Deeper Learning and College Enrollment
What Happens After High School?

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Success today isn't just about what you know—you must also quickly understand and apply new knowledge. This is key to 21st century learning. Experts have defined "deeper learning" as mastery of core content knowledge and of the skills that help students communicate their ideas effectively, think creatively, work collaboratively, and manage their own learning. These skills are essential for success in college, career, and civic life.

The *Study of Deeper Learning: Opportunities and Outcomes*, funded by the William and Flora Hewlett Foundation, assessed whether students who attended high schools that focused on deeper learning got more opportunities for deeper learning and whether they had better outcomes than students in comparison high schools. In an updated set of analyses from the study, American Institutes for Research (AIR) found that students who attended high schools focused on deeper learning were more likely to enroll in four-year institutions and in college in general than their peers who attended comparison schools.

Background

What do today's students really need to learn to succeed not only in the classroom, but also later in college, careers, and society? At a time when new standards for college and career readiness pivot to a new focus on complex thinking tasks and 21st Century learning, the answer to this question has become critically important.

The *Study of Deeper Learning: Opportunities and Outcomes*, funded by the William and Flora Hewlett Foundation, aimed to determine whether students who attended high schools focused on deeper learning ("network schools")[1] experienced greater deeper learning opportunities and outcomes than students in comparison high schools. Findings from this study were released in three reports. The first report described the approaches to deeper learning taken by the network schools, such as project-based learning, internship opportunities, collaborative group work, and longer term assessments (e.g., portfolios and exhibitions) (Huberman, Bitter, Anthony, & O'Day, 2014). The second report focused on students' deeper learning opportunities, and confirmed that students who attended network schools had more opportunities to engage in deeper-learning-oriented curricula than their peers in comparison schools (Bitter, Taylor, Zeiser, & Rickles, 2014). The third report examined student outcomes and found that, relative to students attending comparison high schools, students who attended network high schools demonstrated higher levels of collaboration skills and intrapersonal skills (including academic engagement, motivation to learn, and self-efficacy), scored higher on state exams and the OECD PISA-Based Test for Schools, and were more likely to enroll in four-year and selective colleges (Zeiser, Taylor, Rickles, Garet, & Segeritz, 2014).

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[1] In The *Study of Deeper Learning: Opportunities and Outcomes*, researchers worked with 10 networks that participated in the William and Flora Hewlett Foundation's Deeper Learning Community of Practice to identify schools that they believed focused on deeper learning and implemented the networks' approaches to deeper learning at least moderately well. It is for this reason that schools that focus on deeper learning referred to as "network schools." These 10 networks are: Asia Society, Big Picture Learning, ConnectEd/Linked Learning, EdVisions Schools, Envision Schools, Expeditionary Learning (now EL Education), High Tech High, Internationals Network for Public Schools, New Tech Network, and New Visions for Public Schools.

Since these reports were published, we have continued to collect information about the students' outcomes. Using updated data collected through the summer of 2014, we found that students who attended network high schools continued to graduate at higher rates than students in comparison schools (Zeiser, Mills, Wulach, & Garet, 2016). In the analyses presented in this brief, we further examine the effect of attending a deeper learning network high school on students' college enrollment based on updated postsecondary data. Specifically, these analyses address the following questions:

1. Are students who attended a high school that focuses on deeper learning more likely to go to college?

2. Do the effects of attending a network high school on students' postsecondary enrollment differ across network schools or for student subgroups?

3. Among students who enroll in college, are students who attended network high schools more likely than students who attended non-network schools to enroll in college immediately after high school and more likely to stay in college?

Sample

The updated college enrollment analyses focus on a set of 13 network high schools in California and New York City, including two network schools not included in the original study. Each school is affiliated with one of nine established school networks that promote instructional practices believed to develop deeper learning competencies and that participated in the Hewlett Foundation's Deeper Learning Community of Practice.[2]

To examine whether attending a network high school affects postsecondary outcomes, we selected a matched comparison school (we refer to these as "non-network" schools) for each network school. The two schools in each matched pair were located in the same geographic area and had similar incoming student populations (based on student demographics and prior achievement). Students who entered a network school or non-network school in Grade 9 between 2007–08 and 2010–11 (and were expected to graduate from high school in the spring of 2011 to the spring of 2014) were included in the analyses. (Please refer to the technical appendix for more details about sample selection.) Overall, our analyses included 4,271 network high school students and 15,786 non-network high school students.

Data and Measures

We drew postsecondary data from the National Student Clearinghouse (NSC)[3] through the fall of 2014 (the original report used data through the fall of 2013) to determine the rate at which students who entered Grade 9 in sampled schools subsequently enrolled in postsecondary institutions.[4] We also collected students' demographic and eighth-grade achievement data from participating school districts so that we could account for differences in background characteristics between students in network high schools and students in matched non-network high schools in our statistical analyses.

We looked at the following postsecondary outcomes for the first two research questions: enrolling in any postsecondary institution, enrolling in a two-year institution, enrolling in a four-year institution, and enrolling

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[2] Postsecondary outcomes for schools associated with Envision Schools were not included in the analyses because postsecondary data were not available for their matched comparison schools.

[3] Founded in 1993, NSC is a leading provider of educational reporting and data exchange. Over 3,600 colleges and universities currently participate in NSC, accounting for more than 98 percent of all students in public and private U.S. higher education institutions.

[4] Our postsecondary enrollment records cover enrollment for up to three and a half years for the oldest cohort of students and the first semester after expected high school graduation for the youngest cohort of students in our study. Indicators of student cohort are included in all statistical models.

in a selective four-year institution (see box for our definition of "selective four-year institution").

To address the third research question, we looked at enrollment immediately after expected high school graduation; retention; and consecutive enrollment in two, three, and four academic terms (excluding summers) among students who enrolled in college for at least one academic term by fall 2014 (see box, "Definitions of Enrollment Trend Measures").

Analysis Methods

To estimate the effects of attending a network high school on college enrollment, we conducted separate analyses for each network high school and its paired non-network high school. For each pair, we estimated the differences in outcomes between students who attended the network school and those who attended the non-network school, adjusting for differences in their background characteristics. The analyses also included propensity score weights to account for systematic differences between students who attended network schools and students who attended non-network schools in Grade 9. We then averaged the effects across the school pairs to obtain an overall estimate of the effect of attending a network high school on postsecondary enrollment. To examine whether the effects differ for different student subgroups, we estimated a model similar to the model described above, with the addition of an interaction term between network school attendance and the subgroup indicator. The coefficient for the interaction term was then averaged across school pairs to obtain the overall estimate (see the technical appendix for more details on the analytic methods).

To examine enrollment trends for students who attended college, a school-level weighted mean score (using propensity score weights) was first calculated for each enrollment measure.[6] Then, school-level mean scores were averaged (after weighting based on the sum of weights within a school) across schools to obtain an overall weighted mean for network schools and a weighted mean for non-network schools. The difference between the two weighted means was tested with a two-sample z test for proportions (see technical appendix).

DEFINITIONS OF ENROLLMENT TREND MEASURES

Immediate Enrollment Rate: Percentage of students who enrolled in college in the first fall following their expected high school graduation, among those who ever enrolled in college.

Retention Rate: Percentage of students who were enrolled in college during the second fall following their expected high school graduation, among those who enrolled in the first fall following their expected high school graduation.

Consecutive Enrollment: Percentage of students who enrolled in college in at least two, three, or four consecutive academic terms[5] (excluding summers), among those who ever enrolled in college.

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[5] A student was treated as "enrolled in the fall" if records indicated that the student was enrolled at any time from August to December. A student was treated as "enrolled in the spring" if records indicated that the student was enrolled at any time from January to April.

[6] Analyses of enrollment trends are descriptive, and do not estimate the causal impact of attending a deeper learning network high school because these analyses were restricted to subsamples of students who enrolled in college.

The results in this brief represent findings for the particular group of network schools included in the study. These network schools were purposively selected because they were thought of as at least "moderate implementers" of the network's model (according to network representatives) and to meet other criteria,[7] and so the results cannot be generalized to all schools within the participating networks. The enrollment rates presented in this brief were estimated after accounting for differences in measured student background characteristics.

Findings

Are Students Who Attended a High School That Focuses on Deeper Learning More Likely to Go to College?

Students who attended network high schools were significantly more likely to enroll in college than were students in non-network high schools. As shown in Exhibit 1, approximately 53 percent of students who attended network high schools enrolled in college by the end of 2014, as compared with 50 percent of students who attended non-network high schools. Thus, attending a network high school increased the postsecondary enrollment rate by approximately 3 percentage points. As a point of comparison, experimental studies of college access programs indicate that these programs increase enrollment by 4 percentage points on average (Harvill et al., 2012).

Students who attended network high schools were significantly more likely to enroll in four-year institutions and selective four-year institutions than were students who attended non-network high schools. Among students who attended network high schools, 22 percent enrolled in four-year institutions, as compared with 18 percent of students who attended non-network high schools, and 9 percent enrolled in selective four-year institutions, as compared with 7 percent of non-network school students. There was no significant effect of attending a network high school on enrollment in two-year institutions, which occurred at a rate of 35 percent for both groups of students. These findings are consistent with results from the original study.

Exhibit 1: Enrollment in Postsecondary Institutions, Overall and by Institution Type
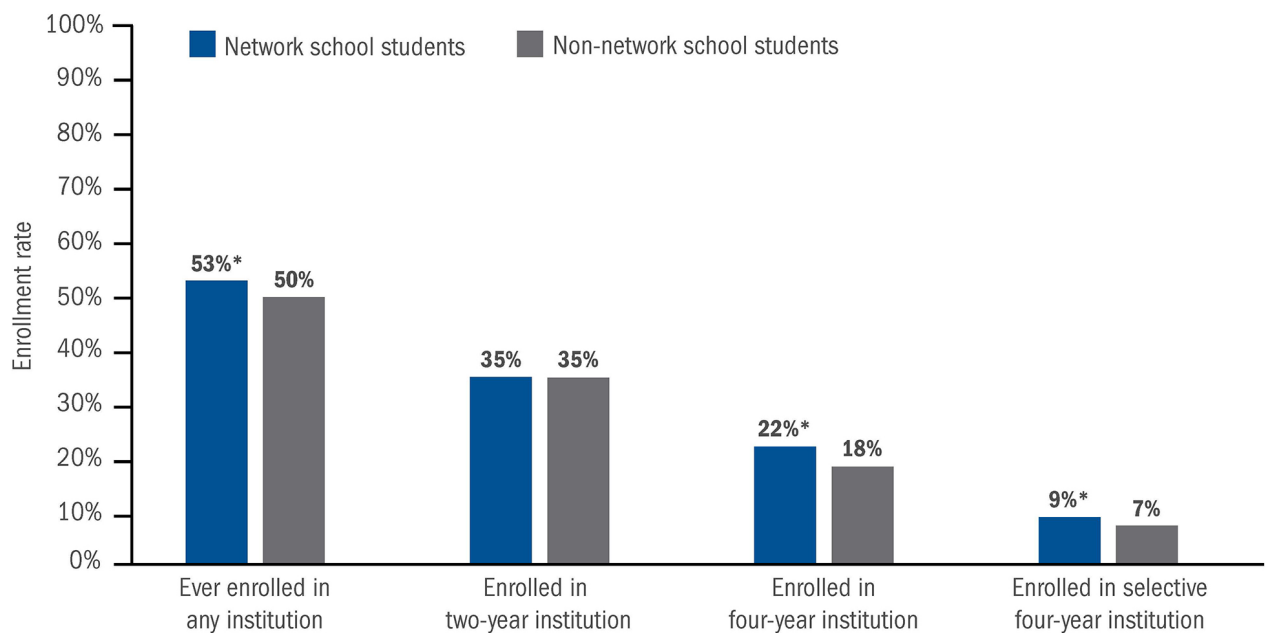
*Difference between network and non-network school students is significant at the .05 level.

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[7] The network schools in the study were required to be non-magnet schools that were associated with the network before the 2007–08 school year, and to have at least an average of 200 students with at least 25 percent eligible for free or reduced-price lunch between the 2007–08 and 2009–10 school years.

Do the Effects of Attending a Network High School on Students' Postsecondary Enrollment Differ Across Network Schools or Student Subgroups?

The estimated effects of attending a network high school on postsecondary enrollment differed across the pairs of network and non-network high schools. For example, the estimated effects on ever enrolling in college were positive for 9 of the 13 pairs of schools (with statistical significance for two pairs) and negative (but non-significant) for the remaining four pairs (see the technical appendix for results by pair).

The effects of attending a network high school on postsecondary enrollment were stronger for students who entered high school with lower achievement than for those who entered with higher achievement.[8,9] In particular, the effect of attending a network high school on overall college enrollment, as well as the effect on enrollment in four-year institutions, was positive and significant for students who entered high school with below-average achievement test scores. In contrast, effects on these outcomes were not significant for students who entered high school with above-average achievement test scores (see Exhibit 2).

Exhibit 2: Enrollment in Postsecondary Institutions, by Level of Grade 8 Achievement
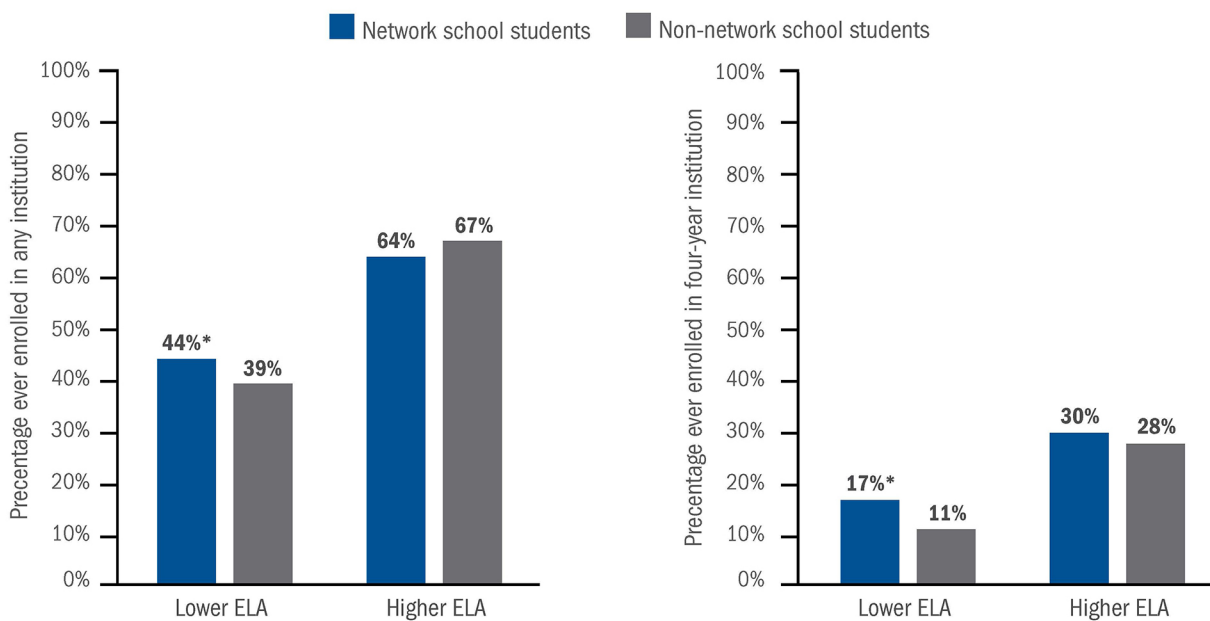
*Difference between network and non-network school students is significant at the .05 level.

Among Students Who Enroll in College, Are Students who Attended Network High Schools More Likely to Enroll in College Immediately After High School and More Likely to Stay in College Than Students who Attended Non-network High Schools?

The findings presented above focus on the effects of network school attendance on college enrollment at any time between expected high school graduation and fall 2014. Also of interest are whether network school students were more likely to enroll in college immediately after expected high school graduation and whether they were more likely to persist in college than non-network school students. We address these questions

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[8] The interaction effects on enrollment in two-year institutions and selective four-year institutions were not significant. The effects of attending a network high school on postsecondary enrollment outcomes were similar for male and female students as well as for students who qualified for free or reduced-price lunch and students who did not.

[9] For this set of analyses, students were classified as having "higher achievement" on their Grade 8 English language arts (ELA) test scores if their scores were above the state mean, and as having "lower achievement" if their test scores were below the state mean.

here by examining enrollment trends among students who ever enrolled in college. Enrollment trends in Exhibit 3 are limited to students who entered Grade 9 in 2007–08 and 2008–09 because these are the only cohorts of students for whom multiple years of postsecondary data were available by fall 2014.

Among students who ever enrolled in college, students who attended network high schools were significantly more likely to enroll in college during the fall immediately after expected high school graduation, but rates of retention and consecutive enrollment were similar for students who attended network schools and non-network schools (see Exhibit 3). Among students who ever enrolled in college, 69 percent of network school students and 65 percent of non-network school students enrolled in the fall immediately following their expected high school graduation. About 80 percent of network and non-network school students who ever enrolled in college were enrolled for at least two consecutive terms, 62 percent were enrolled for at least three consecutive terms, and about half were enrolled for at least four consecutive terms.[10] Among students who enrolled in college during the fall immediately following expected high school graduation, about three-quarters of students who attended both network high schools and non-network high schools were still enrolled in the subsequent fall.[11]

Exhibit 3: Descriptive Statistics for Postsecondary Enrollment Trend Measures
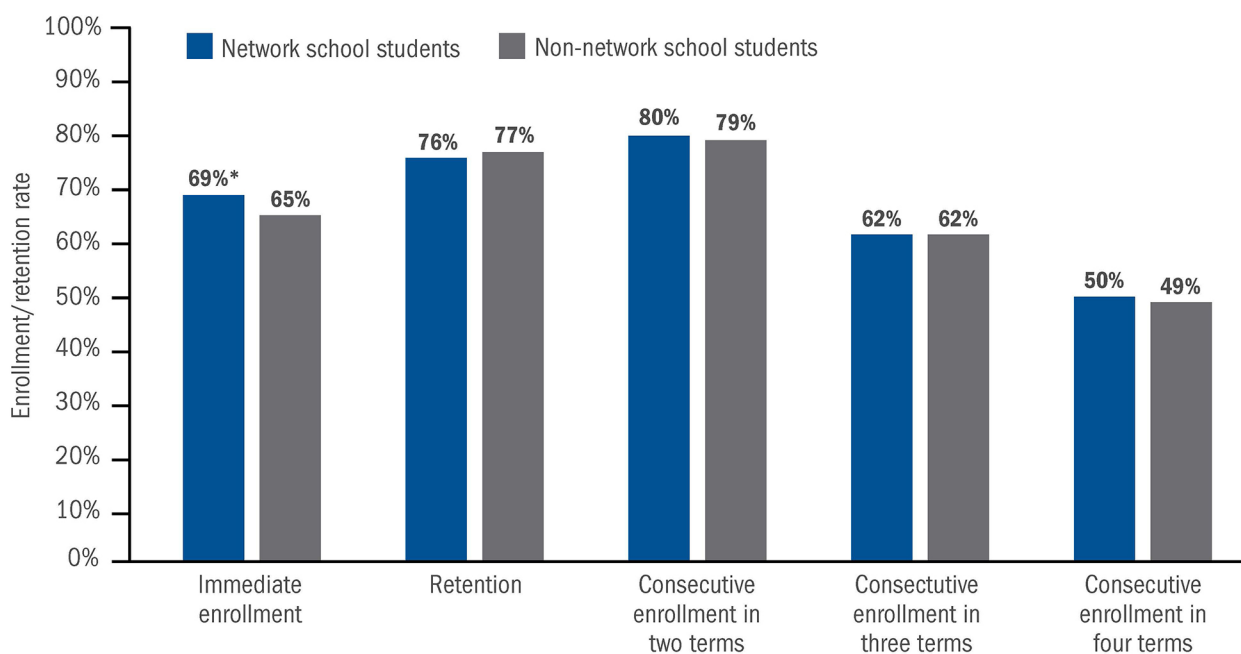
*Difference between network and non-network school students is significant at the .05 level.

[10] Since students who attended network high schools had a higher enrollment rate in four-year institutions than non-network school students, we also checked whether network school students who enrolled in four-year colleges might have been less well prepared academically. If this were the case, we might expect to observe that network school students who enrolled in four-year institutions had lower rates of enrollment in consecutive academic terms than non-network school students who enrolled in four-year institutions. Results from these supplemental analyses revealed that rates of consecutive enrollment were similar for the two types of students.

[11] In the original study, "persistence" was measured for all students, and indicated whether a student was enrolled at any point in the first academic year and during the second fall after expected high school graduation. The interpretation of impact findings for this outcome was complicated because we could not distinguish students who left college before the second academic year from students who did not enroll in college after high school graduation. The retention analysis presented in this brief is based on the subsample of students who enrolled in college during the first fall immediately after expected high school graduation, and is thus descriptive in nature.

Conclusion

As we have shown, students who attended deeper learning network high schools were significantly more likely to enroll in college than were students attending matched non-network high schools. Our findings here also support our previously published findings that network school students enrolled in four-year institutions and selective four-year institutions at significantly higher rates than similar non-network school students. Descriptive analyses also reveal that, among students who ever enrolled in college, students who attended network high schools were significantly more likely to enroll in college during the fall immediately following expected high school graduation than students who attended non-network high schools. This may be partially explained by the fact that students who attended network high schools had higher rates of on-time graduation from high school than students who attended non-network high schools (Zeiser et al., 2016).

Further, while the effect of attending a deeper learning network high school on postsecondary enrollment did not differ by gender or eligibility for free or reduced-price lunch, the effect was stronger for students with lower levels of achievement prior to high school entry than for students with higher levels of achievement. One primary goal of the deeper learning initiative is to offer opportunities to, and improve outcomes for, all students— particularly traditionally underserved student populations and struggling students. These results provide some indication that the network schools have made progress toward this goal in terms of postsecondary enrollment. Attending a network high school did not impact rates of college enrollment among students who entered high school with above-average achievement test scores. However, among students who entered high school with below-average achievement test scores, students who attended a network high school were more likely to enroll in college (by 5 percentage points) and more likely to enroll in a four-year institution (by 6 percentage points) than were students who attended non-network high schools.

These findings contribute to a growing body of evidence that students who attend deeper learning network high schools experience more positive academic outcomes than students who attend non-network high schools. More research is needed to better understand how deeper learning affects students' longer term outcomes (such as postsecondary degree completion), and to identify which student experiences in high school and which deeper learning competencies are associated with on-time high school graduation and postsecondary outcomes.

References

Bitter, C., Taylor, J., Zeiser, K. L., & Rickles, J. (2014). *Providing opportunities for deeper learning. Report #2 Findings from the Study of Deeper Learning: Opportunities and Outcomes.* Washington, DC: American Institutes for Research.

Harvill, E. L., Maynard, R. A., Nguyen, H. T., Robertson-Kraft, C., & Tognatta, N. (2012). *Effects of college access programs on college readiness and enrollment: a meta-analysis.* Evanston, IL: Society for Research on Educational Effectiveness.

Huberman, M., Bitter, C., Anthony, J., & O'Day, J. (2014). *The shape of deeper learning: Strategies, structures, and cultures in deeper learning network high schools. Report #1 Findings from the Study of Deeper Learning: Opportunities and outcomes.* Washington, DC: American Institutes for Research.

Zeiser, K. L., Mills, N., Wulach, S., & Garet, M. S. (2016). *Graduation advantage persists for students in deeper learning network high schools. Updated findings from the Study of Deeper Learning: Opportunities and Outcomes.* Washington, DC: American Institutes for Research.

Zeiser, K. L., Taylor, J., Rickles, J., Garet, M. S., & Segeritz, M. (2014). *Evidence of deeper learning outcomes. Report #3 Findings from the Study of Deeper Learning: Opportunities and Outcomes.* Washington, DC: American Institutes for Research.