.

Statewide data collection on accelerated college credit at both the high school and college levels would allow for periodic analysis of accelerated college credit participation at the state level and monitoring of improvements in access and participation in college-credit courses. These analyses could then reveal trends in accelerated college credit participation and inform outreach to districts, schools, and student groups with low accelerated college credit participation.

Limitations of the study

This study has four limitations. First, data on dual enrollment were not available from all Oregon community colleges. Differences in program definition and reporting structures

impeded state-led efforts to collect these data from all institutions. These gaps in the data limit the generalizability of the results on dual enrollment beyond the institutions providing data. However, because information on dual enrollment has not previously been available for any institutions in Oregon, the results can help stakeholders understand dual enrollment participation at the five community colleges that were able to provide data.

Second, data on dual enrollment participation from the five community colleges in the study were not standardized across institutions and may be of varying quality, making it challenging to compare participation across community colleges. This variation in data quality can inform statewide data collection efforts by identifying essential data needed to answer questions of interest.

Third, because students were not randomly assigned to participate in accelerated college credit courses, all results should be considered exploratory. The study cannot provide evidence of a causal link between accelerated college credit participation and student characteristics, secondary school characteristics, student performance, or students' high school and postsecondary institution outcomes. Unobserved or unmeasured differences between students who choose to participate in accelerated college credit programs and those who do not, such as student motivation and drive to succeed, may explain the observed differences in outcomes rather than participation in accelerated college credit programs.

Finally, the National Student Clearinghouse does not collect data for all U.S. colleges, and it provides data for only a few colleges in other countries. The National Student Clearinghouse collects data on nearly 96 percent of domestic colleges, but it is possible that students who attend a college that is not included are incorrectly recorded as not enrolling in college and are wrongly excluded from the college persistence analysis (Newbaker, 2013). If the number of students outside the dataset who are attending college is substantial, the observed relationship between accelerated college credit participation and college enrollment may be over- or understated.

Although gaps in the data limit the generalizability of the results on dual enrollment beyond the institutions providing data, the results can nonetheless help stakeholders understand dual enrollment participation at the five community colleges that were able to provide data

Appendix A. Literature review

Historically, accelerated college credit (ACC) programs such as dual credit and Advanced Placement (AP) have only been available to high-performing, college-bound students (Bailey & Karp, 2003). More recently, however, educators have increasingly implemented ACC programs to support the postsecondary preparation and success of lower achieving students (Lerner & Brand, 2006).

States are adopting a range of ACC programs, which include AP, International Baccalaureate (IB), dual credit, and dual enrollment courses. Dual credit is typically defined as a course taught at the high school for which a student earns both high school and college credit. Dual enrollment is often defined as a course taught at the college for which the student earns both high school and college credit. However, these terms are used differently by various programs and states.

Regardless of how ACC options are defined, the percentage of public high schools that offer such courses is increasing dramatically. For example, during the 2010/11 school year, 82 percent of U.S. high schools reported having students enrolled in dual credit, 69 percent reported enrollments in AP or IB courses, and 59 percent reported enrollments in both dual credit and AP/IB courses (Thomas, Marken, Gray, & Lewis, 2013). Funding for ACC programs varies by state, with students, school districts, colleges, and private sources all contributing to some degree. The cost of participation may deter some students from taking ACC courses, while lack of funding options or funding instability may restrict the ACC options available.

Dual credit and dual enrollment options

Regarding taking college-level courses while in high school, a number of descriptive studies from individual states suggest promising correlations between student participation and outcomes. A North Carolina study found that racial/ethnic minority students who participated in dual enrollment programs had a higher first-year college grade point average than students who did not participate; among female students, participants had higher college graduation rates than nonparticipants (Ganzert, 2012). In Texas, high school students who completed at least one college-level course while in high school were significantly more likely to attend college, to persist to the second year of college, and to earn a college degree in Texas (within six years of high school graduation) than students who did not earn ACC. These effects existed for economically disadvantaged students and for all racial/ethnic groups (Struhl & Vargas, 2012).

A Florida study found that enrollment in dual credit courses was positively related to earning a high school diploma, enrollment in college, full-time enrollment in college, and college persistence, and students who participated in dual credit had a higher grade point average than nonparticipating peers (Karp et al., 2007). Meanwhile, participants in a dual enrollment program in New York City were more likely to pursue a bachelor's degree and earn significantly more college credits over the long term than their peers who did not participate in the program (Karp et al., 2007).

Nationally, a study using data from the National Education Longitudinal Study found that participation in dual enrollment significantly increased degree attainment (both any

degree and bachelor's degree), particularly for students from lower income backgrounds (An, 2013). This study, in contrast to the New York City study, did find differences based on the number of courses: Students earning six or more credits were more likely to earn a degree while those with only three credits (typically one course) were not. A Washington state study found that students who participated in dual enrollment were less likely to graduate high school but more likely to attend college, though it found no effect on attending college full time as opposed to part time or attending four-year colleges as opposed to two-year colleges (Cowan & Goldhaber, 2013). In that study dual enrollment students participating in the federal school lunch program were more likely to graduate high school and attend college.

A causal evaluation of dual enrollment in Florida used a regression discontinuity design to compare the outcomes of students who scored near the grade point average eligibility requirement for participation in dual enrollment (Speroni, 2011a). The study found that taking a dual enrollment course did not improve students' high school graduation rate, postsecondary enrollment, or completion. However, specifically taking college algebra through the dual enrollment program improved students' likelihood of college enrollment and completion. This indicates that certain ACC courses may have a stronger link with postsecondary outcomes.

A quasi-experimental evaluation of dual credit and dual enrollment in Texas employed a propensity score matching technique in which students who took dual credit courses were compared with academically and demographically similar students in districts that did not offer dual credit options (Giani, Alexander, & Reyes, 2014). The study found that enrollment in dual credit courses in grades 11 and 12 significantly increased the odds that a student attended college, persisted, and completed a postsecondary degree. The findings also suggest that taking more dual credit courses further increased the odds of completing postsecondary outcomes and that taking dual credit courses in core subjects had stronger effects.

Advanced Placement and International Baccalaureate course enrollment and exams

The most common way of earning college credit after taking an AP or IB course is by passing an AP or IB exam. However, nationally only a small proportion of AP coursetakers ever pass the AP exams (Handwerk, Tognatta, Coley, & Gitomer, 2008). A review of the evidence found that students who take AP courses (particularly those who earn AP credit by passing the exams) are more successful in college, but many studies were not rigorous and the evidence is not conclusive (Pope & Levine, 2013). One study found that earning AP credit, typically by achieving a score of 3 or higher, was positively related to college grades and completion but that students who took the AP exam and did not receive credit did not perform better than those who did not take the exam (Ackerman, Kanfer, & Calderwood, 2013). Similarly, descriptive studies for California and Texas found a positive relationship between passing the AP exam and college enrollment, persistence, and grades but no relationship between taking AP courses in high school and success in college (Geiser & Santelices, 2004; Dougherty, Mellor, & Jian, 2005).

Together, these results indicate that the AP exam score may have a stronger relationship with postsecondary performance than enrollment in an AP course. However, another study found that while students scoring 3 or higher on AP exams persisted to the second

year of college at higher rates than students earning a 1 or 2 and those who did not take the exam, students earning a 1 or 2 still benefited and persisted to the second year of college at higher rates than students who did not take the exam (Mattern, Shaw, & Xiong, 2009).

Less research is available on IB programs, perhaps because they are not as commonly offered in U.S. high schools. However, research indicates that IB participation has a positive effect on high school grade point average and graduation (Cortes, Moussa, & Weinstein, 2013). Both positive and negative socioemotional aspects were found to be associated with AP and IB participation. Students enjoyed the challenge of the work but disliked their peers' negative perception of AP and IB participation, as well as the stress and fatigue (Foust, Hertberg-Davis, & Callahan, 2009). This indicates that AP and IB participation may provide more challenging coursework for students but that some students may not participate in these options because of perceived negative aspects.

Finally, a Florida study comparing the effect of AP and dual enrollment found that AP students were less likely than dual enrollment students to attend college after high school but were more likely than dual enrollment students to enroll first in a four-year college (Speroni, 2011b). The effect of dual enrollment and AP participation on bachelor's degree attainment was almost equally positive between the two options. Additionally, any positive effect of dual enrollment was driven by coursetaking at a local community college—dual credit courses taken at a high school had no effect on the outcomes analyzed.

Appendix B. Data and methods

This appendix details the data and methodology used in the analysis.

Data

To address research question 1 on the accelerated college credit (ACC) landscape, this study used information from Oregon college websites and dual credit coordinators and administrative data from two statewide databases—one from the Oregon Department of Education and one from the Oregon Office of Community Colleges and Workforce Development. In addition, the study used data from five participating community colleges (purposefully not identified) to help address research question 4.

Accelerated college credit landscape data. To address research question 1, the study team collected data by reviewing the information available on college websites for all public colleges in Oregon. Dual credit coordinators were then asked to review the information for accuracy. Most coordinators responded to confirm and correct this information. To get additional detail regarding the formation of partnerships between high schools and colleges, program costs, and typical program development, the study team spoke informally with dual credit coordinators at four colleges. Summaries of that information (with college names suppressed) are in appendix C.

Quantitative data. The study team used statewide data from the Oregon Department of Education on students who attended an Oregon high school from 2005/06 to 2012/13 (focusing on the grade 9 cohorts of 2005/06, 2006/07, 2007/08, 2008/09, and 2009/10, which correspond to the expected graduation years of 2008/09, 2009/10, 2010/11, 2011/12, 2012/13). These data include information from the National Student Clearinghouse on the college-going behavior of all students (regardless of whether they attended an Oregon community college). These data were matched to statewide community college data (from the Oregon Office of Community Colleges and Workforce Development) to create a single database and identify Oregon students who enrolled in dual credit courses at Oregon's 17 public community colleges while in high school. This database was used to answer research questions 2, 3, and 4. However, this database has information only on dual credit participation, as other types of ACC are not included in statewide data collections. To help understand dual enrollment (Expanded Options) participation (research question 4), another statewide ACC option, five community colleges agreed to provide administrative data on participation in dual enrollment programs. This allowed the study team to conduct a small analysis on dual enrollment at these institutions.

All data sources were linked either through a common student identification number (for example, between the Oregon Office of Community Colleges and Workforce Development and community college data) or through matching that was performed on student name, birthdate, and demographic characteristics (for example, between the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development/community college data). The data sources and elements that were used to answer each research question are listed in table B1.

Table B1. Research questions, variables, and data sources for accelerated college credit programs in Oregon

Research question	Key variables	Data sources
1. What are the accelerated college credit options available from public colleges in Oregon and what are their key features?	<ul style="list-style-type: none"> • Program information, including student eligibility requirements • Course cost and tuition information • Instructor information 	<ul style="list-style-type: none"> • Publicly available websites (information verified by all dual credit coordinators across Oregon) • Information provided by dual credit coordinators at four colleges implementing accelerated college credit programs
2. Which students participate in community college dual credit programs and what are their demographic, academic, and school characteristics and outcomes (passing dual credit courses, high school graduation, college enrollment, and college persistence)?	<ul style="list-style-type: none"> • Demographics (gender, race/ethnicity, socioeconomic status) • School location • High school performance (Oregon Assessment of Knowledge and Skills scores) • High school outcomes (graduation) • Postsecondary outcomes (enrollment, persistence in college) • Cohort year (grade 9 year/expected graduation year) 	<ul style="list-style-type: none"> • Oregon Department of Education and National Student Clearinghouse
3. What is the relationship between participation in dual credit programs in Oregon community colleges and outcomes such as high school graduation, college enrollment, and college persistence?	<ul style="list-style-type: none"> • Demographics (gender, race/ethnicity, socioeconomic status) • School location • Discipline data • Special education and English learner student status • High school performance (Oregon Assessment of Knowledge and Skills scores) • High school outcomes (graduation) • Postsecondary outcomes (enrollment, persistence in college) • Cohort year (grade 9 year/expected graduation year) 	<ul style="list-style-type: none"> • Oregon Department of Education and National Student Clearinghouse
4. How do participants differ between dual enrollment and dual credit programs at selected Oregon community colleges?	<ul style="list-style-type: none"> • Demographics (gender, race/ethnicity, socioeconomic status) • School location • Discipline data • Special education and English learner student status • High school performance (Oregon Assessment of Knowledge and Skills scores) • High school outcomes (graduation) • Postsecondary outcomes (enrollment, persistence in college) • Cohort year (grade 9 year/expected graduation year) 	<ul style="list-style-type: none"> • Oregon Department of Education and National Student Clearinghouse
	<ul style="list-style-type: none"> • Term-by-term dual credit course enrollment 	<ul style="list-style-type: none"> • Oregon Office of Community Colleges and Workforce Development
	<ul style="list-style-type: none"> • Term-by-term dual enrollment course enrollment 	<ul style="list-style-type: none"> • Postsecondary institution data from five community colleges

The analysis sample included all students who were enrolled in an Oregon high school between the 2005/06 and 2009/10 school years (more than 200,000 students). The study team reports participation rates by high school cohort year (expected graduation year, based on the year of grade 9 entry) because ACC participation has changed considerably over time in Oregon (North & Jacobs, 2010).

Methods

Data were matched by student identification number when available and by student name, birthdate, and demographic characteristics when a common identification number between datasets was not available. Data were matched between the Oregon Department of Education, National Student Clearinghouse, and the Oregon Office of Community Colleges and Workforce Development for other Regional Educational Laboratory Northwest studies and the study team began with the data files used for other studies that had successful matches. The postsecondary institutional data were then matched to the statewide database.

Data from the sources were of mixed quality. Because not all data provided by the colleges were used for external reporting, each individual college's administrative data were not as standardized as the statewide databases. With input from the data staff at the participating institutions, the study team cleaned the data, paying particular attention to the coding of ACC participation indicators.

Missing data. Missing demographic data were minimal. Longitudinal data were used to fill in missing values for time-invariant variables such as race/ethnicity and gender, applying the methods described above as necessary for conflicting data. Students in the Oregon Department of Education data who were still missing demographic information (after an attempt to fill in missing values) were dropped from the analysis. If high school scores on the Oregon Assessment of Knowledge and Skills (OAKS) reading or math tests were missing, students were coded as missing the test score and analyses were conducted using mutually exclusive categories of missing test score and test score quantiles. OAKS scores were standardized with a mean of zero and a standard deviation of one within a school year.

Quantitative analysis. Descriptive statistics to address research questions 2, 3, and 4 were calculated using tabulations of demographic and academic characteristics and outcomes of interest with other key variables (for example, ACC participation). To address research question 3, the study team conducted regression analyses (using a logistic regression model) of high school graduation, college enrollment at any time after high school, immediate enrollment in college, and persistence to the second term of college on dual credit participation and controlling for student demographic and academic characteristics, behavior, attendance, school mobility, and most common high school locale (urban, suburban, town, or rural).

The study did not attempt to establish causality between dual credit participation and the outcomes analyzed but used regression analysis to provide a more nuanced picture of dual credit participation than is possible with descriptive statistics. The results will inform more rigorous analyses anticipated in the future when more comprehensive data become available.

With regression analysis, certain factors could be held constant in examining the relationship of dual credit participation and the outcome of interest. Regression analysis can also be used to identify the relationship between student characteristics and dual credit participation. However, this regression analysis method does not account for unobserved variables, such as student motivation to attend college, which probably is highly positively related to participation in dual credit and to enrolling in college. This suggests that the observed relationships may have a positive bias, be larger in magnitude, or have greater statistical significance than might be expected if data were available on the unobserved variables and included as controls to the model.

For the binary outcomes examined here—high school graduation, college enrollment, and college persistence—the study team conducted logistic regression analyses to examine how participation in dual credit is related to the likelihood of achieving each outcome (for example, whether earning dual credit is related to the likelihood of completing high school). These regression models controlled for various student- and school-level characteristics, such as gender, race/ethnicity, OAKS scores, and school location in a rural locale. The following equation describes the basic logistic regression model for these analyses:

$$\log \left[\frac{\varphi_{is}}{1 - \varphi_{is}} \right] = \beta_1 X_{is} + \beta_2 HighSchool_s + \beta_3 ACC_{is}$$

where φ_i is the probability that student i achieves the binary outcome (for example, graduates high school), given X , a set of variables for student i 's characteristics (for example, female, race/ethnicity, OAKS scores), where student i is in school s , $HighSchool$ is a set of variables for school and district characteristics of school s , and ACC is an indicator variable for whether student i in school s participated in an ACC program (that is, dual credit).

Overall, these descriptive and exploratory regression analyses provided useful information about the relationships between dual credit participation, student characteristics, and high school and postsecondary student outcomes.

Appendix C. Detailed accelerated college credit program information

This appendix provides detailed results of the interviews conducted with staff members at four community colleges, complementing the results presented in the study findings section in the main report on the accelerated college credit (ACC) landscape in Oregon. The four colleges are referred to as College A, College B, College C, and College D, as college names were suppressed.

The characteristics of accelerated college credit programs varied substantially between Oregon's community colleges and four-year institutions, and the large number of ACC programs available to high schools led to colleges having unique sets of offerings that varied in number and type

In addition to the information gathered from all public colleges in Oregon, four community colleges provided detailed information on ACC programs and characteristics through semistructured interviews in 2014 and 2015. College A, for example, offered two programs: a dual credit program and a dual enrollment program. College B offered six programs: one dual credit program and five individual dual enrollment (Expanded Options) programs, ranging from early college to extended campus. In general, a college's offerings tended to arise from spontaneous relationships with individual high schools, purposeful expansion to certain high schools, or both. Most dual enrollment programs offered by College B were individual partnerships with specific high schools or school districts. Staff at multiple colleges, including College B, also described designing ACC offerings to meet the specific goal of increasing student completions in both high school and college.

Most accelerated college credit offerings through community colleges allowed students to receive both high school and college credit

In dual credit programs, both high school and college credit was awarded to students, although the logistics of recording credit may differ between programs. In dual enrollment programs built around specific college–high school partnerships, students usually received both high school and college credit. However, in some dual enrollment programs in which high school students enrolled directly with the college, students may not have received high school credit as their high school was not necessarily involved or in partnership with the postsecondary institution.

Student outreach, targeting, and support services varied between colleges

Most staff members interviewed said that their college did not have marketing, recruitment, or student targeting practices in place. A notable exception was College C, which employed a recruiter for each high school partner and asked all grade 9 students in each partner school to register at College C. Although the other colleges did not formally target students, some staff members believed that programs were targeted to high-achieving students by design, primarily because lower achieving students tended to self-select out of program participation. In one case at College D, career and technical education ACC programs were being developed to explicitly target lower achieving students to increase access: for example, a new program at this college handpicked students who did not otherwise express an interest in ACC offerings. In most cases, either programs had open-ended access, or access was controlled by the high schools.

Among the four community colleges interviewed, only College B provided additional support services for ACC students. Specifically, College B provided orientations and advising for ACC students and hired an advisor for each major high school partner. These advisors received weekly success tracking from instructors and coordinated with high school advisors.

Many accelerated college credit partnerships between high schools and community colleges were initiated by the high school

All staff members interviewed described partnerships as usually being initiated by interested high schools. The level of coordination between colleges and high school partners varied. At College A, college staff received no records of a student's activity at the high school (except proof that a student is not truant, required as an eligibility condition). In contrast, College B required ACC instructors to perform weekly success tracking (for example, reporting substantial absences in a week) to the college; the college then passed that information on to high school advisors. For dual credit programs, the college either provided qualified instructors or approved high school teachers that applied to teach ACC courses.

College cost data on accelerated college credit was not widely available

At all four colleges interviewed, high school partnerships were described as cooperative relationships in which both institutions were focused on student success and less concerned with revenue generation. Some staff members interviewed did not believe that the ACC programs brought in more revenue for the college than they cost to run or did not believe that the college had any metrics on costs. Cost data were not available for analysis, but costs may be a pertinent topic for future research.

The cost of offering accelerated college credit to students was typically supported by both the high school and college

Cost-sharing structures between high schools and colleges varied widely. In some cases, colleges took advantage of enrollment-based state funding at the high school, the college, or both. This resulted in many programs being offered free to students. Other programs offered a discounted credit cost that is typically designed to cover administrative costs such as registration and processing. Some programs required students to cover more than 50 percent of regular tuition or to pay at the regular tuition rate. At College B, high schools entered into contracts with the college in which the high school paid a portion of its state funding for a student to cover ACC tuition costs. The college then provided support services and instruction for dual enrollment in addition to collecting some state funds for the student's college enrollment.

The availability of state funding appears sometimes to have led colleges to develop unofficial advanced diploma programs even though they did not formally offer the program. Because students could choose not to graduate high school even after fulfilling graduation requirements, colleges and high schools may have allowed students to dual enroll in college courses and cover costs using the student's state funds. The result resembles existing fifth-year and advanced diploma programs.

Appendix D. Detailed results

This appendix provides detailed results of the descriptive statistics and regression analysis.

Descriptive statistics

Descriptive statistics of school characteristics by whether students participated in dual credit are provided in table D1.

Table D1. Characteristics of Oregon high schools by dual credit participation, 2005/06–2012/13

School characteristic	Schools with dual credit participation (n = 1,921)	Schools with no dual credit participation (n = 1,776)	Percent of all schools (n = 3,697)
Charter, as percentage of schools with dual credit participation	6.2	14.1	10.0
Urban, as percentage of schools with dual credit participation	20.2	15.9	18.4
Suburban, as percentage of schools with dual credit participation	14.4	15.7	14.9
Town, as percentage of schools with dual credit participation	29.8	25.5	28.1
Rural, as percentage of schools with dual credit participation	35.6	42.9	38.6
Average attendance rate	89.2	87.3	88.3
Percentage of students who are eligible for the federal school lunch program	42.7	43.6	43.2
Percentage of students who are English learner students	3.1	3.0	3.1
Percentage of students who are in special education	19.8	24.7	22.2
Percentage of students who are female	46.2	43.1	44.7
Percentage of students who are American Indian/Alaska Native	2.9	3.8	3.3
Percentage of students who are Black	2.5	3.0	2.7
Percentage of students who are Hispanic	15.6	16.2	15.9
Percentage of students who are White	74.8	73.3	74.1
Average number of students	381.5	86.7	239.9

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Detailed descriptive statistics of the demographic and academic characteristics of students participating in dual credit are provided in table D2.

Table D2. Characteristics of Oregon high school students by dual credit participation, 2005/06–2012/13

Student characteristic	Percent of students taking dual credit (n = 61,921)	Percent of students not taking dual credit (n = 171,652)	Percent of all students (n = 233,573)
Female	55.4	45.8	48.4
American Indian/Alaska Native	1.5	2.3	2.1
Asian/Pacific Islander	5.3	4.1	4.4
Black	1.6	3.5	3.0
Hispanic	12.2	20.9	18.6
Multiracial	1.8	2.0	1.9
White	77.6	67.3	70.0
Ever eligible for the federal school lunch program	45.2	62.8	58.1
Ever received special education services	7.9	20.2	17.0
Ever an English learner student	6.7	13.7	11.9
Ever attended school in rural locale	30.9	30.0	30.2
No Oregon Assessment of Knowledge and Skills (OAKS) math score	8.5	19.6	16.7
OAKS math score in quartile 1	5.6	20.2	16.3
OAKS math score in quartile 2	10.5	17.2	15.4
OAKS math score in quartile 3	31.8	24.3	26.3
OAKS math score in quartile 4	43.5	18.7	25.3
No OAKS reading score	8.0	19.4	16.4
OAKS reading score in quartile 1	5.1	18.0	14.6
OAKS reading score in quartile 2	16.2	20.4	19.3
OAKS reading score in quartile 3	31.6	23.9	25.9
OAKS reading score in quartile 4	39.1	18.4	23.9
Ever expelled	0.5	2.5	2.0
Ever had in-school suspension	7.9	19.1	16.2
Ever had out-of-school suspension	9.6	22.8	19.3
Average high school attendance across all years above 95 percent	57.7	32.3	39.1
Ever switched schools during high school	17.4	40.2	34.2
Graduated from high school	92.4	59.4	68.1
Dropped out of high school	1.5	12.1	9.3
Enrolled in college after high school	67.4	38.4	46.1
Persisted first to second term of college	47.9	24.0	30.3

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

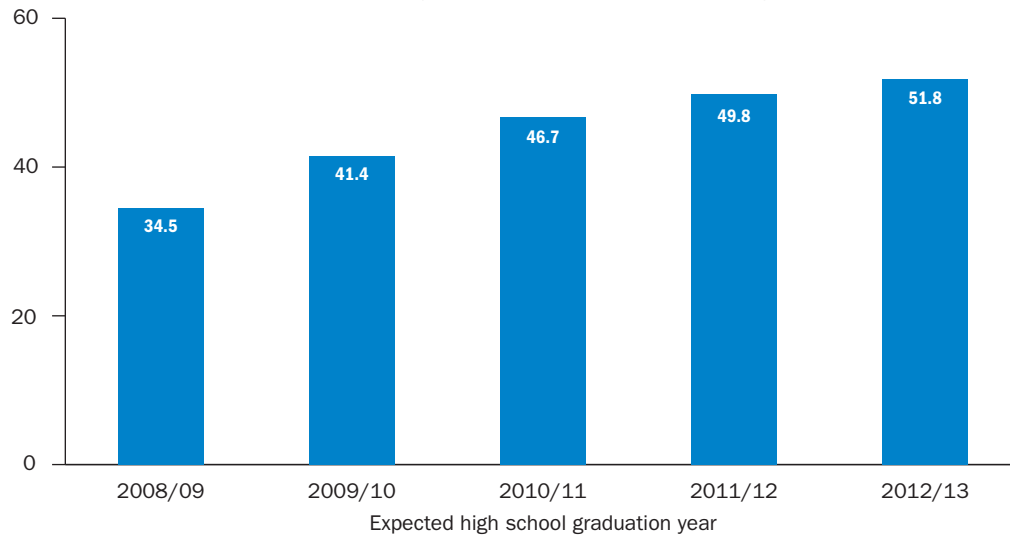
The percentage of Oregon dual credit students eligible for the federal school lunch program over time is shown in figure D1.

Figure D2 examines the dual credit participation of middle-achieving high school students in Oregon by race/ethnicity.

Figure D3 shows the demographic and academic characteristics of Oregon high school students in grade 12 in 2012/13 and compares dual enrollment students with dual credit students.

Figure D1. The percentage of Oregon dual credit students eligible for the federal school lunch program has increased over time, by expected graduation year 2008/09–2012/13

Percent of dual credit students who were eligible for the federal school lunch program

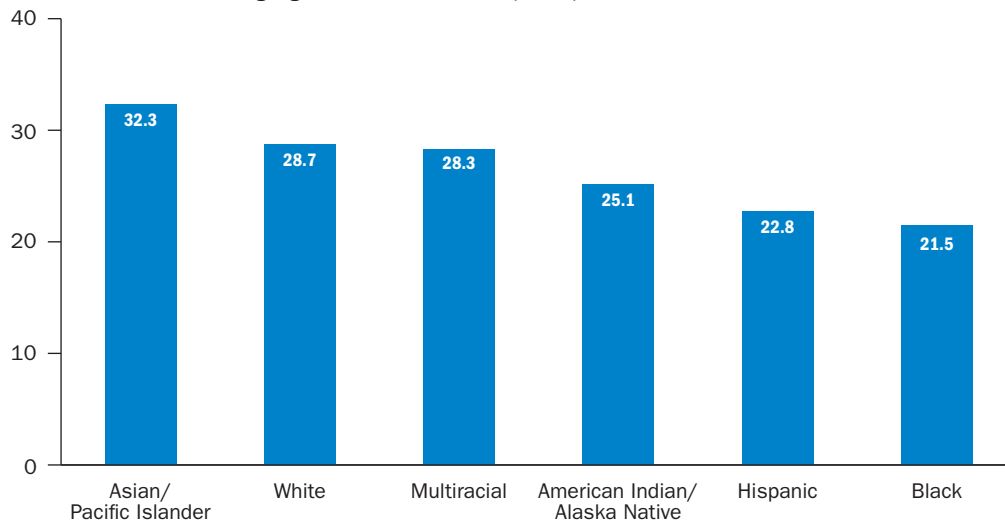


Note: 61,921 students in the sample were eligible for the federal school lunch program.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Figure D2. Dual credit participation varied among middle-achieving high school students in Oregon, by race/ethnicity over 2005/06–2012/13

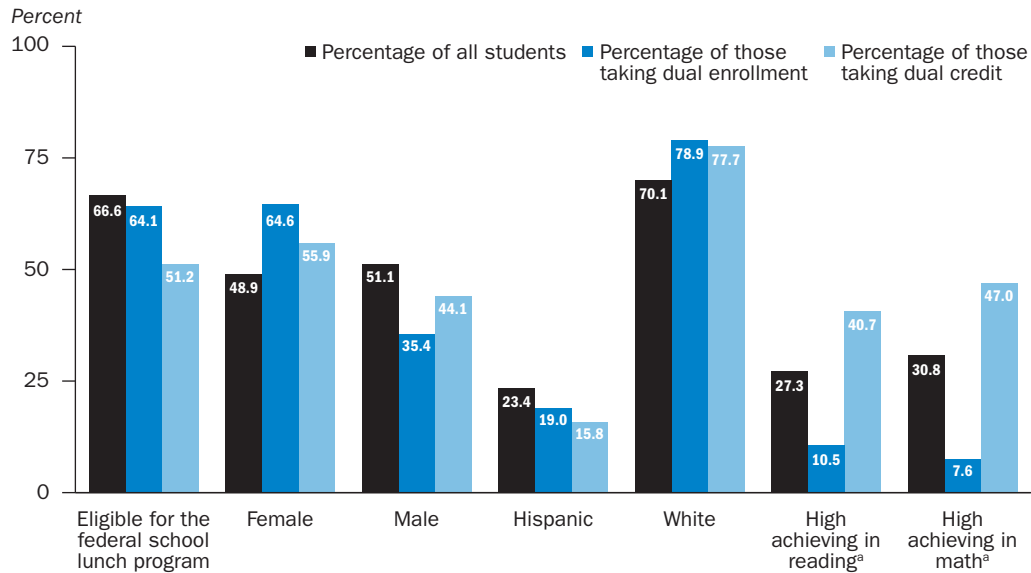
Percent of middle-achieving high school students who participated in dual credit



Note: 62,777 students were considered middle-achieving students (scored in the second or third quartile, or 25th to 75th percentile of students in both math and reading on the high school Oregon Assessment of Knowledge and Skills) in the sample.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Figure D3. Demographic and academic characteristics of Oregon high school students in grade 12 in 2012/13 differed for dual credit and dual enrollment participants



Note: 2,532 students enrolled in dual credit and 237 in dual enrollment. All students (11,447) included students in high schools where 5 percent or more of students had taken accelerated college credit from one of the five participating colleges. This analysis focuses only on students in grade 12 in the 2012/13 school year who entered grade 9 in the 2009/10 school year. Students in high schools with fewer than 5 percent of students participating in accelerated college credit at the five colleges were excluded from the comparison group of all students, as accelerated college credit programs were not widely available from these colleges at these schools.

a. Students who scored in the fourth quartile (76–100 percentile) on the Oregon Assessment of Knowledge and Skills.

Source: Authors' analysis based on data from the Oregon Department of Education, the Oregon Office of Community Colleges and Workforce Development, and postsecondary institution data from five community colleges; see appendix B.

Regression analysis

Detailed results of the regression analyses are provided in tables D3–D7. Results are presented in odds ratios (except in table D6), which represent the strength of the relationship between the variable and the outcome. Odds ratios below 1 indicate a negative relationship (an increase in the variable corresponds to a decrease in likelihood of the outcome), while odds ratios above 1 indicate a positive relationship (an increase in the variable corresponds to an increase in likelihood of the outcome). Odds ratios of 1 indicate no relationship between the variable and the outcome.

Table D3. Logistic regression of likelihood of Oregon high schools offering dual credit courses, 2007/08–2012/13

Variable	Offering dual credit (odds ratio) (n = 1,806)	Robust standard error
2008/09 school year	1.617*	0.361
2009/10 school year	1.988**	0.459
2010/11 school year	1.447	0.364
2011/12 school year	1.595	0.498
2012/13 school year	1.04	0.483
Charter	0.184***	0.0332
Percent of students in the top quartile of Oregon Assessment of Knowledge and Skills math scores	41.39**	58.83
Percent of students in the top quartile of Oregon Assessment of Knowledge and Skills reading scores	0.0918	0.125
Percent of high school graduates	9.192***	5.726
Suburban locale	0.583*	0.136
Town locale	0.691	0.155
Rural locale	0.369***	0.0849
Percent of students ever expelled	0.217*	0.145
Percent of students ever given an in-school suspension	2.859***	0.721
Percent of students ever given an out-of-school suspension	1.249	0.294
Percent of students who had ever switched schools	0.446***	0.0733
Average attendance rate	3,098***	3,294
Percent of students ever eligible for the federal school lunch program	0.457*	0.148
Percent of ever English learner students	0.0425**	0.0517
Percent of students ever receiving special education services	0.155*	0.127
Percent of female students	4.103*	2.355
Percent of American Indian/Alaska Native students	53.36*	94.27
Percent of Black students	44.74	106.10
Percent of Hispanic students	13.59	21.51
Percent of White students	18.45	28.80
Constant	0.000228***	0.000416

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Table D4. Marginal effects at the means of student characteristics on likelihood of Oregon high school students enrolling in dual credit, 2005/06–2012/13

Student characteristic	Marginal effect of characteristic at the mean	Interpretation for average student
Female (compared with male)	0.065	The probability of a female student enrolling in dual credit is 6.5 percent higher than the probability of a male student enrolling.
Black (compared with White)	-0.065	The probability of a Black student enrolling in dual credit is 6.5 percent lower than the probability of a White student enrolling.
Hispanic (compared with White)	-0.029	The probability of a Hispanic student enrolling in dual credit is 2.9 percent lower than the probability of a White student enrolling.
Third quartile of Oregon Assessment of Knowledge and Skills in math (compared with fourth quartile)	-0.054	The probability of a student who scored in the third quartile of the state math assessment enrolling in dual credit is 5.4 percent lower than the probability of a student who scored in the fourth quartile enrolling.
Third quartile of Oregon Assessment of Knowledge and Skills in reading (compared with fourth quartile)	-0.024	The probability of a student who scored in the third quartile of the state reading assessment enrolling in dual credit is 2.4 percent lower than the probability of a student who scored in the fourth quartile enrolling.
Average high school attendance rate	1.160	For each 1 percent increase in average high school attendance, the probability of that student enrolling in dual credit increases by 116 percent.
Mobility	-0.027	Each time a student switches schools, the probability of that student enrolling in dual credit decreases by 2.7 percent.
Ever expelled	-0.052	The probability of a student who was ever expelled enrolling in dual credit is 5.2 percent lower than the probability of a student who was never expelled enrolling.
Ever had an in-school suspension	-0.056	The probability of a student who ever had an in-school suspension enrolling in dual credit is 5.6 percent lower than the probability of a student who has never had an in-school suspension enrolling.
Ever had an out-of-school suspension	-0.026	The probability of a student who ever had an out-of-school suspension enrolling in dual credit is 2.6 percent lower than the probability of a student who never had an out-of-school suspension enrolling.
Ever eligible for the federal school lunch program	-0.005	The probability of a student who was ever eligible for the federal school lunch program enrolling in dual credit is 0.5 percent lower than the probability of a student who was never eligible enrolling.
Ever an English learner student	-0.038	The probability of an English learner student enrolling in dual credit is 3.8 percent lower than the probability of a student who never received those services enrolling.
Ever received special education services	-0.070	The probability of a student who ever received special education services enrolling in dual credit is 7 percent lower than the probability of a student who never received special education services enrolling.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Table D5. Logistic regression of likelihood of Oregon high school students enrolling in dual credit, 2005/06–2012/13

Variable	Enrolled in dual credit (odds ratio) (n = 226,670)	Robust standard error
First entered grade 9 in 2006/07	0.993	0.0169
First entered grade 9 in 2007/08	1.009	0.0174
First entered grade 9 in 2008/09	0.97	0.0169
First entered grade 9 in 2009/10	1.026	0.0178
Female	1.480***	0.0158
American Indian/Alaska Native	0.985	0.0395
Asian/Pacific Islander	0.904***	0.0226
Black	0.685***	0.0266
Hispanic	0.844***	0.0152
Multiracial	0.877***	0.0339
Ever eligible for the federal school lunch program	0.968**	0.0112
Ever received special education services	0.654***	0.0118
Ever an English learner student	0.795***	0.0182
Suburban school locale	0.743***	0.0107
Town school locale	1.084***	0.0148
Rural school locale	0.977	0.0153
Ever expelled	0.734***	0.0451
Ever had in-school suspension	0.705***	0.0130
Ever had out-of-school suspension	0.860***	0.0149
OAKS math: no score	0.465***	0.00987
OAKS math: quartile 1	0.371***	0.00883
OAKS math: quartile 2	0.495***	0.00919
OAKS math: quartile 3	0.726***	0.00965
OAKS reading: no score	0.478***	0.0105
OAKS reading: quartile 1	0.521***	0.0130
OAKS reading: quartile 2	0.729***	0.0121
OAKS reading: quartile 3	0.862***	0.0117
Average high school attendance rate	1,120***	115.6
Most school switches in a year	0.847***	0.00644
Constant	0.00155***	0.000160

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

OAKS is Oregon Assessment of Knowledge and Skills.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Table D6. Logistic regression of likelihood of passing all attempted dual credit courses among Oregon high school students taking any dual credit courses, 2005/06–2012/13

Variable	Passing all attempted dual credit (odds ratio) (n = 58,457)	Robust standard error
First entered grade 9 in 2006/07	1.039	0.0563
First entered grade 9 in 2007/08	1.162**	0.0635
First entered grade 9 in 2008/09	1.295***	0.0718
First entered grade 9 in 2009/10	1.394***	0.0787
Female	1.397***	0.0490
American Indian/Alaska Native	0.672***	0.0787
Asian/Pacific Islander	1.235*	0.109
Black	0.99	0.134
Hispanic	0.849**	0.0481
Multiracial	0.733**	0.0833
Most school switches in a year	0.889***	0.0190
Ever expelled	0.779	0.154
Ever had in-school suspension	0.948	0.0595
Ever had out-of-school suspension	0.730***	0.0402
Average high school attendance rate in grade 9	1.887	0.737
Average high school attendance rate in grade 10	3.528***	1.311
Average high school attendance rate in grade 11	7.670***	2.513
Average high school attendance rate in grade 12	5.505***	1.257
Ever eligible for the federal school lunch program	0.683***	0.0261
Ever received special education services	1.058	0.0805
Ever an English learner student	0.666***	0.0374
Ever attended a rural high school	1.241***	0.0480
Total number of dual credits attempted	0.973***	0.00152
Constant	0.107***	0.0365

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Table D7. Logistic regression of Oregon high school students ever participating in dual credit on high school graduation, college enrollment, and college persistence from the first to the second term, 2005/06–2012/13

Variable	High school graduation (odds ratio) (n = 226,670)	Robust standard error	College enrollment among high school graduates (odds ratio) (n = 155,645)	Robust standard error	Persistence among students who enrolled (odds ratio) (n = 91,249)	Robust standard error
Ever took dual credit	3.068***	0.0565	1.927***	0.0263	1.205***	0.0217
First entered grade 9 in 2006/07	0.534***	0.0114	0.916***	0.0190	1.145***	0.0289
First entered grade 9 in 2007/08	0.437***	0.00978	0.823***	0.0179	1.076**	0.0288
First entered grade 9 in 2008/09	0.326***	0.00730	0.547***	0.0119	1.138***	0.0318
First entered grade 9 in 2009/10	0.225***	0.00505	0.0749***	0.00177	0.00924***	0.000628
Female	1.499***	0.0191	1.577***	0.0198	1.344***	0.0235
American Indian/Alaska Native	0.844***	0.0351	1.002	0.0488	1.053	0.0720
Asian/Pacific Islander	0.951	0.0310	1.547***	0.0468	1.318***	0.0529
Black	1.115**	0.0399	2.030***	0.0840	1.201***	0.0632
Hispanic	1.105***	0.0217	0.895***	0.0182	0.903***	0.0255
Multiracial	0.852***	0.0373	1.120*	0.0514	0.986	0.0619
Ever eligible for the federal school lunch program	0.752***	0.0107	0.680***	0.00917	0.654***	0.0123
Ever received special education services	0.757***	0.0120	0.796***	0.0156	0.842***	0.0252
Ever an English learner student	1.237***	0.0282	0.797***	0.0198	0.996	0.0368
Suburban school locale	0.752***	0.0126	1.057***	0.0175	0.961	0.0221
Town school locale	0.839***	0.0136	0.816***	0.0130	0.801***	0.0179
Rural school locale	0.824***	0.0154	0.887***	0.0162	0.915***	0.0233
Ever expelled	0.821***	0.0366	0.956	0.0637	0.974	0.108
Ever had in-school suspension	1.095***	0.0187	0.772***	0.0152	0.734***	0.0223
Ever had out-of-school suspension	0.943***	0.0154	0.769***	0.0146	0.801***	0.0235
OAKS math: no score	0.186***	0.00453	0.707***	0.0183	0.853***	0.0273
OAKS math: quartile 1	0.306***	0.00755	0.397***	0.0101	0.507***	0.0193
OAKS math: quartile 2	0.495***	0.0116	0.509***	0.0107	0.571***	0.0170
OAKS math: quartile 3	0.783***	0.0167	0.692***	0.0111	0.719***	0.0159
OAKS reading: no score	0.213***	0.00527	0.711***	0.0191	0.746***	0.0246
OAKS reading: quartile 1	0.441***	0.0110	0.535***	0.0143	0.585***	0.0226
OAKS reading: quartile 2	0.917***	0.0203	0.667***	0.0129	0.655***	0.0181
OAKS reading: quartile 3	1.015	0.0210	0.788***	0.0130	0.774***	0.0175
Average high school attendance rate	43,074***	3,837	70.13***	8.829	605.5***	113.3
Most school switches in a year	0.741***	0.00522	0.894***	0.00737	0.840***	0.0105
Constant	0.00178***	0.000156	0.102***	0.0127	0.0156***	0.00288

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

OAKS is Oregon Assessment of Knowledge and Skills.

Source: Authors' analysis based on data from the Oregon Department of Education and the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Appendix E. Dual credit courses by subject

This appendix describes the top five dual credit courses taken by Oregon high school students from 2005/06 to 2012/13 by subject and across all subjects (table E1). Courses were categorized by subject based on the course names and names of the departments in which the dual credit courses are housed at each community college. Table E1 lists the most commonly used name of the course, with course department abbreviation and course number in parentheses.

Table E1. Five most popular dual credit courses in each subject among Oregon high school dual credit students, 2005/06–2012/13

Subject	Course name, number, and top five courses
All subjects	<ul style="list-style-type: none"> • College Algebra (MTH 111) • English Composition I (WR 121) • Trigonometry/Elementary Functions (MTH 112) • English Composition II (WR 122) • History of the United States (HST 201)
Agriculture and natural resources	<ul style="list-style-type: none"> • Animal Science (ANS 121) • Computers in Agriculture (AG 111) • Introduction to Animal Science Operations (ANS 122) • Plant Propagation (HT 137) • Sustainable Ecosystems (CSS 205)
Arts	<ul style="list-style-type: none"> • Photoshop (VC 130) • Ceramics (ART 250) • Fundamentals of Acting (TA 141) • Introduction to Drawing (ART 131) • Graphic Design (ART 225)
Business and management	<ul style="list-style-type: none"> • Computer Typing (BT 120) • Introduction to Business Computing (BA 131) • Introduction to Business (BA 101) • Personal Finance (BA 218) • Restaurant Operations (HR 105)
College and career skills	<ul style="list-style-type: none"> • College Survival and Success (CH 100) • Study Skills for College Learning (CG 111) • Career and Life Planning (CG 140) • Early College Odyssey (EL 120) • Career Exploration (HD 140)
Construction, welding, and mechanics	<ul style="list-style-type: none"> • Basic Drafting (DRF 142) • Introduction to AutoCAD (DRF 130) • Construction Orientation and Environment (CST 111) • Shielded Metal Arc Welding (WLD 121) • Engine Repair (AM 145)
Criminal justice	<ul style="list-style-type: none"> • Survey Criminal Justice System (CJ 100) • Introduction to Law Enforcement (CJ 110) • Introduction to Criminal Justice System—Courts (CJ 112) • Introduction to Criminal Justice System—Police (CJ 111) • Introduction to Criminal Justice System—Corrections (CJ 113)
Education	<ul style="list-style-type: none"> • Introduction to Early Childhood Education & Family Studies (ECE 120) • Early Childhood Development (ECE 125) • Introduction to Education (ED 100) • Introduction & Observation in Early Childhood Education (ECE 150) • Introduction to Early Childhood Education (ECE 140)

(continued)

Table E1. Five most popular dual credit courses in each subject among Oregon high school dual credit students, 2005/06–2012/13 *(continued)*

Subject	Course name, number, and top five courses
English composition	<ul style="list-style-type: none"> • English Composition I (WR 121) • English Composition II (WR 122) • Introduction to Composition (WR 115) • English Composition – Research Writing (WR 123) • Elements of the Essay (WR 60)
English literature	<ul style="list-style-type: none"> • Introduction to Literature: Fiction (ENG 104) • Introduction to Literature: Drama (ENG 105) • Introduction to Literature: Poetry (ENG 106) • Survey of American Literature (ENG 253) • American Literature from 1865 (ENG 254)
Fitness	<ul style="list-style-type: none"> • Volleyball (PE 5) • Soccer (PE 5) • Yoga (PE 85) • Physical Conditioning (PE 185) • Sports Conditioning (PE 5)
Health professions	<ul style="list-style-type: none"> • CPR (HE 261) • Emergency First Aid (HE 167) • First Aid Basics and Beyond (HE 252) • Human Body Systems I (HO 150) • Medical Terminology (HM 120)
History	<ul style="list-style-type: none"> • History of the United States I (HST 201) • History of the United States II (HST 202) • History of the United States III (HST 203) • History of Western Civilization I (HST 102) • History of Western Civilization II (HST 103)
Math	<ul style="list-style-type: none"> • College Algebra (MTH 111) • Trigonometry/Elementary Functions (MTH 112) • Calculus I (MTH 251) • Calculus II (MTH 252) • Introduction to Contemporary Math (MTH 105)
Science	<ul style="list-style-type: none"> • General Biology I (BI 101) • General Biology II (BI 102) • General Biology III (BI 103) • Elementary Anatomy and Physiology (BI 121) • Introduction to Human Anatomy and Physiology I (BI 171)
Social sciences	<ul style="list-style-type: none"> • American Government & Politics I (PS 201) • Introduction to Economics (EC 115) • American Government & Politics II (PS 202) • Introduction to Psychology (PSY 201) • American Government & Politics III (PS 203)
Technology	<ul style="list-style-type: none"> • Computer Fundamentals (CIS 101) • Keyboarding (CA 121) • Beginning Word (CAS 216) • Basic Computer Skills/MS Office (CA 133) • Beginning Keyboarding (CAS 121)
World languages	<ul style="list-style-type: none"> • First-Year Spanish, Term 1 (SPN 101) • First-Year Spanish, Term 3 (SPN 103) • First-Year Spanish, Term 2 (SPN 102) • Second-Year Spanish (SPN 201) • Second-Year French (FRA 202)

Note: Courses are listed in order of enrollment, with the highest-enrollment course listed first and the next four in descending order.

Source: Authors' analysis based on data from the Oregon Office of Community Colleges and Workforce Development; see appendix B.

Notes

1. The Oregon University System formerly governed the seven public four-year universities in the state but was dissolved in 2015 after all universities formed individual governing boards.
2. This analysis was conducted by including schools in which no students appeared to enroll in dual credit courses in the data. It is possible that these high schools do offer dual credit courses through a community college, but no students took advantage of these programs.
3. A total of 159,139 students in the study graduated from high school, 93,116 of those graduates enrolled in college, and 65,005 of those college enrollees persisted to the second term of college. Among dual credit students in the study, 57,175 graduated from high school, 40,383 of those graduates enrolled in college, and 29,010 of those college enrollees persisted to the second term of college.
4. Regressions for college enrollment were restricted to high school graduates and regressions for college persistence were restricted to college enrollees.

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