UTAH SYSTEM OF HIGHER EDUCATION

GENERAL REPORT

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Concurrent Enrollment and Degree Attainment

Concurrent enrollment promises high school students an advantage on their collegiate pathway. Certainly, concurrent enrollment increases a student's likelihood of enrolling in higher education, but does this benefit continue toward degree attainment? Using data from the Utah System of Higher Education, the role of concurrent enrollment participation on degree attainment is examined. Substantially more students who participated in concurrent enrollment earned a degree compared to non-participants. Concurrent enrollment students also earned a degree slightly faster than non-participants.

Key Takeaways

- Seventy-seven percent of concurrent enrollment students earned a degree compared to 34% of non-participants.
- Concurrent enrollment students seeking associate degrees graduated seven months faster than non-participants.
- Bachelor's degree-seeking students with concurrent enrollment credits graduated eight months faster than non-participants.
- Eighty-six percent of concurrent enrollment courses taken were general education credits.
- The more general education courses completed, the more likely a student would graduate.
- Students who completed composition or quantitative literacy courses were likelier to earn a degree.
- The more concurrent enrollment courses a student completed in a classroom—as opposed to online courses—the likelihood of graduating increased by 7%.

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Purpose

The demand for jobs requiring postsecondary education remains high (Carnevale, Smith, and Strohl 2013; Hemelt, Schwartz, and Dynarksi 2020). Last year, employers reported that 70% of entry-level jobs require a bachelor's degree (National Association of Colleges and Employers, NACE 2023), and the need for postsecondary credentials is expected to continue (Education Finance Council 2023). In Utah, individuals with a bachelor's degree earn between $4,582 and $48,182 more than those with only a high school diploma (Beagley 2024). Degree holders also experience lower unemployment rates, better economic mobility, and better health (Tinto 2012). This recognition of the value of a bachelor's degree is evident in the many Americans considering enrolling or re-enrolling in a higher education program (Gallup 2024). However, the journey from enrollment to graduation is not always successful. Only 38% of Americans hold a bachelor's degree or higher (Pew Research Center April 12, 2022; US Census Bureau 2023); for Utah, that rate is 35% (World Population Review 2024). This disparity is a cause for concern, considering that the percentage of graduates has remained stagnant in recent years (US Census Bureau 2023).

One solution is to provide an early start by enrolling students in concurrent enrollment courses. Concurrent enrollment optimizes high school students' time by enabling them to earn high school credits toward a diploma and meet collegiate general education requirements. High school students in Utah can earn credit for a single college course, a technical education certificate, or an associate degree. Another advantage is that these courses engage disinterested students while preparing them for rigorous university work. Consequently, the transition from high school to college is often easier.

Nationally, 9% of all high school students are enrolled in concurrent enrollment programs (Taylor et al. 2022, 7). Locally, 25% of Utah high school students enrolled in concurrent enrollment in 2023, with a 7% growth rate over the past five years (Utah System of Higher Education, USHE 2024). These percentages represent an increasing blending between secondary and postsecondary institutions and greater opportunity for postsecondary credentials (Taylor et al. 2022, 5). Exposure to concurrent enrollment increases the likelihood of attending a postsecondary institution by 2.4 times (Campbell 2023). While it is established that concurrent enrollment increases postsecondary attendance, what is less understood is the effect of concurrent enrollment on degree attainment.

History

California was the first state where institutions offered concurrent enrollment to high school students fifty years ago (Miller et al. 2017; Mohker and McLendon 2009). Minnesota, Arkansas, and Virginia soon followed (Loveland 2017). State policies in these states were developed to support and maintain high school students enrolling in college-level courses. Between 1976 and 2000, 16 additional states adopted concurrent enrollment policies. By 2019, all 50 states implemented concurrent enrollment policies (Zinth and Taylor 2019). The Utah State Legislature formally established its concurrent enrollment program in 1988. Since its inception, high school participation has grown to 53,245 students (USHE 2024).
Initial state policy reviews identified constraints for student enrollment. Analysis showed that institutions restricted enrollment to academically gifted students (Iatarola, Conger, and Long 2011; Speroni 2011). Some states still limit access to concurrent enrollment. Texas requires students to meet a minimum score on standardized tests (Miller et al. 2017). Similarly, Florida requires GPA and placement exam scores

(Tobolowsky and Allen 2016). Lawmakers from these states argued that concurrent enrollment should be restricted for top-achieving students (Bailey and Karp 2003). The effects have been that low-income and students of color have not been afforded the same opportunities for enrollment (An and Taylor 2019, 109-111; Steiger et al. 2023; Taylor et al. 2022). Low-income students having to pay for tuition, fees, and books added a barrier to participation. Some states, like Illinois, revised concurrent enrollment policies to broaden access for more students (Zinth and Taylor 2019).

Box 1. Key terms

Concurrent Enrollment Course. Any college course offered during high school before earning a diploma. A student who completes this course earns high school and higher education credits.

High School Graduate: A high school student who has completed all diploma requirements outlined by the Utah State Board of Education.

Institution Mission: refers to the role and service area of a USHE institution. The Utah legislature outlines four designations: Research, Regional, Community College, and Technical College.

Regional University: One of six four-year institutions that provide certificates and degrees for a specified geographic region. All regional institutions are open enrollment.

Research University: A four-year institution with an emphasis on research.

Research

Scholars agree that concurrent enrollment prepares students for participation in higher education (An and Taylor 2019, 116). Students with concurrent enrollment experience develop better study habits and writing skills (Morgan, Zakhem, and Loloff Cooper 2018). Participation promotes competency in problem-solving, perseverance, and self-confidence (Burns et al. 2019; Garcia et al. 2018; Kimmel et al. 2024). Further, once enrolled at a postsecondary institution, these students are likelier to persist beyond the first year (Bailey and Karp 2003; Taylor 2015; Taylor and Yan 2018).

Research has shown that students who complete concurrent enrollment courses are likelier to earn a certificate or degree than those who start after high school (Buckley et al. 2022; Zeiser et al. 2021). However, differences across student populations exist. Women are more likely to earn a degree than men (Bailey and DiPrete 2016), and underrepresented students are less successful than traditionally represented students (Flores and Park 2013; Melguizo 2010).

Concurrent enrollment students often earn a bachelor's degree in less time (Ganzert 2014; Haskell 2016). Ison (2022) found that students who enrolled in concurrent enrollment courses were likelier to earn a bachelor's degree within five years of enrolling. Concurrent enrollment classes completed while in high school reduce the time needed at a postsecondary institution (Burns et al. 2019). Finally, these graduates earn higher salaries (Phelps and Chan 2016).

Like concurrent enrollment students in other states, Utah participants are likelier to enroll in higher education (Campbell 2021). Contrary to other states, students in Utah appear to use concurrent enrollment credits as a buffer by taking fewer classes in their first year. However, what is not well known is the effect of concurrent enrollment on degree attainment at USHE institutions.

Researchers face unique challenges in studying the outcomes of concurrent enrollment at the state level. Zinth and Taylor (2019; Taylor et al. 2022) identify inadequate state data systems as barriers to state-level

analyses. Specifically, siloed data between K-12 and higher education has prevented accurately tracking the transitions between the systems. At the same time, national repositories, such as the Integrated Postsecondary Data System (IPEDS), need more comprehensive data to address relevant research questions adequately. USHE has strived to overcome these challenges by working with the State Board of Education to combine their data with high school graduation data.

Objective

This study examined the degree attainment for concurrent enrollment students at USHE institutions. The following research questions were addressed:

1. How do student demographics and concurrent enrollment affect award attainment?
2. How do institutional characteristics, such as mission and type, affect award attainment?
3. How does participation in concurrent enrollment affect the type of awards earned?
4. Which concurrent enrollment courses facilitate award attainment?
5. Which concurrent enrollment courses must be repeated along the pathway to attainment?

Box 2. Data and methods

Most data were sourced from the USHE data tables. USHE maintains a statewide system for all students attending public technical colleges, community colleges, and universities. Students were identified from the Utah State Board of Education high school graduation records. Three high school graduating cohorts (2015, 2016, and 2017) were tracked.

The final sample included 53,982 participating students. Participation in concurrent enrollment courses consisted of completing at least one course in high school. Relevant characteristics of students at the high school level are presented. Data is analyzed as a whole and by graduation cohort.

See the Appendix for a more detailed description of the research methods.

Results

High school students who graduated from Utah public high schools in 2015, 2016, and 2017 and enrolled at a USHE institution were tracked for six years. The gender composition was equal between women and men. Eighty-three percent of students identified as white and 10% as Latinx/Hispanic. Asian American, Black/African American, Native American/Alaskan Native, Pacific Islander, and students who identified as multi-racial/ethnic comprised the remaining 7%.

Forty-seven percent of high school graduates completed at least one concurrent enrollment course. Fifty-three percent of concurrent enrollment participants were female, and 47% were male. Eighty-six percent of concurrent enrollees were white; 8% were Latinx/Hispanic. The remaining 6% comprised Asian American, Black/African American, Native American/Alaskan Native, Pacific Islander, and students with multi-racial/ethnicities.

Concurrent Enrollment Course Completion

Concurrent enrollment students completed three courses on average, equating to eight postsecondary credit hours. Most courses (86%) were taught in person, leaving 14% being taught online. Seventy-three percent of courses taken were general education credits. This count only measures the eight central core and breadth categories, excluding foreign languages and institutional-specific general education courses. This also excludes courses designated as only career and technical education (CTE). Courses that could be counted as both general education and CTE were included.

Of the general education core classes, 64% of students completed at least one written communication course (also known as composition), 40% completed their quantitative literacy requirement, and 30% completed the American Institutions requirement.

Online Courses

Advocates for more online concurrent enrollment courses expect such courses to improve access or provide financial savings (Holian et al. 2014). Prior research examined whether a high school student who completed a concurrent enrollment course online or in the classroom impacted enrollment at a USHE institution. Students were more likely to continue into postsecondary education if they took in-person courses than online coursework. Most (86%) concurrent enrollment courses were completed in the classroom. This finding corresponds with earlier studies (An and Taylor 2019, 119-120; Lochmiller et al. 2016; O'Brien et al. 2007). Students enrolled in online concurrent enrollment courses were also less likely to earn a degree. Additional analytical details are available in the Appendix.

Postsecondary Enrollment

Of the high school graduates, 39% (43,083) enrolled in a USHE institution. Of those, 61% (26,214) completed at least one concurrent enrollment course. Sixty-six percent of USHE enrollees completed a concurrent enrollment course; 53% were women, and 47% were men.

Concurrent enrollment students were predominantly white (85%). As a reference, white individuals comprised about 78% of adults between 18 and 24 in Utah and 73% of K-12 students (Backlund et al. 2021, 7, 18). Nine percent identified as Latinx/Hispanic who participated in concurrent enrollment, compared to 15% for adults 18 to 24 and 18% of K-12 students. The remaining racial identities comprised 6%, compared to 7% for 18 to 24-year-olds and 9% for K-12 students for the same period.

Concurrent enrollment had a small effect on where students started their higher education pursuits. Three percent started as juniors, 25% as sophomores, and 72% as freshmen. Most (75%) enrolled as full-time first-time students, with the remaining 25% as part-time students.

Table 1. Student counts from high school graduation through USHE enrollment.

	High School		CE Participant		Enrolled with CE Credits		Enrolled No CE	
	n	%	n	%	n	%	n	%
Female	27,450	50	31,063	53	13,698	52	7,530	45
Male	26,965	50	2,939	47	12,516	48	9,339	55
White	44,991	83	31,063	87	22,539	86	12,682	75
Latinx/Hispanic	5,446	10	2,939	8	2,164	8	2,424	14
BIPOC	3,545	7	1,858	5	1,511	6	1,762	10

Concurrent enrollment participants were most likely to enroll at a four-year institution. One-half of all USHE enrollees with concurrent enrollment credit enrolled at a regional university, and another 30% enrolled at a research university. Non-participants were also most likely to enroll at regional institutions, with a significant proportion enrolled at community colleges.

Table 2. Percent of enrollment by institutional mission and student concurrent enrollment status. Percentages accrue by concurrent enrollment status.

Mission	CE Participant	Non-Participant
Community College	20%	34%
Regional University	50%	42%
Research University	30%	24%

Concurrent enrollment students differed little between those who sought bachelor's degrees (48%) and those who sought associate degrees (47%).

Repeated Courses

An ongoing concern has been the effect of concurrent enrollment courses on award attainment. Some have argued that concurrent enrollment courses lack adequate rigor (Dougan 2005). Researchers who examined this claim found the courses to be at least as rigorous as those at postsecondary institutions (Ferguson, Baker, and Burnett 2015; Windham 1997). Nonetheless, some concurrent enrollment courses were repeated when students enrolled in a USHE institution. Possible explanations were examined for each general education (GE) course category. The counts for each GE category are presented with each potential strategy. Some counts may apply to more than one strategy.

Each GE category requires a different number of required courses. Only one mathematics course is needed for the quantitative literacy general education requirement for USHE degree attainment with three options: Math 1030, Quantitative Reasoning; Math 1040/Stat 1040, Statistics; and Math 1050, College Algebra. Still, the concurrent enrollment catalog contains three higher-level courses for high school students. Some of these are taken in preparation for STEM majors. All six quantitative literacy courses are included in the following analysis.

Major requirement

Several courses that meet general education are also required for specific majors. These lower-level courses tend to be prerequisites for entry into a program or for higher-level courses. As seen in Table 3, 9% of Quantitative Literacy courses taken after meeting the general education requirement could have counted as a pre-requisite for a major.

Table 3. Percent and counts of additional GE courses that match a requirement for a major.

	Required Course Percent	Required Course Counts	Total General Education Counts
Quantitative Literacy	9%	156	1,674
American Institutions	19%	156	812
Fine Arts	17%	349	2,057
Humanities	36%	1,002	2,752
Life Sciences	57%	905	1,575
Physical Sciences	44%	1,067	2,442
Social Sciences	26%	1,190	4,596

Life and physical sciences had the highest proportion of courses that count as prerequisites or requirements for a specific major. Quantitative Literacy (MATH 1030) had the lowest proportion, with 9% of courses repeated. Two-thirds of these were Trigonometry (MATH 1060), a requirement for secondary mathematics education. No additional composition courses were required for a major area of study.

Refresher

Students may have repeated a course as a refresher. This strategy assumes that a calendar year between taking the high school class and re-enrolling in the same course at a postsecondary institution indicates a refresher. Such scenarios may include military or religious service, medical leave, or stopping out for family or personal reasons.

Table 4. Students who may have retaken a course as a refresher.

	Refresher Percent	Refresher Counts	Total Counts
Composition	65%	265	405
Quantitative Literacy	29%	481	1,674
American Institutions	9%	76	812
Fine Arts	10%	202	2,057
Humanities	2%	62	2,752
Life Sciences	6%	93	1,575
Physical Sciences	7%	167	2,442
Social Sciences	21%	986	4,596

Retaking composition or quantitative literacy courses was common. Students also enrolled in additional social science and fine arts courses. Enrolling in low-division courses such as physical sciences, life sciences, or humanities was rare in American institutions.

Improve GPA

Students may repeat a course to improve their grade point average (GPA). A minimum GPA may be required or increase the chance of being admitted to a limited enrollment program. Another option is that the student intends to apply to graduate school, and repeating a course with a higher grade may improve their chances of acceptance into a graduate program.

Table 5. The proportional breakdown of repeated courses by grade. Totals are by general education category.

	Percent "A"	Percent "B"	Percent "C"	Percent "D"
Composition	12%	25%	31%	32%
Quantitative Literacy	9%	19%	29%	42%
American Institutions	63%	21%	10%	6%
Fine Arts	57%	17%	6%	2%
Humanities	67%	24%	7%	2%
Life Sciences	45%	35%	16%	4%
Physical Sciences	61%	29%	8%	2%
Social Sciences	61%	27%	10%	2%

Grades may have dictated repeated composition courses initially earned. Sixty-three percent earned a C or D as a concurrent enrollment course. Similarly, 42% of students who passed quantitative literacy earned a D, and 29% earned a C. Otherwise, grades in the remaining categories tended to be As and Bs.

Table 6. The proportion of courses retaken for potential grade improvement.

	Improved Grade	Same course	Different Course
Composition	68%	100%	0 %
Quantitative Literacy	52%	100%	0 %
American Institutions	73%	13%	87%
Fine Arts	78%	5%	95%
Humanities	81%	1%	99%
Life Sciences	68%	3%	97%
Physical Sciences	74%	3%	97%
Social Sciences	69%	3%	97%

* The second and third-column percentages identify whether it was the same or similar course. Counts are excluded because some cells are less than ten and do not meet the standard to maintain student privacy.

To further explore this phenomenon, cases were analyzed where a grade may have been unsatisfactory and improved or did not improve in the repeated course. Instances of when a different course within the same GE category was taken were also investigated. Any course in a general education area with a grade

less than an A was compared to the repeated course with the intent to examine if that grade improved. Any grade assigned as an A- or below was classified as unsatisfactory. An additional analysis examined if the same course was retaken or if another course in the same general education area was completed instead. The same course was repeated in composition and quantitative literacy; however, students were more likely to complete different courses in the other six general education courses.

Composition and quantitative literacy courses were the most commonly repeated courses. In more than half of the cases, students earned a better grade than in a concurrent enrollment course. In most cases, different courses were taken in the other six categories.

Responding to Institutions

This category encompasses student responses to institutional processes. One example would be that these credits did not transfer between institutions. Another explanation is that students may have enrolled according to guidance from an academic advisor. Finally, they may have enrolled in a course for personal interest. Table 7 represents a course repeated at an institution other than high school.

Repeating a course after transferring from an institution was rare. The high number of fine arts and humanities courses may suggest these courses were taken for personal interest. The other courses may fall under previously explored explanations.

Table 7. Courses repeated after transferring or courses that were repeated while a student remained at one institution.

	Remained at an Institution	Transfer to an Institution
Composition	58%	0%
Quantitative Literacy	50%	0%
American Institutions	50%	1%
Fine Arts	63%	3%
Humanities	58%	1%
Life Sciences	49%	3%
Physical Sciences	50%	1%
Social Sciences	49%	5%
*Counts are excluded because some cells are less than ten and do not meet the standard to maintain student privacy.		

Change in or Adding a Second Major

Thirty-three percent of all degree-seeking students in the U.S. change their major (Leu 2017). In this sample, 10% of students changed their major. A smaller number of students double-majored or pursued two majors simultaneously. Both choices can be seen in Table 8. The assumption was that other courses, while classified as general education credit, were required as prerequisites for the new major.

Some courses were prerequisites specific to that major, while others were for students who changed majors. Only a few students were pursuing dual majors. These courses may reflect the change in major. The highest proportion were students who changed their major from the sciences: life, physical, and social sciences.

Table 8. The proportion of students who repeated or took a general education pre-requisite course in response to changing their major or adding a second major to their degree program.

	Change Major	Dual Major	Total
Quantitative Literacy	2% (10)	4% (27)	626
American Institutions	2% (19)	4% (34)	812
Fine Arts	6% (122)	4% (76)	2,057
Humanities	5% (146)	6% (161)	2,752
Life Sciences	10% (152)	2% (38)	1,575
Physical Sciences	13% (313)	3% (80)	2,442
Social Sciences	12% (538)	6% (273)	4,596

Degree Completion

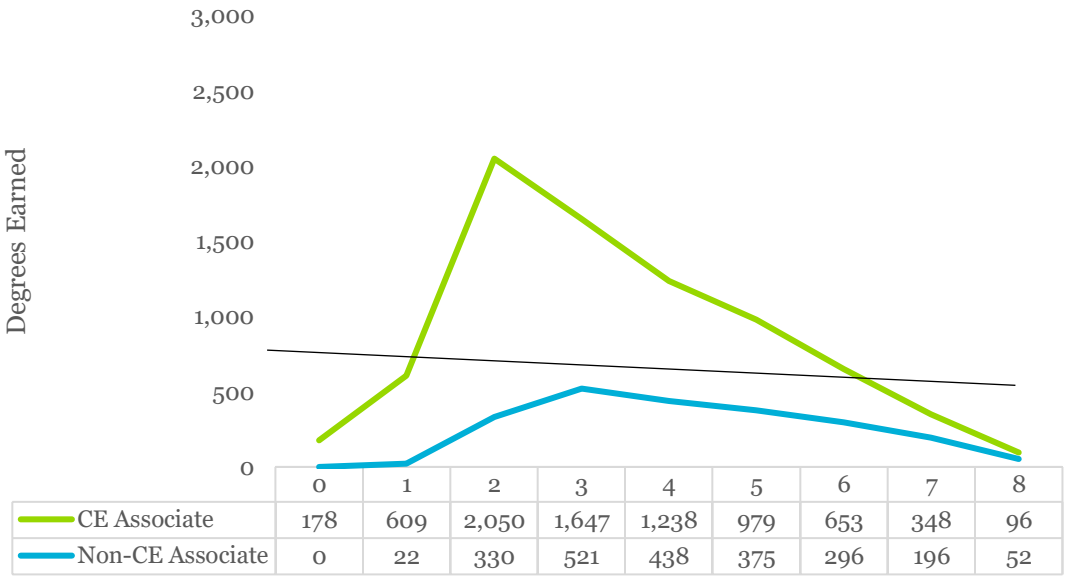
More concurrent enrollment students earned degrees than non-participants. Forty-eight percent of USHE students earned a degree, which equated to 19% of the original sample. Of these, 77% of graduates participated in concurrent enrollment compared to 34% of non-participants. Breaking it down by degree, 78% of associate degrees were awarded to concurrent enrollment participants compared to 22% to non-participants. Within community colleges specifically, 69% of associate degrees were awarded to concurrent enrollment participants and 31% to non-participants. For bachelor's degrees, 76% of awards went to concurrent enrollment participants, leaving 24% to non-participants.

Table 9. Student counts from high school graduation through degree attainment. Attainment is counted only if the degree is earned within six years.

	High School		CE Participant		Degree with CE		Degree No CE	
	n	%	n	%	n	%	n	%
Female	27,450	50	31,063	53	9,344	64	2,444	57
Male	26,965	50	2,939	47	5,321	36	1,834	43
White	44,991	83	31,063	87	12,742	87	3,432	87
Latinx/Hispanic	5,446	10	2,939	8	1,049	7	411	10
BIPOC	3,545	7	1,858	5	810	6	399	3

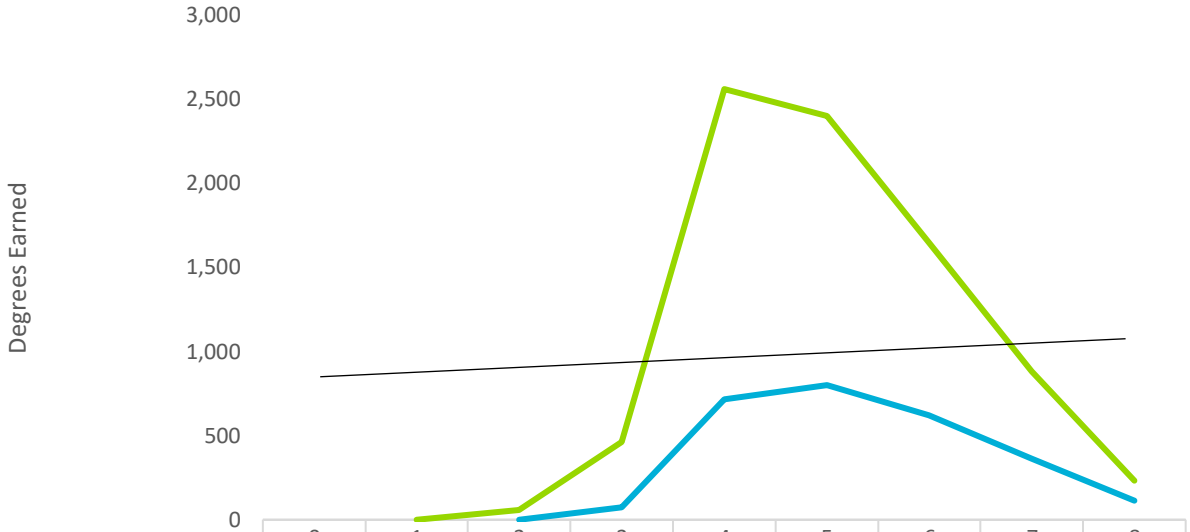
Most degree-earners were concurrent enrollment participants. Of all who earned a degree, 49% were women who participated in concurrent enrollment, and 28% were men who also participated in concurrent enrollment. This equals 77% of all graduates who were concurrent enrollment participants. The remaining graduates included 29% of non-participating women and 18% of non-participating men. Most graduates were white, including 68% of white concurrent enrollment participants and 18% of white students who did not participate in concurrent enrollment. Eight percent were Latinx/Hispanic students who participated, compared to 6% of graduates being Latinx/Hispanic who did not. Four percent of

graduates identified as Black, Indigenous, and People of Color (BIPOC), who completed concurrent enrollment courses. Two percent were BIPOC graduates who did not.



	0	1	2	3	4	5	6	7	8
CE Associate	178	609	2,050	1,647	1,238	979	653	348	96
Non-CE Associate	0	22	330	521	438	375	296	196	52

*Figure 1. The time to associate degrees in years by concurrent enrollment status. The black line represents the average. *Zeros equal less than 10 degrees earned that year.*



	0	1	2	3	4	5	6	7	8
CE Bachelor's		0	59	461	2,559	2,398	1,645	883	232
Non-CE Bachelor's			0	72	716	800	620	364	114

Figure 2. The time to bachelor's degrees in years by concurrent enrollment status. The black line represents the average.
* Zeros equal less than 10 degrees earned that year.

On average, concurrent enrollment students earned a degree five months faster than non-participants. However, the time to award differed by where students first enrolled. The institutional mission defined those differences. Concurrent enrollment participants graduate seven months faster than non-participants among community college students. The difference is nine months at regional universities and eight at research institutions.

Table 10. Mean number of months to award by concurrent enrollment participation and institutional mission.

Mission	Concurrent Enrollment	Non-participant
Community College	43	50
Regional University	44	53
Research University	48	56

No difference existed in total credits earned between concurrent enrollment students and non-participants. However, differences did appear when the institutional mission was added to the analysis. Community college students who successfully completed concurrent enrollment courses earned more credits than non-participants when awarded their associate degrees. At four-year institutions, concurrent enrollment participants earned fewer credits toward degree completion than those who did not participate in concurrent enrollment, with the difference being bigger at regional universities than at research institutions.

Table 11. Mean credits earned at graduation by concurrent enrollment participation.

Mission	Concurrent Enrollment	Non-participant Pathway
Community College	92	87
Regional University	117	120
Research University	120	121

Pathway to Attainment

To investigate if an optimal number of concurrent courses completed led to degree attainment, the total count of courses completed was compared to degree completion. No deadline for completion was included in this analysis. No optimal number of concurrent enrollment courses completed was identified. The more concurrent enrollment courses a student completes in high school, the greater the likelihood of earning a postsecondary degree. Concurrent enrollment participants were 56% more likely to earn a degree than non-participants. The impact was more extensive for those seeking associate degrees (60%) than those who sought bachelor's degrees (53%).

Related to this, the number of completed general education credits also increased the likelihood of degree attainment. The benefit was slightly larger for students seeking an associate degree, with each general education course increasing the possibility of attainment by 9%. In contrast, each general education course increased degree attainment by 7% for bachelor-seeking students. Most courses (85%) taken met general education criteria.

Meeting the composition requirement (English 1010 and 2010) increased the likelihood of earning a degree by 58%. Likewise, the quantitative literacy requirement increased the likelihood of attaining a degree by 56%. On the other hand, life sciences and foreign languages decreased the likelihood of earning an associate degree. These types of courses did not affect bachelor's degree attainment. Complete details for these analyses can be found in the Appendix.

Not only does concurrent enrollment increase the likelihood of earning a degree, but it also decreases the time required to earn that degree. Comparing the mean months to completion, students seeking an

associate degree with concurrent enrollment credits completed their coursework in 35 months compared to 45 months for non-participants. For bachelor's degree-seeking students, those with concurrent enrollment credit attain a degree in 56 months compared to 59 months for non-participants.

Instruction Type

Some policymakers advocate for more online concurrent enrollment courses, assuming such courses may improve access or provide financial savings (Holian et al. 2014). This assumption was not supported in this study. Attending in-person classes substantially improved the likelihood of students earning a bachelor's degree. For each course taken in the classroom, the likelihood of earning a bachelor's degree increased by 5%. Neither in-person nor online courses affected how long a student would need to earn a degree.

Limitations

This analysis only includes students who enrolled at a USHE institution. Students enrolled at private or out-of-state institutions were excluded. One study identified that 39% of Utah's college students attend private institutions (Chingos 2017). A more inclusive scope is needed to understand concurrent enrollment in Utah better.

Relatedly, institutions that are predominantly online could not be identified. Many online institutions are private schools or out-of-state. Online institutions recruit students of different demographics from public colleges or universities, mostly adult learners (Jobe et al. 2018). Concurrent enrollment could have differential effects as adult learners postpone a college education. The content learned from concurrent enrollment courses may have lost its utility. In addition, out-of-state and private institutions do not have to accept concurrent enrollment credits.

Finally, the study participants were limited to those who graduated from high school seven and nine years ago. The proportion of concurrent enrollment participants and demographic characteristics of more recent cohorts have changed. Subsequently, the conclusions may differ from an analysis of recent high school graduates.

Implications

Regardless of the number of concurrent enrollment courses completed, participation increased the likelihood of enrolling in a USHE institution. Still, participation and the related outcomes varied through demographic differences. More women participated in concurrent enrollment in high school. However, concurrent enrollment participation among men significantly impacted enrollment and degree attainment. Most underrepresented students who participated in concurrent enrollment enrolled at greater rates than traditionally represented students.

Enrollment differed by USHE institution type. Concurrent enrollment participants were likelier to enroll at four-year institutions, while non-participants were more likely to attend community colleges. This

finding coincides with prior research (Hemelt, Schwartz, and Dynarski 2019; Ison 2021). Students who completed concurrent enrollment courses perceive bachelor's degrees as more easily attainable (Jones 2014). Despite postsecondary enrollment, most concurrent enrollment courses are sponsored by community colleges. This trend occurs nationally and in Utah. One explanation may be that most courses are taught by sponsored high school teachers rather than community college instructors. This pattern may disconnect the high school student from the community college. Alternatively, a positive relationship with the high school teacher may raise student aspirations. Currently, research exploring either explanation is lacking.

The more concurrent enrollment courses taken, the more likely a student will earn a degree. Additionally, the more courses a student completes that meet general education requirements, the better the odds of earning a degree. Unlike findings at the national level (Ison 2021), concurrent enrollment in Utah benefits those who seek associate degrees. Most concurrent enrollment courses fulfill general education requirements, facilitating associate degree attainment. The role of general education courses as concurrent enrollment had a similar effect on those who sought bachelor's degrees.

Students with concurrent enrollment credits tend to earn degrees faster. The difference can be more than one academic year. Prior research suggested that taking only a few courses did not affect how long the attainment took (Campbell 2021). This research indicates that which courses are taken may be a contributing factor. The salient result is that meeting the quantitative literacy requirement impacts the time to completion, suggesting a possible psychological barrier. Quantitative literacy is one of the most challenging requirements (Nietzel 2018; Saxe, Braddy, and Kirwan 2015). Decades of research have identified math anxiety as a barrier to completing these courses (Dreger and Aiken 1957; Escalera-Chavez et al. 2021), with survey results suggesting math anxiety rates between 25% and 80% of college students (Beilock and Willingham 2014; Chang and Beilock 2016; Escalera-Chavez et al. 2021). Meeting this requirement in high school may provide the academic and psychological support a student needs to address the challenges faced in higher education. Passing a quantitative literacy course in high school and learning from fellow students struggling with mathematics content while at college may increase confidence enough to persist to graduation.

Despite the overall benefits of concurrent enrollment, it is crucial to note that underrepresented students are not reaping the same rewards. While 45% of white students earned a degree, fewer than 33% of underrepresented students did. Even in two-year programs, Latinx/Hispanic students struggled to earn associate degrees. This disparity in postsecondary persistence requires a deeper investigation.

This research allows for some suggestions as to which concurrent enrollment courses a student should take. If a student is going to take only one course, the most significant impact may be to enroll in English 1010. In this selection of students, 42% of USHE graduates completed one composition course in high school. While quantitative literacy had an equal impact on bachelor's degree-seeking student success, that course did not influence those who sought associate degrees. Students who take three courses should complete the composition and quantitative literacy requirements. Forty percent of the participating concurrent enrollment students met that requirement. If high school students want to complete a fourth course, the evidence suggests that the course should be physical science (physics or chemistry). Further

details can be found in the Appendix. These recommendations should not exclude considering student goals or interests and course availability.

In summary, concurrent enrollment leads to higher graduation rates. The effect is significant enough that taking one course can facilitate graduation. Still, the more concurrent enrollment courses students can complete in high school, the more likely they will succeed. Taking multiple general education courses helps students move toward degree attainment. Additionally, concurrent enrollment students can earn that degree faster.

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Appendix

Methodology

The sample consisted of 54,415 students who graduated from Utah's public high schools in 2015, 2016, or 2017. Fifty percent were female. Eighty-three percent were white, and 10% were Latinx/Hispanic, leaving 7% comprising the other racial identities. The breakdown is in Table A1. Twenty percent of the original sample qualified for free or reduced lunch, a proxy for identifying low-income families. Two percent were classified as English Learners.

Table A 1. Racial or ethnic breakdown of the original sample.

Identity	Proportion	Count
Asian American	2%	1,251
African American/Black	1%	604
Latinx/Hispanic	10%	5,441
Native American/Alaskan Native	1%	248
Pacific Islander	1%	625
Two or more	2%	1,082
White	83%	45,164

Population/Student Data

Forty percent of the sample attended a USHE institution. Seventy-two percent enrolled as freshmen, 25% entered as sophomores, and 3% started as juniors. Seventy-five percent first enrolled as full-time students, with the remaining 25% as part-time students. No differences existed between the three cohorts, so analyses are not broken down by cohort.

Of those, 35% graduated with a degree. Forty percent of USHE enrollees earned an associate degree, and 44% earned a bachelor's degree. Many students earned both an associate and bachelor's degree. Students who earned an associate degree required a mean of 37.4 months, while those who earned a bachelor's degree required 55.9 months.

Variables

Concurrent Enrollment Course. Any college course offered during high school before earning a diploma. A student who completes this course earns high school and higher education credits.

High School Graduate: A high school student who has completed all diploma requirements outlined by the Utah State Board of Education.

Institution Mission: Refers to the role and service area of a USHE institution. The Utah legislature outlines four designations: Research, Regional, Community College, and Technical College.

Institution Type: Institutional classification by expected time to degree: two-year and four-year.
Regional University: Institutions that provide certificates and degrees for a specified geographic region. All regional institutions are open enrollment.

Research University: A four-year institution with an emphasis on research.

Results

Analyses used standard unweighted analysis and inverse probability weighting (IPW) to examine the questions in this study. IPW is a continuation of developing more robust statistical models when randomly controlled trials are not possible. IPW can compensate for incorrectly specified models (Ertefaie and Stephens 2010) by reducing sample bias and increasing the analysis's robustness (Collier et al. 2022). IPW begins by matching students into two groups: those who participated in concurrent enrollment and those who did not. Matching occurred through propensity score matching on gender, race/ethnicity, high school low-income status, and high school GPA. A weight is created to estimate the degree of bias each variable potentially adds for each student. This builds on propensity score modeling by adding weights to the scores (Monaghan 2017). Larger weights are assigned to study participants who are less likely to meet the outcomes. The probability scores are down-weighted for those more likely to meet the outcomes. This procedure can create a better balance among the observed variables.

Inverse probability weights were created by estimating the probability of each outcome from any USHE institution based on student demographics and degree sought. Once the weights were obtained, the outcomes were regressed on whether students completed a degree. Examining degree completion via logistic regression, a difference was identified between concurrent enrollment participants and non-participants, B = 0.22, z = 6.84, $p < 0.001$, AIC = 25,740, OR = 1.25. Adding institutional mission to the model identified that attending regional (odds ratio (OR) = 1.10) or research universities (OR = 1.25) also contributed to degree completion. Separate analyses by degree type showed a higher impact for associate degrees (B = 0.44, z = 7.81, $p < 0.001$, AIC = 9,276.3, OR = 1.55) compared to the attainment of bachelor's degrees (B = 0.13, z = 3.28, $p < 0.001$, AIC = 15,815, OR = 1.14). Comparing the odds ratio, concurrent enrollment credit provides 1.55 times the odds of a student seeking an associate degree than a non-participant. The odds drop to 1.14 for a bachelor's degree-seeking student with concurrent enrollment credit compared to a bachelor-seeking non-participating student.

Looking at the role of concurrent enrollment on the total number of credit hours earned by degree completion failed to show a significant difference $F_{(1, 20,280)} = 0.51$, n.s., B = 0.62. A similar finding occurred when examined as a one-way ANOVA.

Table A 2. IPW regression weights for concurrent enrollment and institutional mission on credit hours earned at degree completion.

Variable	B	t	p
CE Participant	4.03	2.17	0.03
Regional University	32.28	20.14	< 0.001
Research University	32.41	20.83	< 0.001
CE x Regional	-7.62	3.32	0.001
CE x Research	-3.96	1.71	n.s.

Both concurrent enrollment participation (B = -13.99), degree type (B = 17.78), and the interaction between the two (B = 3.68) predicted the number of credit hours at degree completion via the IPW regression, $F_{(3, 20,278)} = 726.60$, $p < 0.001$, partial $R^2 = 0.10$. Participation in concurrent enrollment

suppressed the number of credit hours earned. Concurrent enrollment participants who earned associate degrees earned fewer credits (M= 92.2, SD = 75.7) than non-participants (M=93.4, SD = 88.4). On the other hand, concurrent enrollment participants who earned bachelor's degrees earned more credits (M = 134.0, SD = 27.6) than non-participants (M = 128.0, SD = 25.5).

Table A 3. Total mean credits earned with standard deviations (in parentheses) by concurrent enrollment participation.

Mission	Concurrent Enrollment	Traditional Pathway
Community College	92.7 (40.1)	87.0 (41.3)
Regional University	117.0 (73.6)	120.0 (91.7)
Research University	120.0 (42.8)	121.0 (35.5)

Exploring concurrent enrollment participation and institutional mission, the number of credit hours at degree completion demonstrated the difference between the two variables and their interactions, $F_{(5, 20,276)} = 164.40$, $p < 0.001$, $R^2 = 0.04$. Regional and research institutions were compared to community college students. Concurrent enrollment students at regional institutions graduated with fewer course credits than non-participants.

Table A 4. IPW regression weights for concurrent enrollment and institutional mission on time to degree completion.

Variable	B	t	p
CE Participant	-3.69	6.22	< 0.001
Regional University	3.03	5.92	< 0.001
Research University	4.95	9.96	< 0.001
CE x Regional	-1.77	2.42	0.02
CE x Research	0.12	0.16	n.s.

A difference also existed in how long, in months, it took students to earn a degree between concurrent enrollment participants and non-participants, $F_{(1, 20,280)} = 265.4$, $p < 0.001$, $R^2 = 0.01$, B = -4.46. Concurrent enrollment students required fewer months to earn a degree. Adding degree type (B = 7.11) with concurrent enrollment participation (B = -16.44) demonstrated that both variables and the interaction as significant (B = -2.99), $F_{(3, 20,278)} = 1,810.00$, $p < 0.001$, $R^2 = .21$. Students who earned associate degrees required fewer months (M = 35.0, SD = 18.4) than non-participants (M=44.7, SD = 19.5). Similarly, students seeking bachelor's degrees and participating in concurrent enrollment also required fewer months (M = 54.5, SD = 13.9) than non-participants (M = 57.2, SD = 13.6).

Table A 5. Means and standard deviations (in parentheses) of months to award by concurrent enrollment participation and institutional mission.

Mission	Concurrent Enrollment	Non-participant
Community College	42.8 (21.0)	50.1 (20.5)
Regional University	44.3 (20.9)	52.7 (18.4)
Research University	48.3 (18.8)	53.5 (15.2)

Exploring concurrent enrollment participation, institutional mission, and the interaction identified both variables as predictors, as were the interactions, $F_{(5, 20{,}276)} = 95.96$, $p < 0.001$, $R^2 = 0.02$. Regional and research institutions were compared against community college students. Concurrent enrollment participants at regional institutions required less time to complete their degree.

A one-sample proportion test identified a statistically significant difference between online and in-person instruction. Students were likelier to take in-person courses, $P = 0.71$, $\chi^2 = 13{,}574$, $p < 0.0001$. Related, a greater proportion of students took general education courses than not, $P = 0.73$, $\chi^2 = 57{,}813$, $p < 0.0001$.

Table A 6. Beta weight and odds ratios (OR) for full, associate, and bachelor models predicting degree completion.

	Full	OR	AA/AS	OR	BA/BS	OR
Male Student	0.23***	1.26	-0.07	0.94	0.15***	1.16
Asian American	0.05	1.06	-0.04	0.96	0.44***	1.55
Black/African American	-0.26*	0.77	-0.73*	0.48	-0.07	0.94
Latinx/Hispanic	-0.30***	0.74	-0.35***	0.70	-0.23***	0.79
Native American	-0.18	0.83	-1.21*	0.30	0.07	1.08
Pacific Islander	-0.92***	0.40	-1.62***	0.20	-0.58**	0.56
Two or more races	-0.07	0.93	0.01	1.01	-0.22*	0.81
Low Income (FRL)	-0.30***	0.74	-0.18*	0.84	-0.50***	0.61
Total CE Courses	0.07***	1.08	0.23***	1.26	0.10***	1.10
General Education	-0.001	0.99	0.09**	1.09	0.06***	1.07
In-person CE Courses	0.05***	1.05	-0.07	0.94	0.06***	1.07
Nagelkerke R^2	0.04		0.07		0.05	
AIC	60,077.00		6,922.60		28,224.00	

*p < .05, **p < .01, ***p < .001

Three logistic regression models were developed to predict what factors contributed to completion. The first model included all degrees, the second included only associate degrees, and the final examined only bachelor's degrees. Male students were likelier to earn a degree, as were the total number of concurrent enrollment credits earned, including completing at least one composition course. Several variables decreased the likelihood of graduating, including identifying as Black/African American, Latinx/Hispanic, Pacific Islander, and low-income, as measured by high school free or reduced lunch status. Completing general education courses as concurrent enrollment contributed to earning either degree.

The likelihood of earning a degree increased 1.09 times for each concurrent enrollment course: the number of general education credits completed as concurrent enrollment affected degree completion. Completing a composition course increased the likelihood of graduating 1.39 times; however, completing quantitative literacy courses only facilitated earning a bachelor's degree. Completing life science and foreign language courses as concurrent enrollment suppressed degree attainment. Further research is needed to explain why these courses have a suppressant effect.

Table A 7. Beta weight and odds ratios for full, associate, and bachelor models predicting degree completion based on general education courses completed.

	Full	OR	AA/AS	OR	BA/BS	OR
Male Student	0.23	1.25	-0.08	0.92	0.15***	1.16
Asian American	0.05	1.06	-0.07	0.94	0.41***	1.51
Black/African American	-0.27*	0.77	-0.71	0.49	-0.09	0.92
Latinx/Hispanic	-0.30***	0.74	-0.34	0.71	-0.221***	0.80
Native American	-0.14	0.87	-1.19	0.30	0.14	1.15
Pacific Islander	-0.93***	0.40	-1.68	0.19	-0.62**	0.54
Two or more races	-0.07	0.94	-0.04	0.96	-0.22*	0.80
Low Income (FRL)	-0.29***	0.75	-0.17	0.85	-0.49***	0.61
Total CE Courses	0.08***	1.09	0.29	1.33	0.12***	1.12
In-person CE Courses	0.05***	1.05	-0.11	0.90	0.04**	1.04
Composition	0.33***	1.39	0.24	1.27	0.18***	1.20
Quantitative Literacy	-0.02	0.98	0.27	1.31	0.25***	1.28
Life Sciences	-0.26***	0.77	-0.20	0.82	-0.18***	0.84
Physical Sciences	0.02	1.02	-0.101	0.90	0.07	1.07
Foreign Languages	-0.27***	0.77	-0.15	0.86	-0.09	0.92
Nagelkerke R^2	0.05		0.09		0.06	
AIC	61,077.00		6,888.60		28,133.00	

*p < .05, **p < .01, ***p < .001

Exploring the role of concurrent enrollment courses in predicting time to award, it was found that male students and Latinx/Hispanic students predicted more months to completion, while taking more concurrent enrollment courses decreased the time to completion, $F_{(1, 12,192)} = 43.02$, $p < 0.001$, $R^2 = 0.04$. If the in-person courses variable is removed from this model, the total number of concurrent enrollment courses also contributes to time to completion.

Table A 8. Multiple regression models predicting the time to completion in months.

	Full	Associate	Bachelor's
Male Student	4.58***	5.79***	4.24***
Asian American	2.10	5.04	1.44
Black/African American	3.93	8.86	2.82
Latinx/Hispanic	2.49***	2.39	2.79***
Native American	-4.41	4.63	-5.33*
Pacific Islander	-1.55	-6.93	-0.71
Two or more races	0.48	1.88	0.18
Low Income (FRL)	-0.27	0.01	-0.15
Total CE Courses	-1.09***	-1.05*	-1.19***
General Education	-0.63***	-0.28	-0.68***
In-person CE Courses	0.11	0.11	0.21
R^2	0.04	0.04	0.04
F	43.11	7.87	36.42

The interaction on time to award between concurrent enrollment participation (participant vs. non-participant), award type (associate vs. bachelor's), and institution type (two-year vs. four-year) was analyzed via a three-way analysis of variance (ANOVA). The interaction between all three variables was not significant, $F_{(1, 20,962)} = 2.09$, n.s.; nor was the interaction between concurrent enrollment participation and institution type, $F_{(1, 20,962)} = 2.07$, n.s. The interaction between award type and institution type was significant, $F_{(1, 20,962)} = 51.08$, $p < .0001$, $o^2 = .006$. The interaction between award type and concurrent enrollment was also significant, $F_{(1, 20,962)} = 132.75$, $p < .0001$, $o^2 = .007$. All three main effects were significant. Students who participated in concurrent enrollment took fewer months to attain a degree than non-participants. Those students at four-year institutions took slightly longer to earn associate degrees.

Table A 9. Means and standard deviations of months to award by concurrent enrollment, institution type, and degree type.

		Non-participant			CE participant		
		N	M	SD	N	M	SD
2-year	**AAAS**	1,203	44.7	19.4	2,660	35.0	18.4
	BABS	412	65.3	14.1	1,177	61.2	14.1
4-year	**AAAS**	1,814	45.7	19.4	7,869	35.1	21.6
	BABS	3,037	57.2	13.6	9,854	54.5	13.9

Three multiple regression models were developed to predict what factors contributed to time to degree attainment. The first model included all degrees, the second included only associate degrees, and the final examined only bachelor's degrees. All three models were significant. The total number of courses contributed to all three models. The completion of quantitative literacy courses predicted bachelor's degree attainment. Composition courses contributed to the full model; this appears to benefit the bachelor's degree seekers, though this specific model composition courses did not meet statistical significance ($p = .059$).

Table A 10. Beta weight for full, associate, and bachelor models predicting time to completion based on general education courses completed.

	Full	Associate	Bachelor's
Male Student	4.62***	5.94***	4.27***
Asian American	2.22*	4.83	1.55
Black/African American	3.89	8.65	2.77
Latinx/Hispanic	2.44	2.38	2.78***
Native American	-4.54***	4.94	-5.36*
Pacific Islander	-1.44	-6.72	-0.57
Two or more races	0.53	1.96	0.22
Low Income (FRL)	-0.31	-0.07	-0.19
Total CE Courses	-1.28***	-1.07**	-1.35***
In-person CE Courses	0.25	-0.22	0.29
Composition	-0.73*	0.04	-0.72
Quantitative Literacy	-1.29***	-0.94	-1.19***
Life Sciences	-0.25	1.98	-0.66
Physical Sciences	-0.53	-0.07	-0.62
Foreign Languages	1.02	0.96	1.42

R^2	0.04	0.04	0.04
F	31.96	6.08	26.78

The interaction in the number of credit hours between concurrent enrollment participation (participant vs. non-participant), award type (associate vs. bachelor's), and institution type (two-year vs. four-year) was analyzed via a three-way ANOVA. The interaction between all three variables was not significant, $F_{(1, 27,371)} = 1.25$, n.s.; nor was the interaction between concurrent enrollment participation and institution type, $F_{(1, 27,371)} = 3.30$, $p = .07$. The interaction between award type and institution type was significant, $F_{(1, 27,371)} = 7.68$, $p = .006$, $o^2 = .0004$. The interaction between award type and concurrent enrollment was also significant, $F_{(1, 27,371)} = 41.51$, $p < .0001$, $o^2 = .001$. All three main effects were statistically significant. Students who participated in concurrent enrollment earned more credits toward bachelor's degrees but fewer toward associate degrees at four-year institutions than non-participants. Students at four-year institutions earning associate degrees accumulated more credit hours than those at two-year institutions.

Table A 11. Means and standard deviations of total credit hours earned by award attainment by concurrent enrollment, institution type, and degree type.

		Non-participant			CE participant		
		N	**M**	**SD**	**N**	**M**	**SD**
2-year	**AAAS**	1,203	77.8	38.1	2,660	78.4	32.8
	BABS	412	114.0	38.3	1,177	123.0	38.5
4-year	**AAAS**	1,814	104.0	109.0	7,869	97.0	85.2
	BABS	3,037	130.0	22.6	9,854	136.0	25.7