

# Evidence on Career Academies and Linked Learning

David Stern and Gary Hoachlander

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**Introduction.** Career academies, such as the California Partnership Academies (CPAs), are college-and-career pathways organized within high schools to provide support for small groups of teachers working with about 100 to 300 students over the course of two to four years. Students each year take a core set of academy classes together, and only academy students are scheduled into these classes. The multi-year curriculum combines the courses required for college admission with a sequence of career-technical courses related to the academy theme. Students also engage in the world of adult professional work through a series of experiences including field trips, job shadowing, and internships.

The Linked Learning approach provides systemic support at the district level for career academies and other college-and-career pathways such as self-contained small schools, enabling districts to offer students a variety of different pathways from which to choose. All Linked Learning pathways give students access to the academic courses required for postsecondary education, in addition to a sequence of career-technical courses, work-based learning, and extra support for student achievement. In California, career academies are the most common kind of college-and-career pathway within Linked Learning districts.

This paper summarizes existing evidence on career academies and Linked Learning. Most of this evidence has come from evaluations of career academies, which have been widely replicated since the model originated in 1969 in Philadelphia. These evaluations have found gains for career academy students during high school, on such measures as credits earned, GPA, and college-preparatory courses completed. Career academy students perform just as well as their peers on standardized tests, and a recent study outside of career academies found that embedding academic topics in technical courses can lead to higher test scores. Increased earnings of career academy graduates also provide evidence of significant learning. With regard to postsecondary educational attainment, the only study of career academies that used a random-assignment design found no impact, but relatively large proportions of both the career academy students and the control group completed postsecondary credentials or degrees. The quasi-experimental and correlational evidence generally shows higher postsecondary educational attainment for career academy students.

**Experimental studies.** Experimental studies randomly assign students to treatment and control groups. This procedure is considered the gold standard for evaluation because in large samples it is likely that the two groups will be similar with respect to unobserved characteristics that may affect the outcomes of the program. Such student characteristics may include motivation, self-discipline, time management, ambition, and other qualities that researchers usually cannot measure.

One well-designed and well-implemented experimental study of career academies,

conducted by MDRC (Kemple and Snipes 2000; Kemple 2004, 2008), compared students who were and were not randomly admitted to career academies from a pool of applicants. The academies were located in schools that served mainly low-income minority students. Conducted over 12 years, this evaluation followed 1,700 students who applied for one of nine career academies participating in the study. The study monitored the progress of these students throughout four years of high school and eight years afterwards.

While students were still in high school, the MDRC study found that:

- Career academies improved attendance, increased academic course taking, and increased the likelihood of earning enough credits to graduate on time.
- Among students who were most at risk of dropping out of high school, career academies were effective in keeping students in school through their senior year and helping them acquire the credentials needed to graduate and prepare for postsecondary education.
- Career academies increased both the level of interpersonal support students experienced during high school and their participation in career awareness and work-based learning.
- In sites where the career academies produced dramatic enhancements in the interpersonal support that students received from teachers and peers, there was evidence of reduced dropout rates and improved school engagement for both the high- and medium-risk subgroups (about 75 percent of the students served).

It is likely that the positive impacts produced by well-implemented career academies in the MDRC will continue to occur more generally as a result of the Linked Learning approach. Since the mid-1980s, the career academies funded by the State of California, and the career academies supported around the country by the National Academy Foundation have included the core elements of Linked Learning: students, as a cohort, take core academic courses along with a sequence of technical courses, supplemented by various well-structured work-based learning experiences, and stronger academic and social support resulting from the closer personal relationship between students and teachers. All these features were present in the 1980s career academies described by Stern, Raby, and Dayton (1992). The Linked Learning initiative should sustain and even increase these impacts, by strengthening district-level institutional support for these elements of the career academy model, and by developing new curriculum specifically for Linked Learning pathways.

The MDRC study found that academy students performed no better, and no worse, on standardized tests than their peers in the control group. New curriculum that has been developed for Linked Learning emphasizes authentic application of academic concepts and methods — consistent with the Common Core State Standards — and engages students through project-based learning. Implementation of this new curriculum in Linked Learning sites should produce a positive impact on academic achievement as measured by test scores.

Evidence that combining academic with career-technical instruction can improve test

scores comes from an experimental study by Stone, Alfeld, and Pearson (2008). They found that high school students offered an integrated curriculum, with enhanced math instruction in their career-technical classes, performed significantly better on standardized tests than those whose career-technical classes did not integrate the math topics. These results came from a group randomized trial involving 137 teachers and approximately 3,000 students. In the instructional model, groups of math and career-technical teachers worked together to enhance mathematics in career-technical courses. In addition to curriculum design, the model also included professional development for the teachers implementing the math-enhanced lessons. The study found that, after one year of exposure to the math-enhanced lessons, the students in the experimental classrooms performed significantly better on the Terra Nova (a global, standardized test of math ability) and ACCUPLACER (a college placement exam). Moreover, there was no decrease in students' performance on measures of occupational and technical knowledge that was the focus of the career-technical courses.

In the MDRC study, results after students left high school provide impressive indirect evidence of student learning (Kemple 2008):

- The career academies produced sustained gains in earnings that averaged 11 percent (or \$2,088) more per year for academy group members than for individuals in the non-academy group—a \$16,704 boost in total earnings over the eight years of follow-up (in 2006 dollars).
- These labor market impacts were concentrated among young men of color, a group that has experienced a severe decline in real earnings in recent years. Through a combination of increased wages, hours worked, and employment stability, real earnings for young men in the academy group increased by \$3,731 (17 percent) per year—or nearly \$30,000 over eight years.

Impacts of this magnitude, sustained over eight years following the intervention, are very rare in education research. To categorize them simply as “employment outcomes,” as opposed to gains in student achievement, illustrates the danger of focusing too narrowly on standardized test scores for mathematics and English language arts. Proficiency in mathematics and English language arts is certainly necessary for success in both college and career, but the evaluation of career academies indicates that other kinds of knowledge and skill also make a difference. Academy students performed no better, and no worse, than their counterparts on tests of mathematics and English. Yet, for eight years following high school, they earned as much as \$3,731 a year more in the work world. At a discount rate of 5 percent, the net present value of this gain is more than \$24,000 per student, or nearly \$10 million in an academy of 400 students. What kind of learning produced this extraordinary result?

Unfortunately, we don't know, or at least not with certainty. In contrast to conventional high schools, academies provide students with more career awareness, career and technical coursework, and work-based learning. They place more emphasis on cross-disciplinary application and problem solving, applied communication, technological literacy, and teamwork—all attributes that employers value highly. Nevertheless, the

MDRC study was not designed to assess whether it is this kind of learning in academies that produces such large differences in the future productivity and earnings of academy students. Precisely what this additional learning is remains to be determined. But whatever it is, academies evidently produce it, and the impact is substantial.

Finally, the MDRC evaluation found high rates of postsecondary educational attainment for both the academy students and the control group, but no significant difference between them. Eight years after high school, half of the academy students, and half of the control group, had obtained a bachelor's or associate's degree, or a postsecondary certificate or license. Kemple (2008, Exhibit 8) compared these results with a sample of NELS students of the same age from all urban, non-selective, public high schools. Eight years after high school, only 28 percent of the NELS sample had completed a postsecondary credential or degree. Taken together with the employment results, the MDRC evaluation of career academies found a significant and substantial impact on earnings eight years after high school, while a relatively large proportion of students from career academies also completed postsecondary credentials or degrees.

**Quasi-experimental and correlational research.** Quasi-experimental research designs attempt to approximate random assignment by matching each student in the program with a similar student who is not in the program being evaluated. In addition, many evaluations use multivariate statistical analysis to control for students' demographic characteristics and prior performance. These methods control for variables that can be measured by the researchers, but they do not control for unobserved characteristics such as motivation, self-discipline, etc.

A number of studies of career academies, using quasi-experimental designs, strong statistical controls, or both, provide additional evidence of positive impacts on students. For example, a longitudinal study of academies in California using matched pairs and statistical controls (Stern et al., 1989) found that academy students showed significant improvement, relative to comparison groups, in attendance, credits earned, average GPAs, and likelihood of staying in school (the three-year dropout rate for academies was 7 percent vs. 15 percent in the comparison group). Subsequent longitudinal studies (Elliott et al., 2002; Hayward & Talmadge, 1995; McPartland et al., 1998; Maxwell & Rubin, 1997 and 2000) using strong statistical controls also found significantly improved high school performance of academy students, as measured by attendance, credits, grades, and not dropping out.

Several studies of career academies followed students for one or more years after high school, to examine enrollment and persistence in postsecondary education. All but one found significant positive impacts. Reller (1987) evaluated the first two career academies in California. Fifteen months after high school, she found 62 percent of academy students were enrolled postsecondary education, compared to 47 percent of a matched sample of students from the same high schools. Stern, Raby, and Dayton (1992) studied the first ten career academies funded by the State of California, and found no consistent differences between academy and comparison graduates in postsecondary attendance or degree aspirations. Maxwell and Rubin (1997, 2000) analyzed school records for three

cohorts of students in grades 10-12 in a large urban district in California, which included 9 career academies. A follow-up survey one year after graduation found 52 percent of former academy students went to 4-year colleges, compared to 36 percent of non-academy students. Maxwell (2001) compared career academy graduates who attended a large public four-year university with other graduates from the same schools who attended that university. Using extensive statistical controls, she found that 49 percent of former non-academy students needed remediation in English, compared to 37 percent of former academy students. The bachelor's degree completion rate was 53 percent for former non-academy students, compared to 57 percent for former academy students.

The Center for Advanced Research and Technology (CART) more recently provided additional evidence that the Linked Learning approach increases students' participation in postsecondary education (Center for Advanced Research and Technology 2011). CART enrolls students in grades 11 and 12 from 15 nearby high schools, offering laboratory-based coursework in 15 fields including multimedia, environmental science, biomedicine and biomedical engineering. CART students also take college-preparatory academic courses at their home high schools. To evaluate CART's effectiveness in preparing students for postsecondary education, a comparison group of non-CART students was selected from the same high schools, using a nearest-neighbor propensity-score matching procedure with 5 demographic and 5 educational achievement variables. With 2,627 student in each group, results for the CART and comparison students, respectively, were: 71 vs. 60 percent enrolling in community college directly from high school, with 62 vs. 51 percent still enrolled after one year. These differences were consistent from 2002-3 through 2008-9. In addition, 23 percent of CART students enrolled in four-year colleges or universities, vs. 21 percent of the comparison students.

Finally, analysis of data on California's state-funded career academies (Dayton, Hester, & Stern 2011) compared performance by academy students with the performance of students statewide. By law, half the students entering the California Partnership Academies must meet specified "at-risk" criteria including a history of poor attendance, and low income, grades, and test scores. It is notable, therefore, that academy students tend to outperform the statewide student population. In grade 10, academy students were more likely to have passed both sections of the California High School Exit Examination; academy 12th graders were more likely to graduate at the end of the year; and academy graduates were more likely to have completed the 15 academic ("a-g") courses required for admission to the UC or CSU systems (57 percent of academy students vs. 36 percent of graduates statewide). These differences were consistent when students are disaggregated by gender and race/ethnicity. The findings from 2009-10 were very similar to findings from 2004-05 (Bradby et al. 2007).

**Summary.** There is good evidence of the effectiveness of the key features of Linked Learning, as exemplified in career academies. Existing research has shown that this approach to high school improvement leads to stronger student engagement and reduced dropping out. On several measures of student achievement (e.g., credits earned, GPA, and college-preparatory courses completed), academy students also fare better. In no study do academy students perform better on standardized tests of academic achievement (though

they do just as well as non-academy students), but recent research on the effectiveness of embedding mathematics in career-technical courses strongly suggests that more systematic attention to this strategy improves this result. Moreover, if one accepts the remarkable earnings benefits of career academy participation as evidence of valuable learning (as employers of academy students certainly do), then this kind of college-and-career pathway can produce substantial gains in student achievement. With respect to impact on postsecondary transition and persistence, the MDRC experimental study found no impact, but both academy students and the control group had relatively high levels of postsecondary educational attainment. The quasi-experimental and correlational evidence generally shows career academy students outperforming their non-academy peers in postsecondary education.

## References

Bradby, D., Malloy, A., Hanna, T., and Dayton, C. (2007). *A Profile of the California Partnership Academies 2004-2005*. Berkeley, CA: ConnectEd and the Career Academy Support Network.

Center for Advanced Research and Technology (2011). *A Model for Success: CART's Linked Learning Program Increases College Enrollment*. Clovis, CA: Center for Advanced Research and Technology.

Dayton, C., Hester, C.H., & Stern, D. (2011). *Profile of the California Partnership Academies, 2009-2010*. Berkeley, CA: Career Academy Support Network, University of California.

Elliott, M.N., Hanser, L.M., and Gilroy, C.L. (2002). Career Academies: Additional Evidence of Positive Student Outcomes. *Journal of Education for Students Placed at Risk* 7(1):71-90

Hayward, B. and Talmadge, G. (1995) *Strategies for Keeping Kids in School*. Washington, DC: U.S. Department of Education.

Kemple, J. J. (2004). *Career academies: Impacts on labor market outcomes and educational attainment*. New York: MDRC. Retrieved April 27, 2010, from <http://www.mdrc.org/publications/366/full.pdf>.

Kemple, J. J. (2008). *Career academies: Long-term impacts on labor market outcomes, educational attainment, and transitions to adulthood*. New York: MDRC.

Kemple, J. J., & Snipes, J. C. (2000). *Career academies: Impacts on students' engagement and performance in high school*. New York: MDRC.

Maxwell, N. L. (2001). Step to college: Moving from the high school career academy through the four-year university. *Evaluation Review*, 25(6), 619-654.

Maxwell, N. & Rubin, V. (1997). *The Relative Impact of a Career Academy on Post-Secondary Work and Education Skills in Urban, Public High Schools*. Hayward, CA: the

Human Investment Research and Education Center (HIRE), School of Business and Economics, California State University, Hayward.

Maxwell, N. and Rubin, V. (2000): *High School Career Academies: A Pathway to Educational Reform in Urban Schools?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

McPartland, J., Balfanz, R., Jordan, W., & Legters, N. (1998). Improving climate and achievement in a troubled urban high school through the Talent Development Model. *Journal of Education for Students Placed at Risk*, 3(4), 337-361.

Reller, D.J. (1987). *A longitudinal study of the graduates of the Peninsula Academies, final report*. Palo Alto, CA: American Institutes for Research in the Behavioral Sciences.

Stern, D., Dayton, C., Paik, I., & Weisberg, A. (1989). Benefits and costs of dropout prevention in a high school program combining academic and vocational education: Third-year results from replications of the California peninsula academies. *Educational Evaluation and Policy Analysis*, 11(4), 405-416.

Stern, D., Raby, M., & Dayton, C. (1992). *Career Academies: Partnerships for Reconstructing American High Schools*. San Francisco: Jossey-Bass (Wiley).

Stone, J.R., Alfeld, C., & Pearson, D. (2008). Rigor and relevance: Enhancing high school students' math skills through career and technical education. *American Educational Research Journal*, 45(3), 767-795.