# EARLY COLLEGE VS. DUAL CREDIT: PLANNING THE MOST EFFECTIVE HIGH SCHOOL – COLLEGE COLLABORATION BASED ON STUDENT OUTCOMES

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## ABSTRACT

*This research examines the dual credit and early college program options for school districts planning high school and college collaborations. It utilizes a quasi-experimental design from existing data at a community college that has a well-established dual credit and early college program that offers the students the option of Pell in high school as part of a USDOE program. The study uses logistic regression and covariate analysis of students in an early college program comparing their college GPA, cumulative credits, ACT scores, and bachelor's degree attainment to dual credit students as well as traditional postsecondary students from three comprehensive high schools that matriculated to the college after high school. The results indicated that early college students had significantly higher GPAs and more of them earned the bachelor's degree as compared to dual credit, and traditional postsecondary students.*

## BACKGROUND

A significant body of research indicates that a high school diploma is not sufficient for the skills required in most jobs of the 21st century (Carnevale et al, 2018). As educators seek to provide students with the academic, employability, and occupational skills needed to succeed in the workplace, an emphasis on life-long learning and training beyond high school is critical. One means of helping students learn these needed skills and experience postsecondary training is through dual credit courses and early college programs.

Over the past few decades, the boundaries that separate secondary and postsecondary education have increasingly blurred as more high school students enroll in college before they graduate high school (Taylor et al, 2022). This research is intended to help school and district leaders and educational planners evaluate and plan the most effective options for high school and college collaboration by comparing the student outcomes in dual credit as compared to early college at a well-established program in a community college.

National estimates suggest about 1.4 million high school students—or 9% of all high school students—are enrolled in college courses each year, but this number has grown tremendously in recent years. The growth of dual enrollment programs is difficult to assess at the national level due to limited data, but state-level data often show astounding growth (Taylor, et al 2022).

In dual credit, a student is enrolled in a course which allows him/her to earn high school credit and college credit simultaneously. This course may be taught on a college campus, on a high school campus, online, or at an area technology center, but it will be in conjunction with a college or university. Dual enrollment is very similar to dual credit. However, with dual enrollment, the student will actually be enrolled in both high school and college. The classes are nearly always taught on the college campus and the student will often be taking multiple college courses. Dual enrollment programs allow high schools and community colleges to share limited resources while offering students opportunities to take college classes, explore careers, save money, and shorten their time to a degree (NACEP, 2022). Once intended for high-achieving students, dual enrollment is now

perceived as a means of helping more students, especially low-income students and first-generation college-goers, get and stay on pathways to postsecondary attainment (NACEP, 2022).

The terms dual credit, dual enrolment, and concurrent enrolment are commonly used to refer to high school students taking college courses. States and localities use different terms, and these terms may have different meanings by location. This paper uses the term dual credit to include all types of programs and courses that enable high school students to enrol and earn college credit.

Unlike dual credit or dual enrolment programs, where students take college courses as part of their high school schedule either on campus or at their high schools, early colleges involve students attending college fulltime on campus with courses taught by college faculty during the last two years of high school. Early college high schools and early college programs combine high school and the first two years of college into a coherent educational model. By minimizing the physical transition between high school and college and allowing students to move ahead in subjects as they demonstrate success, early colleges enable students to earn a high school diploma and complete two years of college credit (or an associate degree) within 4-5 years of entering ninth grade (Kisker, 2006).

This study will analyze the data from a dual credit and an early college program at a community college with students from three feeder comprehensive high schools in a small city in rural middle America to examine the role of the dual credit as compared to early college in improving outcomes for students, including students of color and low-income students receiving Pell grants as high school students. The community college program that is the subject of this study has operated a dual credit program for over 20 years and early college program for the past eight years. The programs are accredited by the National Association of Concurrent Enrolment Partnerships (NACEP) and have built-in supports, collaborative measures, and quality control mechanisms shared between the three high schools and the college.

This study hypothesizes that students in early college high school programs outperform dual credit and traditional postsecondary students. Specifically, early college high school students are more likely to complete bachelor's degrees and have higher cumulative college GPA than students that enter community colleges with dual credit courses or directly from high school. Furthermore, we hypothesize that early college is a more effective option for student of color and a more effective investment of Pell funds for high school students compared to the Pell investments made in dual credit tuition for low-income high school students using Pell.

## REVIEW OF LITERATURE

Dual credit is an evidence-based practice broadly supported in research literature. Although the effects of dual credit are not always equitable, the evidence is clear that on average, dual credit positively impacts student outcomes (Taylor, et al, 2022). Dual credit expands learning opportunities and college access to college-level education which can translate to positive contributions to local communities and the overall economy (Taylor, et al, 2022).

Dual credit is a common practice in most U.S. high schools and the number of students participating continues to grow. Nearly 1.4 million high school students participate in dual credit programs each year and in some states as many as 60% of high school graduates participated in dual credit options (Jenkins & Fink, 2020; Taie & Lewis, 2020). Although widespread and growing, the purpose,

design, and participation in dual credit programs can vary dramatically by state and locality (Indiana Commission on Higher Education, 2021; Jenkins & Fink, 2020).

### Dual Credit Outcomes

The opportunity to participate in dual credit is unequal. Fink (2021) and Harlow (2018) show that students of color, low-income students, lower achieving students, and those with disabilities participate in dual credit at lower rates than their counterparts. Research on equity in dual credit outcomes is mixed. Struhl and Vargas (2012), Taylor (2015), and Liu et al. (2020) find that dual credit helps reduce inequities. While Kentucky Council on Postsecondary Education (2020), Miller et al (2018), Birkeland (2019), Harlow (2018), Welsh et al (2005), and Brake (2003) found that dual credit yielded either no difference or further contributions to inequities.

Research consistently shows that dual credit programs have positive impacts on high school and college outcomes such as high school graduation (Miller et al, 2018), college enrolment (Britton et al, 2019; Dash, 2017; Miller et al, 2018), college success (Allen & Dadgar, 2012; Grubb, 2015; Karp et al, 2007), and college completion (Allen & Dadar, 2012; Ingham, 2018; Kentucky Council on Postsecondary Education, 2020; Loftin, 2012; Rowett, 2012). For some outcomes, such as college enrolment and completion, the effects of dual credit are stronger and more consistent than the effects of high school graduation and college success (Miller et al, 2018; Struhl & Vargas, 2012; Taylor, 2015).

Two specific aspects of dual credit outcomes relevant to this research are the academic momentum of students enrolled in dual credit courses as well as the intensity or dosage of dual credit courses students are exposed to while in high school. Academic momentum is a term often referred to in the dual credit literature to refer to the pace at which high school students accumulate college credits (Taylor et al, 2022). It is also an important indicator in college degree attainment literature (Adelman, 1999, 2006). Attewell and Monaghan (2016) found that students who take 15 credits in their first semester of college are more likely to complete a bachelor's degree compared to those that take 12 hours. Calcagno et al (2007) find earning 20 credits or completing 50% of a program are significant milestones in obtaining a community college credential. Dual credit plays an important role in college credit accumulation providing students academic momentum to complete their initial college credential. This momentum allows them to persist at a better rate than traditional postsecondary students and ultimately complete a college degree. Research shows that participation in dual credit courses increases the total number of credits earned. Karp et al (2007) estimate that students who participated in dual credit earned 15.1 more college credits within three years after high school graduation than nonparticipants. Allen and Dadgar (2012) and Grubb (2015) report that dual credit students earn more credits during their first semester in college than students who did not enrol.

There are mixed results on the importance of where students take dual credit courses. Some evidence shows that dual credit on a college campus yields better results than on a high school campus (Speroni, 2011). DeHay (2019) and Liu et al (2020) find effects of dual credit similar regardless of where classes are offered. Other concerns about the location of dual credit courses focuses on the instructional quality of dual credit courses taught by high school faculty despite a lack of supporting evidence. Birkeland (2019) found positive associations for student outcomes for such high school-based options.

## Dual Credit Policy and Practice

Allen et al (2019), Battle (2020), Hart (2019), and Kanny (2015) report that students enroll in dual credit because it is affordable, it can help save money, and helps them get a head start and save them time in college. Many others take dual credit because it is a more rigorous alternative to traditional high school or provides an educational environment that is more conducive to learning and development (Adams et al, 2020; Battle, 2020; Hart, 2019).

Dual credit funding is largely guided by state policies, so the funding structures and mechanisms reflect 50 different policies. Education Commission of the States (2019), Hoffman and Vargas (2010), and Taylor et al (2015) show that some states have streamlined their finance policies such as school and college reimbursement and tuition policies, but overall funding structures vary considerably and revenue sources for dual credit can be a combination of federal, state, local, private, and student funding. There is limited research examining the cost-benefits of dual credit programs, but Atchison et al (2019) and Reichardt and Christeson (2020) indicate that dual credit is a cost-effective strategy for students, schools, colleges, and states. The Pell sites experiment opened the door for access to dual credit and early college so that students could access Pell while in high school, thus leveling the playing field. However, the USDOE discontinued the "Pell Sites" project that enabled high school students to access Pell citing mixed results (Bettinger, et al, 2022).

State-level dual credit policies vary extensively and often drive local policy and practice in areas such as access (Bartlett, 2008; ECS, 2019; Zinith, 2014), equity (Barnett, 2019; Bartlett, 2008; Brake, 2003; Taylor et al, 2015;), finance (ECS, 2019; Williams & Perry, 2020), quality (Taylor, et al 2022; Zinth, 2014), and transferability (ECS, 2019; Williams & Perry, 2020). Research by Perry and Williams (2020), ECS (2019), Bartlett (2009), Zinth (2014), and Barnett (2019) shows that critical state policy issues such as inadequate funding, restricted eligibility, and inflexible quality control can restrict dual credit access and equity.

Career and technical education (CTE) is a prevalent dual credit model, but the scope of CTE participation varies across states. CTE dual credit models have evolved from Tech Prep to career academies, to pathway programs, to technology-CTE driven high schools such as P-TECH (Taylor et al, 2022). Evidence of their impact is promising and shows that many CTE dual credit programs are helping students to better complete the transition from high school to college and careers (Bragg et al, 2006; Rosen et al, 2020; Warner et al, 2016). Bragg et al (2006) and Orr et al (2002) also suggest that CTE supports secondary and postsecondary alignment.

## Early College Model

Early college high schools (ECHS) are a comprehensive school reform model that includes dual credit as one element. Many ECHS are designed to enroll students who are underrepresented in college. Berger et al (2010) and Edmunds et al (2020) show that ECHS have achieved that purpose. Edmunds et al (2017) shows that ECHS have positive impacts on overall outcomes, especially for students who are historically underserved in college. ECHS have shown a large outcome on postsecondary degree attainment (Edmunds, 2020).

There is an abundance of literature advocating better integration of the high school and community college. The earliest model, Leonard Koos's 6-4-4 plan that integrated the last two years of high school with the first two years of "junior college," was implemented over a century ago (Kisker, 2006). The modern version of the model emerged in the early 1970s with the Middle College High School at LaGuardia Community College in New York (Lieberman, 2006). Since then, groups like

the Gates Foundation, Jobs for the Future, and others have championed the model as among the most successful approaches to high school reform (Bush, 2017; Jett & Rinn, 2020; Schwartz, 2016).

The outcomes have been promising. Wechsler (2001) found that the early colleges enhance curricular unity and allow for accelerated, rigorous, and flexible coursework. Powell (2003) advocated the approach to expand a general liberal arts education to those that do not attend university. Lieberman (2006) emphasized the advantages of keeping students in the same institution through adolescence. Edmunds, et al (2020) found that early colleges generate more students on-track for college than traditional high schools. They also found that early colleges provide students significant cost savings compared to students that enter postsecondary education using the traditional route. Schwartz (2016) found that early colleges prepared students at a level commensurate with the global standard of secondary education compared to the traditional high school diploma.

Early colleges have also been a successful pathway for underserved, disadvantaged and minority students (Barnett et al, 2015). Jett and Rinn (2020) did a systematic review of research on student experiences and outcomes of early college programs. Their meta-analysis found that early colleges have powerful teacher-student relationships and students in early colleges outperform high school peers academically, socially, and emotionally. They also found that the academic culture benefits students as they complete college and enter the workforce.

In sum, the literature on dual credit and early college strongly supports various models of college-level learning in high school as a method of better preparing students for the attainment of college credentials and preparing them to successfully contribute to the economy and modern society.

## RESEARCH QUESTIONS

This study addressed the following research questions:

1. Does early college participation more strongly predict bachelor's degree attainment than cumulative GPA, and credits controlling for ACT score, race, and Pell status compared to dual credit and traditional postsecondary community college enrollment?

2. Does the early college program status have an effect on cumulative college GPA for students compared to dual credit and traditional college students, and do ACT and college status (early college, dual credit, or traditional postsecondary) interact?

3. Does the early college program status have an effect on cumulative college GPA for Pell students compared to dual credit and traditional college Pell students, and do ACT and college status (early college, dual credit, or traditional postsecondary) interact?

4. Does the early college program status have an effect on cumulative college credits for students compared to dual credit and traditional college students, and do ACT and college status (early college, dual credit, or traditional postsecondary) interact?

5. Does the early college program status have an effect on cumulative college credits for Pell students compared to dual credit and traditional college Pell students, and do ACT and college status (early college, dual credit, or traditional postsecondary) interact?

## SIGNIFICANCE OF THE STUDY

This research is significant because it examines the dual credit and early college program options for school districts planning high school and college collaborations. The community college that is the focus of the study has a well-established dual credit and early college program that offers the students the option of Pell in high school as part of a USDOE program.

The study provides a framework based on outcomes of a successful program as an avenue for education planners and policymakers to begin to evaluate the overall role that dual credit and early college should play in the scope of P-16 educational reform.

## METHODOLOGY

The research sample included a total of 2,248 students from the population of the graduating classes of 2016-2021 from three comprehensive high schools that subsequently enrolled in a nearby community college. Of this sample, 236 were early college students, 1,382 were enrolled in dual credit courses, and 639 were traditional postsecondary students coming from high school to the community college without any dual credits. All three high schools are located within three miles of the community college. The college was one of the USDOE designated "Pell Sites" experiment that allowed high school students in both the dual credit program as well as the early college to access federal Pell money to cover the cost of tuition while in high school. Data were disaggregated to include a subsample of students that received Pell funding for early college, dual credit, or as postsecondary students.

This research utilized a quasi-experimental study design using existing data supplied from the state community college system and state postsecondary education authority. The study used three postsecondary performance and academic momentum factors, bachelor's degree attainment, cumulative community college GPA, and cumulative college credits earned. The ACT test score of students served as a covariate, testing for the effect of the college program status while controlling for prior high school achievement. The independent variable was the college program status: early college, dual credit, or traditional postsecondary attendance at the community college.

## RESULTS

For Research Question 1, a logistic regression was performed using SPSS to ascertain the effects of enrolment status, race, Pell, ACT, cumulative GPA, and cumulative college credits earned on the likelihood of a student attaining a bachelor's degree. The logistic regression model was statistically significant  (7) = 182.7, $p < .001$. The model explained 25.1% (Nagerlkerke ) of the variation in bachelor's degree attainment and correctly classified 86.4% of cases. Early college Pell students are 2.5 times more likely to earn a bachelor's degree than dual credit or traditional students. Dual credit students are 1.4 times more likely to earn a bachelor's degree than traditional college students. Students with high grades and test scores were significantly more likely to complete a bachelor's degree. Students with higher GPAs were 4.7 times more likely to earn a bachelor's degree. Race as Pell status did not add significantly to the model, indicating that differences of race and socio-economic status as defined by Pell do not significantly predict a bachelor's degree. (See Table 4.)

To further explore the outcomes of early college students based on race or Pell status, a follow up Pearson independent samples chi square test was used to determine if the number of Pell students earning a bachelor's degree based on enrolment status are independent of one another. The proportion of Pell early college students earning a bachelor's was 32% compared to 10% of Pell

dual credit students, and 6% of traditional postsecondary Pell students. Bachelor's degree attainment of early college students was found to be significantly independent of dual credit and traditional postsecondary enrolment students receiving Pell, $(2, n = 921) = 28.1, p < .001$. The same procedure was used to determine if the number of non-white students earning a bachelor's degree based on enrolment status are independent of one another. The proportion of non-white early college students earning a bachelor's was 27% compared to 14% of dual credit students, and 10% of traditional postsecondary students. Bachelor's degree attainment of early college students was found to be significantly independent of dual credit and traditional postsecondary enrolment students that are non-white, $(2, n = 221) = 13.27, p < .001$.

For Research Questions 2-3, an analysis of covariance was run to determine if there is a statistically significant difference between the variance in the data of the GPA for students that attended early college programs as compared to those that attended as dual credit or traditional postsecondary students. The same test was run on the subsample of Pell students to determine the difference between Pell student GPA by enrolment status. Post-hoc tests using the independent samples Kruskal-Wallis test was used to further determine the significance of the variance between each independent variable group. The Levene's test for equality of variances was conducted to test the assumption that equal variances are not assumed. The Kruskal-Wallis test was selected as the post-hoc analysis for pairwise comparisons to account for the unequal variances and unequal sample sizes.

For question 2, the ANCOVA determined there was a statistically significant interaction between the effects of college status and ACT score on college GPA, $F(2, 2{,}111) = 5.51$, $p = .004$. These results indicate that the covariate of ACT as a measure of high school achievement is found to have a significant effect on cumulative college GPA indicating the high achieving students regardless of program status perform well. Follow-up post-hoc tests using the Kruskal-Wallis test to analyze the simple main effects showed that GPAs were still significantly higher for early college ($M = 3.33$) students than dual credit ($M = 3.08$, $p < .000$) or traditional postsecondary Pell students ($M = 2.72$, $p < .001$)., $H(2) = 79.05$, $p = .000$. The dual credit mean ($M = 3.08$) was significantly higher than traditional college students ($M = 2.72$, $p < .001$). (See Table 3.)

For question 3, the ANCOVA determined there was not a statistically significant interaction between the effects of Pell student college status and ACT score on college GPA, $F(2, 1{,}058) = 1.31$, $p = .271$. These results indicate that differences in cumulative college GPA for Pell students could be more influenced by the early college program status than the ACT measure of high school achievement. Follow-up post-hoc tests using the Kruskal-Wallis test to analyze the simple main effects showed that GPAs were significantly higher for early college ($M = 3.05$) students than dual credit ($M = 2.51$, $p < .001$) or traditional postsecondary Pell students ($M = 2.02$, $p < .001$), $H(2) = 13.71$, $p = .001$. The dual credit mean ($M = 2.51$) was not significantly higher than traditional college students ($M = 2.02$, $p = .072$). (See Table 3.)

For research questions 4-5, an analysis of covariance was run using SPSS to determine if there is a statistically significant difference between the variance in the data of the cumulative college credits for students that attended early college programs compared to those that attended as dual credit or traditional postsecondary students. The same test was run on the subsample of Pell students to determine the difference between Pell student college credits by enrolment status. Post-hoc tests using the independent samples Kruskal-Wallis test was used to further determine the significance of

the variance between each independent variable group. The Levene's test for equality of variances was conducted to test the assumption that equal variances are not assumed. The Kruskal-Wallis test was selected as the post-hoc analysis for pairwise comparisons to account for the unequal variances and unequal sample sizes.

For question 4, the ANCOVA determined there was a statistically significant interaction between the effects of college status and ACT score on college cumulative credits earned, $F(2, 2{,}111) = 7.92$, $p < .001$. These results indicate that the covariate of ACT as a measure of high school achievement is found to have a significant effect on cumulative college credits earned. Follow-up post-hoc tests using the Kruskal-Wallis test to analyze the simple main effects showed that cumulative credits earned were significantly higher for early college ($M = 63.4$) students than dual credit ($M = 43.8$, $p < .001$) or traditional postsecondary students ($M = 48.5$, $p < .001$), $H(2) = 185.69$, $p = .000$. The dual credit mean ($M = 43.8$) was significantly higher than traditional college students ($M = 48.5$, $p < .007$). (See Table 3.)

For question 5, the ANCOVA determined there was not a statistically significant interaction between the effects of Pell student college status and ACT score on college GPA, $F(2, 1{,}058) = 1.11$, $p = .329$. These results indicate that differences in cumulative college credits earned for Pell students could be more influenced by the dual credit and early college program status than the ACT measure of high school achievement. Follow-up post-hoc tests using the Kruskal-Wallis test to analyze the simple main effects showed that cumulative credits were significantly higher for early college ($M = 58.3$) Pell students than traditional postsecondary Pell students ($M = 45.4$, $p < .005$), but not significantly different for early college compared to dual credit Pell students ($M = 52.2$, $p = .097$), $H(2) = 44.40$, $p = .001$. (See Table 3.)

## LIMITATIONS

While the results are very promising for early college as a model to serve both Pell as well as all students in high school, there are some limitations with this research. First, while the sample included a large low-income Pell population, it was not racially diverse (15% non-white, 85% white) with sample sizes too small to use race as a variable in the ANCOVA, however, the results from the logistic regression and chi-square tests painted an overall positive picture of non-white student performance in the early college program. The paired sample method of comparison was not utilized in this study. Rather, it compared a smaller population cohort of early college students with larger populations of postsecondary students and dual credit students. The fact that all the students in the sample attend the same community college matriculating from the graduating classes at the same three high schools eliminates some confounding variables, a more detailed cohort-based study may be needed to yield more robust quasi-experimental results. In addition to examining cohorts of students, additional quantitative and qualitative methods incorporating student voice, their experiences with the program and its impact on their educational trajectory would further compliment and add needed depth to the outcomes-based data analysis provided here. Finally, despite the statistically significant $p$-values, the effect sizes using Cohen's ($d = 0.1$) for the ANCOVA were all below the 0.2 level, suggesting low practical significance. The difference between the groups could have more to do with the large and unequal sample sizes.

## DISCUSSION

The results of this study are consistent with other research that support dual credit, dual enrollment, and early college programs as successful models in higher education as well as high school reform circles (Zeiser, 2019). As previously discussed, such programs have been shown to boost college attendance, reduce the time it takes to complete a degree, and add rigor to the last two years of high school (Edmunds, et al, 2020). Because most programs require students to pay full or reduced tuition and book costs, early college and dual enrollment have been out of reach for lower income and disadvantaged students (Ndiaye & Wolfe, 2016). Historically dual enrolment and early college students have come from wealthy, high achieving students (Schwartz, 2016).

The interaction effect of the ACT result in this study is in line with the historical trend of dual credit access limited to high achieving students. The covariate of ACT as a measure of high school achievement was found to have a significant effect on cumulative college GPA and cumulative college credits earned by high school students in both early college and dual credit options in the analysis of the overall student population of this sample. A bright spot of these results indicate that a Pell financed early college model provides a viable option to serve students that are not necessarily wealthy high achievers. These results indicate that when controlling for prior achievement using ACT scores, the Pell eligible high school students in an early college model perform better than traditional postsecondary and dual enrollment students.

The Pell sites experiment opened the door for access to dual enrolment and early college so that students could access Pell while in high school, thus leveling the playing field. While the results focusing on dual enrolment have been mixed, the results here indicate that early college model, which offers a more intensive program with more supports, may be the best method to deploying resources such as Pell for lower socio-economic populations.

## IMPLICATIONS

The student outcomes highlighted in this study and previous studies focusing on dual credit and early college programs have several implications for educational leaders and planners. A critical design element of dual credit and dual enrolment programs is an effective high school and college collaboration with a partnership to provide increased access, flexibility, funding, and student support. The results here emphasize a particular focus about how dual credit and early college programs can support more diverse student populations, especially students of color and those with financial challenges to pay for the cost of college courses. The community college programs that served as the subject of this evaluation was the result of 20 years of intensive collaboration with the regional high schools, including the three that were part of this research.

Early college is a challenging model to implement, it poses different sets of planning issues, even for districts and high schools that have long-term dual credit options and partnerships. The positive outcomes of early college students suggest that the implementation challenges pay off with the expanded access to college success by more underrepresented populations.

The physical location on a college campus along with a supportive policy framework that involves the state, the local board of education, and the community college system are two significant issues. Funding is perhaps the most significant issue for the early college design. Studies from Jobs for the Future (2019), Webb (2004), Zeiser (2019) and the Washington Institute for Public Policy (2019) estimate that early colleges cost more to operate, ranging from $1,000 to $4,000 more per student.

But the return on investment was approximately $15 for every dollar invested. The burden of tuition cost on students and families is also much greater in an early college since students are enrolled as full-time degree seeking students. While the USDOE discontinued the "Pell Sites" project that enabled high school students to access Pell (Bettinger, et al, 2022), they are currently exploring options for an "Early Pell" for high school students. Such a program would be structured using similar parameters to the "Second Chance Pell" program that is currently on the books. The results here indicate such a policy approach is a worthy investment to consider and would be a potential game changer for districts and community colleges planning an early college model.

Overall, these results are indicating a positive step and are consistent with other research evaluating the dynamic impact of early colleges, especially in serving low-income students. However, more research is needed to warrant sweeping conclusions about early college as a model for high school students accessing Pell funding. These results also carry implications about how early college contributes to the academic momentum and the importance of the intensity or dosage of dual credit courses on student outcomes, specifically high school students in the Pell experiment. More research is also needed connecting the dual credit and early college research with the postsecondary research on academic momentum.

## CONCLUSION

The findings of this study provide strong evidence for the positive impact of early colleges on students. Early college students had a greater opportunity than their peers to enrol in and graduate from college. They also appeared to be on a different academic trajectory, with early college students earning college degrees at higher rates than other students in the comparison. In addition, the results here from the Pell students offer evidence that early colleges can play a role in mitigating the traditional educational attainment gaps between advantaged and disadvantaged students.

Dual credit and early college programs are one of the most significant educational trends over the past few decades. This research provides a framework from the outcomes of a successful program as an avenue for education planners and policymakers to begin to evaluate the overall role that dual credit and early college should play in the scope of P-16 educational reform. Early college and dual credit programs have facilitated the transition between secondary and postsecondary education and offered greater productivity of P-16 learning.

## REFERENCES


Adams, T. R., Robinson, D. E., & Lewis, C. W. (2020). Developing scholar identities: A case study of black males in an early college high school. *Journal of African American Males in Education, 11*(1), 6-22.

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment.* U.S. Department of Education. https://www2.ed.gov/pubs/Toolbox/toolbox.html

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* U.S. Department of Education. https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/index.html

Allen, D., & Dadgar, M. (2012). Does dual enrollment increase students' success in college? Evidence from a quasi-experimental analysis of dual enrollment in New York City. *New Directions for Higher Education, 2012*(158), 11–19. https://doi.org/10.1002/he.20010

Allen, T. O., Thompson, M. L., & Martinez-Cosio, M. (2019). Message, hope, and reality: How do Latinx students access dual credit and leverage their experiences in engineering programs? *The High School Journal, 103*(1), 38-52.

Atchison, D., Zeiser, K. L., Mohammed, S., Levin, J., & Knight, D. (2019). *The costs and benefits of early college high schools.* American Institutes for Research. https://www.echs-nm.com/wp-content/uploads/2020/04/Costs-Benefits-Early-College-High-Schools-508-report-Dec-2019.pdf

Attewell, P., Heil, S., & Reisel, L. (2012). What is academic momentum? And does it matter? *Educational Evaluation and Policy Analysis*, *34*(1), 27–44. https://doi.org/10.3102/0162373711421958

Attewell, P., & Monaghan, D. (2016). How many credits should an undergraduate take? *Research in Higher Education, 57*(6), 682–713.

https://doi.org/10.1007/s11162-015-9401-z

Barnett, E. (2018). *Differentiated dual enrollment and other collegiate experiences: Lessons from the STEM Early College Expansion Partnership.* Columbia University, Teachers College, National Center for Restructuring Education, Schools, & Teaching. https://www.tc.columbia.edu/ncrest/publications--resources/Differential-Dual-Enrollment-030518.pdf

Barnett, E., Maclutsky, E., & Wagonlander, C. (2015). Emerging early college models for traditionally underserved students. *New Directions for Community Colleges, 2015*(169), 39–49. https://doi.org/10.1002/cc.20131

Bartlett, W. C. (2008). *Dual credit /concurrent enrollment initiatives: A study of influences on students' postsecondary decisions* (Publication No. 304534410) [Doctoral dissertation, The University of North Carolina at Greensboro]. ProQuest Dissertations & Theses Global.

Bettinger, E. P., Lu, A., Matheny, K.T., & Kienzl, G. S. (2022). Unmet need: Evaluating Pell as a lever for equitable dual enrolment outcomes. *Education Evaluation and Policy Analysis*, DOI:10.3102/01623737221091574

Battle, K. A. (2020). *The experiences of dual enrollment students on completion of the baccalaureate degrees in North Carolina* [Unpublished doctoral dissertation]. North Carolina State University.

Berger, A. R., Adelman, N., Cole, S. (2010) The Early College High School Initiative: An overview of five evaluation years. *Peabody Journal of Education, 85*(3), 333-347.

Birkeland, A. (2019). *Dual-credit access, participation and outcomes in Washington state* [Unpublished doctoral dissertation]. University of Washington. https://www.proquest.com/docview/2281198822

Bragg, D. D., Kim, E., & Barnett, E. A. (2006). Creating access and success: Academic pathways reaching underserved students. *New Directions for Community Colleges, 2006*(135), 5-19.

Brake, N. (2003). *Predictors of student success in dual credit programs* [Unpublished doctoral dissertation]. University of Louisville.

Britton, T., Chelliah, B., Symns, M., & Campbell, V. (2019). *College now…or later: Measuring the effects of dual enrollment on postsecondary access and success* (19-118). Annenberg Institute at Brown University.

Bush, B.V. (2017). Building as we go: Secondary schools, community colleges, and universities in partnership: The early college high school initiative. *Community College Journal of Research and Practice, 41*(10), 623–638. https://doi.org/10.1080/10668926.2016.1214089.

Calcagno, J. C., Crosta, P., Bailey, T., & Jenkins, D. (2007). Stepping stones to a degree: The impact of enrollment pathways and milestones on community college student outcomes. *Research in Higher Education, 48*(7), 775–801. https://doi.org/10.1007/s11162-007-9053-8.

Carnevale, A., Strohl, J., Ridley, N., & Gulish, A. (2018). *Three educational pathways to good jobs: High school, middle skill, and the bachelor's degree.* Georgetown University Center for Education and the Workforce. https://cewgeorgetown.wpenginepowered.com/wp-content/uploads/3ways-FR.pdf.

Cellini, S. R. (2006). Smoothing the transition to college? The effect of Tech-Prep programs on educational attainment. *Economics of Education Review, 25*, 394-411.

Dash, K. (2017). *An evaluation of the impact of dual credit and dual enrollment on college-going in Nebraska.* Nebraska Department of Education. https://cdn.education.ne.gov/wp-content/uploads/2017/07/Dual_Enrollment_and-Credit_Study.pdf.

DeHay, D. G. (2019). *Does location matter? Evaluating the influence of dual enrollment program location on noncognitive measures of college readiness and academic performance: A multiyear study* [Unpublished doctoral dissertation]. Clemson University.

Edmunds, J. A., Arshavsky, N., Lewis, K., Thrift, B., Unlu, F. & Furey, J. (2017). Preparing students for college: Lessons learned from the Early College. *NASSP Bulletin, 101* (2), 117-141.

Edmunds, J., Unlu, F., Furey, J., Glennie, E., & Arshavsky, N. (2020). What happens when you combine high school and college? The impact of the early college model on postsecondary performance and completion. *Educational Evaluation and Policy Analysis, 42*(2), 257–278. https://doi.org/10.3102/0162373720912249.

Education Commission of the States. (2019). *50-state comparison: Dual/concurrent enrollment policies.* Education Commission of the States. https://www.ecs.org/dual-concurrent-enrollment-policies/.

Fink, J., Jenkins, D., & Yanagiura, T. (2017). *What happens to students who take community college "dual enrollment" courses in high school?* Community College Research Center, Columbia University.

Grubb, J. M. (2015). *Dual enrollment and community college outcomes for first-time, full-time freshmen: A quasi-experimental study* [Unpublished doctoral dissertation]. East Tennessee State University.

Grubb, J. M., Scott, P. H., & Good, D. W. (2017). The answer is yes: Dual enrollment benefits students at the community college. *Community College Review, 45*(2), 79–98. https://doi.org/10.1177/0091552116682590.

Harlow, K. J. (2018). *Evaluation of college credit plus: Dual enrollment in Ohio* [Unpublished doctoral dissertation]. Ohio State University.

Hart, L. K. (2019). *Three-quarters college student: A multiple case study of dual credit at a high school site and on a college campus* [Unpublished doctoral dissertation]. Kent State University.

Hoffman, N., & Vargas, J. (2010). *A policymaker's guide to early college designs: Expanding a strategy for achieving college readiness for all.* Jobs for the Future. https://files.eric.ed.gov/fulltext/ED520109.pdf.

Howley, A., Howley, M.D., Howley, C.B., & Duncan, T. (2013). Early college and dual enrollment challenges: Inroads and impediments to access. *Journal of Advanced Academics, 24*(2), 77-107. https://doi.10.1177/1932202X13476289.

Indiana Commission for Higher Education. (2021). *Indiana early college credit report.* https://www.in.gov/che/files/2021_Early_College_Credit_Report_01_28_2021.pdf.

Inghram, C. S. (2018). *Student attributes related to dual enrollment baccalaureate degree outcomes in a rural state* [Unpublished doctoral dissertation] Marshall University.

Jenkins, D., & Fink, J. (2020, April 30). How will COVID-19 affect community college enrollment? Looking to the Great Recession for clues. *CCRC Mixed Methods Blog*. https://ccrc.tc.columbia.edu/easyblog/covid-community-college-enrollment.html.

Jett, N. & Rinn, A. N. (2020). Student experiences and outcomes of early college: A systematic review. *Roeper Review*, *42*(2), 80 https://doi.org/10.1080/02783193.2020.1728801.

Jobs for the Future. (2019). *Achieving equity in College in High School Programs: Practitioner-informed policy design commitments and principles.* Jobs for the Future. https://files.eric.ed.gov/fulltext/ED603696.pdf.

Kanny, M. A. (2015). Dual enrollment participation from the student perspective. *New Directions for Community Colleges, 2015*(169), 59–70. https://doi.org/10.1002/cc.20133.

Karp, M. M., Calcagno, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states.* Community College Research Center, Columbia University. https://files.eric.ed.gov/fulltext/ED498661.pdf.

Kentucky Council on Postsecondary Education. (2020). *Dual credit & student success: The effect of high school dual credit on educational outcomes at Kentucky public universities.* Kentucky Council on Postsecondary Education. https://files.eric.ed.gov/fulltext/ED608256.pdf.

Kisker, C. B. (2006). Integrating high school and the community college: Previous efforts and current possibilities. *Community College Review*, *34*(1), 68–86.

Lewis, T. L. (2009). Student reflections: The impact of dual enrollment on transitions to a state university. [Unpublished doctoral dissertation]. University of South Florida.

Lieberman, J. (Ed.) (2006). Collaborating with high schools. *New Directions for Community Colleges*. San Francisco: Jossey-Bass.

Liu, V. Y. T., Minaya, V., Zhang, Q., & Xu, D. (2020). High school dual enrollment in Florida: Effects on college outcomes by race/ethnicity and course modality. Community College Research Center, Columbia University. https://ccrc.tc.columbia.edu/media/k2/attachments/dual-enrollment-florida-race-ethnicity-course-modality.pdf.

Loftin, T. A. (2012). *Concurrent and dual credit: The bridge to postsecondary education for first-generation college students* [Unpublished doctoral dissertation]. University of Arkansas.

Marken, S., Gray, L., & Lewis, L. (2013). *Dual enrollment programs and courses for high school students at postsecondary institutions: 2010–11* (NCES 2013–002). U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/pubs2013/2013002.pdf.

Miller, T., Kosiewicz, H., Tanenbaum, C., Atchison, D., Knight, D., Ratway, B., Delhommer, S., & Levin, J. (2018). *Dual-credit education programs in Texas: Phase II*. American Institutes for Research. https://www.air.org/project/dual-credit-education-programs-texas.

National Association of Concurrent Enrollment Partnerships (2022). *What is concurrent enrollment.* https://www.nacep.org/about-nacep/what-is-concurrent-enrollment/.

Ndiaye, M. & Wolfe, R. E. (2016). Early college can boost college success rates for low-income, first-generation students: giving students a taste of college early can encourage them to persist in high school and through higher education. *Phi Delta Kappan*, *97*(5), 32–32.

Orr, M. T., Hughes, K. L., & Karp, M. M. (2002). *Career academies: Designing improved education for students, teachers' work and employer participation.* Institute on Education and the Economy, Teachers College, Columbia University.

Perry, L. M. (2013). A case study market analysis of acceleration mechanisms in Florida: Dual enrollment positioning (Publication No. 1698505490) [Doctoral dissertation, Nova Southeastern University]. ProQuest Dissertations & Theses Global.

Powell, A. (2003). American high schools and the liberal arts tradition. *Brookings Papers on Education Policy*, *2003*(1), 7–53. https://doi.org/10.1353/pep.2003.0018.

Reichardt, R., & Christeson, R. (2020). *Colorado concurrent enrollment return on investment and cost model.* Grantee Submission. https://eric.ed.gov/?id=ED608037.

Rosen, R., Byndloss, D. C., Parise, L., Alterman, E. & Dixon, M. (2020). *Bridging the school-to-work divide: Interim implementation and impact findings from New York City's P-TECH 9-14 Schools.* New York: MDRC. https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED605308.

Rowett, C. (2012). *Exploring college readiness: The role of dual credit and SES on college persistence and student success* [Unpublished doctoral dissertation]. University of Texas at Arlington.

Speroni, C. (2011). *Determinants of students' success: The role of Advanced Placement and dual enrollment programs.* National Center for Postsecondary Research, Teachers College, Columbia University. https://ccrc.tc.columbia.edu/publications/role-advanced-placement-dual-enrollment.html.

Struhl, B. (2013). *Rewarding dual enrollment in performance-based funding formulas: How states can create incentives for college to high school partnerships.* Jobs For the Future. https://files.eric.ed.gov/fulltext/ED561309.pdf.

Struhl, B., & Vargas, J. (2012). *Taking college courses in high school: A strategy for college readiness: The college outcomes of dual enrollment in Texas.* Jobs for the Future. http://www.jff.org/publications/taking-college-courses-high-school-strategy-college-readiness.

Taie, S., & Lewis, L. (2020). *Dual or concurrent enrollment in public schools in the United States* (NCES 2020-125, Data Point). U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/pubs2020/2020125.pdf.

Taylor, J. L. (2015). Accelerating pathways to college: The (in)equitable effects of community college dual credit. *Community College Review, 43*(4), 355–379. https://doi.org/10.1177/0091552115594880.

Taylor, J. L., Allen, T. O., An, B. P., Denecker, C., Edmunds, J. A., Fink, J., Giani, M. S., Hodara, M., Hu, X., Tobolowsky, B. F., & Chen, W. (2022). *Research priorities for advancing equitable dual enrollment policy and practice.* University of Utah.

Taylor, J. L., & Yan, R. (2018). Exploring the outcomes of standards-based concurrent enrollment and advanced placement in Arkansas. *Educational Policy Analysis Archives, 26*(123), 1–22. https://doi.org/10.14507/epaa.26.3647.

Warner, M., Caspary, K., Arshan, N., Stites, R., Padilla, C., Patel, D., McCracken, M., Harless, E., Park, C., Fahimuddin, L., & Adelman, N. (2016). *Taking stock of the California Linked Learning District Initiative. Seventh-year evaluation report.* Menlo Park, CA: SRI International.

Washington State Institute for Public Policy (2019). *Early college high school (for high school students).* http://www.wsipp.wa.gov/BenefitCost/Program/789.

Webb, M. (2004). *The Early College High School Initiative: What is the cost of planning and implementing early college high school?* https://files.eric.ed.gov/fulltext/ED497817.pdf.

Wechsler, H. S. (2001). *Access to success in the urban high school: The middle college movement*. New York: Teacher's College Press.

Welsh, J. F., Brake, N., & Choi, N. (2005). Student participation and performance in dual-credit courses in a reform environment. *Community College Journal of Research and Practice, 29*(3), 199–213. https://doi.org/10.1080/10668920590901158.

Williams, A., & Perry, A. (2020). *Prioritizing equity in dual enrollment.* Education Commission of the States. https://www.ecs.org/prioritizing-equity-in-dual-enrollment/.

Zeiser, K. (2019). *The cost and benefits of early college high school programs*. American Institutes of Research. https://www.air.org/resource/costs-and-benefits-early-college-high-schools-0.

Zinth, J. D. (2014). *Increasing Student Access and Success in Dual Enrollment Programs: 13 Model State-Level Policy Components.* Education Commission of the States. https://files.eric.ed.gov/fulltext/ED561913.pdf.

Table 1. STUDENT DEMOGRAPHICS

| Demographic Groups | n | % |
|---|---|---|
| Early College | | |
| Non-White | 27 | 12% |
| White | 201 | 88% |
| Female | 156 | 68% |
| Male | 70 | 32% |
| Dual Credit | | |
| Non-white | 155 | 11% |
| White | 1,271 | 89% |
| Female | 767 | 54% |
| Male | 652 | 46% |
| Postsecondary Enrollment | | |
| Non-white | 108 | 21% |
| White | 416 | 79% |
| Female | 255 | 49% |
| Male | 263 | 51% |
| Total Sample | | |
| Non-white | 290 | 13% |
| White | 1,888 | 87% |
| Female | 1,178 | 54% |
| Male | 985 | 45% |
| Early College- Pell | | |
| Non-white- Pell | 20 | 19% |
| White- Pell | 87 | 81% |
| Female- Pell | 83 | 78% |
| Male- Pell | 24 | 22% |
| Dual Credit- Pell | | |
| Non-white- Pell | 81 | 16% |
| White- Pell | 414 | 84% |
| Female- Pell | 294 | 60% |
| Male- Pell | 199 | 40% |
| Postsecondary Enrollment-Pell | | |
| Non-white- Pell | 127 | 28% |
| White- Pell | 329 | 72% |
| Female- Pell | 248 | 54% |
| Male- Pell | 200 | 45% |
| Total Sample- Pell | | |
| Non-white- Pell | 228 | 22% |
| White- Pell | 830 | 78% |
| Female- Pell | 625 | 59% |
| Male- Pell | 423 | 41% |

Table 2. DESCRIPTIVE STATISTICS FROM STUDY VARIABLES

| Variable | n | M | SD |
|---|---|---|---|
| | All Students | | |
| College GPA | | | |
| Early College | 226 | 3.33* | 0.65 |
| Dual Credit | 1,382 | 3.07* | 0.75 |
| Postsecondary Enrollment | 506 | 2.72 | 0.84 |
| Cumulative College Credits | | | |
| Early College | 226 | 63.4* | 15.6 |
| Dual Credit | 1,382 | 43.8 | 26.1 |
| Postsecondary Enrollment | 506 | 48.5* | 23.5 |
| Bachelor's Degree Completion (%) | | | |
| Early College | 95 | 35.8%* | |
| Dual Credit | 1,255 | 15.5%* | |
| Postsecondary Enrollment | 667 | 7.2% | |
| | High School Pell Students | | |
| College GPA | | | |
| Early College- Pell | 106 | 3.1* | 0.71 |
| Dual Credit- Pell | 481 | 2.8 | 0.74 |
| Postsecondary Enrollment- Pell | 456 | 2.6 | 0.79 |
| Cumulative College Credits | | | |
| Early College- Pell | 106 | 58.3 | 15.4 |
| Dual Credit- Pell | 481 | 52.2* | 25.7 |
| Postsecondary Enrollment- Pell | 456 | 45.4 | 23.5 |
| Bachelor's Degree Completion (%) | | | |
| Early College- Pell | 44 | 31.8%* | |
| Dual Credit- Pell | 403 | 9.7%* | |
| Postsecondary Enrollment- Pell | 283 | 6.4% | |

*$p < .05$

Table 3. UNIVARIATE ANALYSIS OF COVARIANCE CUMULATIVE COLLEGE GPA

| Variable | Sum of Squares | df | F | Sig. |
|---|---|---|---|---|
| GPA-All Students | | | | |
| Enrollment Status | 3.9 | 2 | 3.67 | .026 |
| ACT Score | 27.2 | 1 | 50.3 | <.001 |
| Status*ACT Interaction | 5.6 | 2 | 5.5 | .004 |
| GPA- Pell Students | | | | |
| Enrollment Status | 8.19 | 2 | 3.79 | .025 |
| ACT Score | 21.2 | 1 | 19.3 | <.001 |
| Status*ACT Interaction | 2.88 | 2 | 1.31 | .271 |
| Credits-All Students | | | | |
| Enrollment Status | 4709.3 | 2 | 3.93 | .004 |
| ACT Score | 4232.3 | 1 | 7.06 | .008 |
| Status*ACT Interaction | 9505.9 | 2 | 7.92 | <.001 |
| Credits- Pell Students | | | | |
| Enrollment Status | 735.4 | 2 | .65 | .525 |
| ACT Score | 2309.8 | 1 | 4.06 | .044 |
| Status*ACT Interaction | 1268.1 | 2 | 1.11 | .329 |

Table 4. LOGISTIC REGRESSION FOR BACHELOR'S DEGREE COMPLETION

| Variable | B | SE | Weld | Sig | Exp(B) |
|---|---|---|---|---|---|
| Step 1 | | | | | |
| Enrollment Status | | | 5.93 | .051 | |
| Enrollment Status (EC) | .925 | .40 | 5.33 | .021 | 2.5 |
| Enrollment Status (DC) | .349 | .21 | 2.68 | .102 | 1.4 |
| ACT Score | .127 | .03 | 24.26 | <.001 | 1.4 |
| College GPA | 1.56 | .19 | 71.01 | <.001 | 4.7 |
| Cumulative Credits | -.009 | .004 | 4.11 | .043 | .99 |
| Race (white, non-white) | -.610 | .342 | 3.12 | .074 | .54 |
| Pell Status | -.527 | .189 | 9.21 | .002 | .57 |