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Defining, Exploring, and Measuring High-Quality Instructional Practices in College & Career Readiness

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Annotated Bibliography

Defining, Exploring, and Measuring High-Quality Instructional Practices in College and Career Readiness

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Research Questions:

1. What are the current practices in the field of college and career readiness that are related to issues of equity, opportunity and achievement?
2. How well do CCR programs addresses equity and access for all students?
3. Which CCR programs have the greatest impact on student outcomes?

Topic: College and Career Readiness Programs and Instructional Practice

Alfeld, C., Hansen, D., Aragon, S. R., & Stone III, J. R. (2006). Inside the black box: Exploring the value added by career and technical student organizations to students' high school experience. *Career and Technical Education Research*, 31(3), 121-156. <https://doi.org/10.5328/CTER31.3.121>

Key Relevant Findings: Membership in a career and technical student organization (CTSO) is associated with higher levels of many of the outcome variables of interest at the start of the year (fall survey), compared with a control group, which may account for why this group gains less than students in the other groups over the course of the academic year. Outcome variables included: **academic motivation, academic engagement, civic engagement, grades, career self-efficacy, employability skills** (just not college aspirations). The more a student participates, the better the results (except civic engagement). The effects can be uniquely attributed to participation in a CTSO. Participating in competitive events had significantly positive effects on academic engagement and career self-efficacy. Because they started out ahead, it seems that CTSO students are “good students” already.

Method: The design was a 4-group, cross-sectional, pre-test/post-test design for one academic Year, with the main group being CTE students in an active CTSO compared to other student groups without CTSO. They used HLM due to nested nature of data.

*The scales used included:

- **Academic motivation:** Motivated Strategies for Learning Questionnaire (MSLQ; University of Michigan);
- **Academic engagement:** High School Survey of Student Engagement (HSSSE; Indiana University);
- **Career self-efficacy:** Betz, Klein, and Taylor's (1996) scale assesses students' beliefs about their abilities to secure a job. Also: Michigan Study of Adolescent Life Transitions (MSALT, Eccles, Barber, & Jocefowicz, 1999);
- **Civic responsibility:** Civic Responsibility Survey for K-12 Students Engaged in Service-Learning developed at the University of California, Berkeley (Furco, Muller, & Ammon, 1998).

Aragon, S. R., Alfeld, C., & Hansen, D. M. (2014). Benefits of career and technical student organizations' on female and racial minority students' psychosocial and achievement outcomes. *Career and Technical Education Research, 38*(2), 105-124. DOI:10.5328/cter38.2.105

Key Relevant Findings: This study examines the interaction between race and gender status and classroom type (CTSO or not). CTSO experiences provide benefits above those offered through general education alone; girls tend to receive more of the benefits compared to boys. The study offers reason to believe that students of color benefit more from a CTE experience (*not necessarily a CTSO*) compared to White students, but the benefit is small.

Method: Cross-sectional, descriptive research design to describe the benefits of the CTSO experience at one point in time across students with varying experiences. Linear regression evaluated the contribution of gender and minority status to the bolded outcomes in the previously cited study.

Haxton, C., & O'Day, J. (2015). *Improving equity and access in Fresno: Lessons from a K12-higher education partnership*. Washington, DC: American Institutes for Research.

Key Relevant Findings: The Fresno Unified School District superintendent used a grading scandal as a platform to begin this partnership between the district and a University of California campus, with the goal of advancing college and career readiness, equity, and access for Fresno students. Results include: (1) an increased four-year cohort graduation rate from 69 percent in 2009–10 to 79 percent in 2013–14; (2) an increased percentage of college-preparatory CTE courses from 4 percent to 48 percent; and (3) an increase in seniors' a-g completion rates of college preparatory courses from 32 percent to 48 percent, giving them greater postsecondary choices.

Method: Case study documenting the process of improving access and equity

Alfeld, C., Charner, I., Johnson, L., & Watts, E. (2013). *Work-based learning opportunities for high school students*. Louisville, KY: National Research Center for Career and Technical Education.

Key Relevant Findings: This report describes similarities and differences, as well as strengths and limitations, across three major WBL categories - internships/ co-operative education (co-op), youth apprenticeships, and school-based enterprises (SBE) - supplemented by vignettes, case studies, and descriptions of selected WBL sites. Assuming that federal policy will support states in improving WBL programs, recommendations based on the findings generated by this project are for state leaders to:

- Provide a clear, substantive purpose for and stated value of WBL, emphasizing the learning component in the work experience.
- Offer resources and information about components of high-quality WBL programs.
- Provide professional development for teachers and WBL coordinators to develop instructional strategies, including for cognitive transfer of problem-solving skills.

- Convene meetings with employer associations and labor unions to achieve buy-in for the creation of more meaningful WBL programs connected to school curriculum.
- Provide resources and guidelines for employer mentor selection, training, and continued engagement.
- Support teachers (with release time and professional development) to work closely with WBL coordinators and employer mentors to construct detailed student training plans (into which students can have input).
- Require the broadening of selection criteria and provisions for access so more students can participate in WBL.
- Demonstrate strategies for involving academic and CTE teachers in the WBL process so that WBL is connected to classroom learning.
- Provide better guidelines for accountability for student learning in WBL programs
- Fund WBL coordinators for each project with adequate support and resources.

Method: Review of literature and visitations to selected high schools

Athanases, S. Z., Achinstein, B., Curry, M. W., & Ogawa, R. T. (2016). The promise and limitations of a college-going culture: Toward cultures of engaged learning for low-SES Latina/o youth. *Teachers College Record*, 118(7).

Key Relevant Findings:

- Educators' "sympathy" in the classroom must be developed by understanding the challenges students face in school and society.
- Educators must redefine sympathy so it is relational and encompasses a belief in their responsibility to hold high expectations for their students.
- Educators must connect their sympathetic practices to the need to genuinely care about students in classrooms. As such, they must have a critical understanding of students' context for learning and must situate a caring relationship in the racialized context of students.
- Mentorship must be framed in the context of establishing caring relationships with students.
- Educators must combine the practice of caring with communicating high expectations for learning.
- Educators must challenge dominant definitions of rigor that emphasize high test scores. Instead, they must redefine rigor as peer mentoring and being centered on critical thinking as well as student empowerment.
- Schools must create the space and time for teachers to reflect on their beliefs about students, and whether their conscious and unconscious practices create rigid profiles that differentiate the intellectual capacities of students by race and other identity markers.

Method:

- Qualitative study
- Semi structured interviews with 9 teachers who were identified as being social justice-oriented, possessed a critical awareness of their students' social and educational injustices, worked primarily with Latinx students and other students of color, taught for 3 or more years, and were known for

having positive and caring relationships with their students and an impact on students' college aspirations or college access, as perceived by either their school principal and/or counselor.

Bodilly, S., Ramsey, K., Stasz, C., & Eden, R. (1992). *Integrating academic and vocational education: Lessons from eight early innovators*. Berkeley, CA: National Center for Research in Vocational Education. Retrieved from <https://files.eric.ed.gov/fulltext/ED353407.pdf>

Key Relevant Findings:

- Identified three different approaches to integration: (1) enhanced academics (increasing academic content of vocational programs); (2) enhanced relevance (providing students with practical experience relevant to workplace and college); (2) enhanced engagement (reorganizing schools to facilitate changes in pedagogy and curriculum in order to increase student motivation and strengthen academic preparation). (p. vi-vii)
- All sites made efforts to integrate academic and career knowledge and skills; the enhanced academic sites made some curricular changes but did not substantially change pedagogy. The enhanced relevance sites implemented pedagogical strategies such as hands-on problem solving, collaborative work, and interdisciplinary projects, as well as internships, senior projects, and career planning. The enhanced engagement sites focused on organizational changes to free up teachers to reform curriculum and pedagogy, and instituted career planning. (p. vii)
- Barriers to implementation included "existing regulations, poor funding, lack of existing materials, and lack of support for teacher efforts." (p. 36)
- *Equity implication:* When well implemented, the changes in pedagogy "provided an option for students who had been poorly served by the existing academic curriculum in the comprehensive high schools" (p. 69). To be successful, needs to be seen as part of comprehensive school reform (p. 68).

Method: Multiple case study of 8 schools in 5 states. Analysis of integration efforts in context of background characteristics and policy environment.

Bottoms, G., Young, M., & Han, L. (2009). *Ready for tomorrow: Six proven ideas to graduate and prepare more students for college and 21st-century careers*. Atlanta, GA: Southern Regional Education Board. Retrieved from http://publications.sreb.org/2009/09V20_Ready_for_Tomorrow.pdf

Key Relevant Findings:

- CTE concentrators who learn academics through authentic, applied methods better grasp abstract concepts, and can apply knowledge in new contexts.
- Struggling students benefit from receiving extra help
- Relative to all students completing the assessment, CTE concentrators were:
- less likely to be from minorities
- more likely to be male
- males got less extra help than females

- more likely to come from low-SES families
- students from low-SES backgrounds were also less likely to receive such extra help
- CTE concentrators “were more likely to meet the reading and mathematics readiness goals on the HSTW Assessment if they frequently completed CT assignments requiring them to read and write, interpret technical books and manuals, use computer skills and apply mathematics.” — 13% more students met reading readiness goal; 8% more met math readiness goal.” (p. 11)
- 44% of CTE concentrators in the sample reported taking academic courses with high levels of incorporation of workplace learning; Students experiencing high levels of integration scored higher on assessments (30% greater in reading and 20% in math (p. 18).

Method: Analysis of 2008 data from High Schools That Work (HSTW), Assessment of CT concentrators. 38 states participated in the 2008 HSTW Assessment; Total N= 61,044 HS seniors. The report focuses on the 57% of sample considered CTE concentrators (students who had completed a sequence of at least four CT credits).

Conchas, G. Q., & Clark, P. A. (2002). Career academies and urban minority schooling: Forging optimism despite limited opportunity. *Journal of Education for Students Placed at Risk*, 7(3), 287-311.

Key Relevant Findings: Academy structures benefited students and teachers of all races and economic backgrounds. The authors found differences between the two case study academies regarding:

- school culture (including intentional efforts by faculty to encourage “cohesion and tolerance across racial lines,” p. 307)
- degree of integration of challenging academic and CTE courses

These differences led to:

- differences in recruitment strategies that focused on promoting greater diversity by race and academic abilities
- differences in students’ sense of “social belonging and academic success” (p. 308)—the more intentionally diverse academy yielded greater sense of belonging and success

Method: Qualitative case study/comparisons of 80 minority high school students in two Californiacareer academies.

Kantrov, I. (2017). *Achieving educational equity and justice in career academies: Challenges and promising strategies*. Education Development Center, Inc. Retrieved from http://www.ltd.edc.org/sites/ltd.edc.org/files/CareerAcademiesReport2017_0.pdf

Key Relevant Findings: Points to combination of intentionally developed equitable academy culture and pedagogy that is student-centered, integrates academic and CTE, and includes continuum of work-based learning experiences as having greatest potential to serve students of all races and economic backgrounds. (p. 12)

Method: Literature review and interviews with twelve academy teachers, administrators, and community partners in seven communities.

Mergendoller, J. R., Maxwell, N. L., & Bellisimo, Y. (2006). The effectiveness of problem-based instruction: comparative study of instructional methods and student characteristics. *Interdisciplinary Journal of Problem-based Learning*, 1(2), 5.

Key Relevant Findings: This study examined whether students who were taught macroeconomics using a problem-based pedagogical approach outperformed students who were taught the same content using a traditional, lecture-based approach. More specifically, the study entailed having five teachers in four high schools in California teach the same content but with different pedagogical approaches to 246 students. The researchers found that students who received the problem-based instruction demonstrated greater gains on a pre- and post-test of macroeconomics knowledge. The researchers also found preliminary evidence that students whose prior verbal ability was in the midrange or below benefited most from exposure to the problem-based classes.

Method: Difference in means on the pretest-posttest change on assessments of macroeconomics knowledge in classes where teachers used problem-based approaches vs. traditional approaches.

Nayar, N., Bracco, K. R., & Darche, S. (2009). Work-based learning in California: Opportunities and models for expansion. *Focus*. Retrieved from <https://folio.iupui.edu/bitstream/handle/10244/768/workbasedlearning.pdf?sequence=1>

Key Relevant Findings: Equity connections:

- Applied learning can help address students' diverse learning styles because applying learning enables youth to learn and master skills and competencies through problem-solving.
- Work-based learning (WBL) can add relevance to the curriculum by showing students how classroom learning is applied in the world and exposing students to diverse career options.
- Expanding the definition of work-based learning—including school-based learning opportunities as well as intentional learning at work sites—can help expand equitable access to its benefits. (pp. 15-16)
- Expanding access requires that both academic and technical teachers participate in work-based learning. (p. 18)
- Work-based learning “can also promote psychological and social development. (p. 7)
- Giving students opportunities to reflect—and to connect classroom experiences with what they learn in the workplace—facilitates knowledge transfer and “helps students see the workplace as a ‘subject of inquiry, not just the location for learning.’” (p. 8)

- Connecting work-based learning to themes and to students' interests also supports deeper learning. (p. 16)

Method: Literature review and case studies (site visits to 13 California schools and programs, interviews with researchers and practitioners).

Stone III, 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.

Key Relevant Findings: Students in "math-in-CTE" classes outperformed control students on:

- mathematics section of TERRANOVA (high school achievement test)
- ACCUPLACER Elementary Algebra text (college placement test)
- No differences between groups on post-test measure of workplace (applied) math skills.

Method: RCT within 5 CTE occupational areas/schools. Yearlong instructional intervention

Sun, J., & Spinney, S. (2017). *Transforming the American high school experience: NAF's cohort graduation rates from 2011–2015*. Fairfax, VA: ICF.

Key Relevant Findings: NAF academies implement an educational design to improve student outcomes of college and career readiness that includes work-based learning as a core component of the four-year program of study. This four-year longitudinal study including data for 613,002 students across 10 districts from 6 states, demonstrated higher rates for all NAF high school students, especially those at-risk of not graduating high school when compared to non-NAF students. The greatest difference of +10% was found for students who participated in four-year, full programs. Full program participation includes a four-year WBL experience.

Method: Longitudinal quasi-experimental design; 2 to 1 propensity matching

Welton, A. D., & Martinez, M. A. (2014). Coloring the college pathway: A more culturally responsive approach to college readiness and access for students of color in secondary schools. *The Urban Review*, 46(2), 197-223.

Key Relevant Findings: Recommendations (based on findings):

- There is a need for more culturally responsive frameworks to consider ways in which students of color tenaciously resist structural challenges along the pathway to college.

The following recommendations are from the students who participated in both studies:

- Establish relationships built on trust and authentic caring: “school personnel need not only focus on academic rigor and college resources, but also on taking the time to develop trusting and authentic relationships with students of color” (p. 216).
- Integrate college-level work and resources into all courses: there needs to exist a collaborative effort to integrate college-level coursework and college resources in all classrooms, not just AP or dual enrollment courses.
- Encourage students to earn college credit in high school

The following recommendations are from the researchers:

- Provide increased college supports for new immigrant students and their families
- Ensure all school personnel recognize and validate that students of color possess college assets and potential
- Secondary schools must be conscious of ways in which dominant ideology ostracizes students of color from college readiness opportunities; at the same time, consider ways in which the cultural identities of students of color mitigate structural barriers to college access and readiness.
- Educators and researchers must engage in critical self-reflection to challenge racial and cultural biases.

Method: A review of research on college access

Topic: Student Outcomes

Advance CTE. (2017). *The value and promise of career technical education: Results from a national survey of parents and students.* Retrieved from https://cte.careertech.org/sites/default/files/files/resources/The_Value_Promise_Career_Technical_Education_2017.pdf

Key Relevant Findings: Overall parents had a reasonably strong understanding and positive attitude towards CTE.

Method: National Survey

Allen, W. R., Kimura-Walsh, E., & Griffin, K. A. (2009). *Towards a brighter tomorrow: College barriers, hopes and plans of Black, Latino/a, and Asian American students in California.* Charlotte, NC: Information Age Publishing, Inc.

Key Relevant findings: Several studies indicate that African American students are disproportionately underachieving as evidenced by numerous publications highlighting their educational upbringing as insufficiently resources in culturally unresponsive K-12 schools.

Although LL is embedded in several high schools the achievement gap persists, AA student continue to be under represented in Advance Placement courses, and overrepresented in special education.

Method: Qualitative & document review state data base

Allensworth, E. M., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago public high schools: A close look at course grades, failures, and attendance in the freshman year. Research report.* Chicago, IL: Consortium on Chicago School Research.

Key Relevant findings: This study identifies a variety of indicators—including students' failures, absences, and overall grades—to learn what matters for a successful freshman year (and hence high school completion).

The study provides evidence that academic **behaviors** (including **student engagement**) play a central role in determining students' grades. Researchers looked closely at academic behaviors and their relationship to course grades and course failures for CPS ninth-graders. While students' prior test scores and background characteristics, such as gender, race/ethnicity, economic variables, school mobility, and age at entry into high school, together only explained

12 percent of the variation in ninth-grade course failures, students' absences and self-reported study habits explained an additional 61 percent of the variation in 9th grade failures. Attendance and studying not only strongly predicted course failures but also were the strongest predictors for getting high grades—more so than test scores or student background characteristics.

Findings from this study point to the importance of students' course grades, grade point average (GPA), or class rank as vastly better predictors of high school and college performance and graduation, as well as a host of longer-term life outcomes, than their standardized test scores or the coursework students take in school. With this finding, the researchers conclude that students' academic preparation for high school is far less important for simply passing courses than is their behavior in high school, particularly their course attendance. Course passing rates are primarily determined by attendance. Students attend class more often when they have strong relationships with their teachers, and when they see school and their coursework as relevant and important for their future.

Berger, A., Turk-Bicakci, L., Garet, M., Knudson, J., & Hoshen, G. (2014). *Early college, continued success. Early college high school initiative impact study*. San Mateo, CA: American Institutes for Research.

Key Relevant findings: 81% of early college students enrolled in college, as compared with 72% of comparison students. 25% of early college students earned a degree (mainly an Associate's degree). No effect of early college on college enrollment rates for students from different backgrounds; however, effects on degree attainment stronger for minority and low-income students, and those with higher prior achievement.

Method: Longitudinal random, lottery-based random assignment

Bragg, D. D. (2007). Teacher pipelines: Career pathways extending from high school to community college to university. *Community College Review*, 35(1), 10-29.

Key relevant findings: One case using targeted support around Accuplacer support saw a 25% decline in remediation to the community college. Two cases showed a large increase in grade-to-grade retention; though in one case that increase may not be attributed to the intervention. One case doubled the number of students matriculating to the CC. Authors note that these outcomes are mid-point measures as the programs had only been operating for 2-3 years, making the impact on baccalaureate degree attainment impossible to assess.

Method: Multicase study w/ 3 sites implementing teacher pathways

Carnevale, A., Garcia, T., Gulish, A. (2017). *Career pathways: Five ways to connect college and careers*. Center on Education and the Workforce. Washington, DC: Georgetown University. Retrieved from <https://cew.georgetown.edu/wp-content/uploads/LEE-final.pdf>

Key Relevant Findings: This is a conceptual publication that makes an argument for the importance of aligning pathways with labor market demand, aligning curriculum with workforce requirements, offering high quality counseling, and conducting job placement and skills gap analyses.

Method: Conceptual piece rather than research; includes case studies. References lots of labor market research.

Carnevale, A. P., Rose, S. J., & Hanson, A. R. (2012). *Certificates: Gateway to gainful employment and college degrees*. Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from https://www.insidehighered.com/sites/default/server_files/files/06_01_12%20Certificates%20Full%20Report%20FINAL.pdf.

Key Relevant Findings: Potential of certificates – and shorter credentials to facilitate employment and education

Method: Survey mostly, but this area seems to be an area ripe for further study. The tremendous growth in micro-credentials that could be gained in college/career programs in high school is a potential area for study. Such programs are beginning to integrate such credentials into programs and research needs to assess their potential.

Castellano, M. E., Richardson, G. B., Sundell, K., & Stone, J. R. (2016). Preparing students for college and career in the United States: The effects of career-themed programs of study on high school performance. *Vocations and Learning*, 10(1), 47-70. doi: 10.1007/s12186-016-9162-7

Key Relevant Findings: POS enrollment improved students' probability of graduation by 11.3% and each additional CTE credit earned increased graduation probability by 4%.

Method: Structural equation modeling and instrumental variable approach

Castellano, M., Richardson, G. B., Sundell, K. E., & Stone III, J. R. (2017). Preparing students for college and career in the United States: The effects of career-themed programs of study on high school performance. *Vocations and Learning*, 10(1), 47-70.

Key Relevant Findings: Enrollment and participation in POS CTE course sequences improved students' probability of graduation by 11.3% and each additional CTE credit earned in POS increased their probability of graduation by 4%. There were non-significant effects for high school GPA.

Method: Structural equations and an instrumental variable approach

Castellano, M., Stone, R., Stringfield, S., Farley-Ripple, E.N., Overman, L.T., & Hussain, R. (2007). *Career-Based comprehensive school reform: Serving disadvantaged youth in minority communities*. Louisville, KY: National Research Center for Career and Technical Education.

Key Relevant Findings: Researchers found *neutral* effects of career-based comprehensive reform efforts on the engagement, achievement, and transition of traditionally underserved students.

Achievement

None of the three study schools achieved consistent gains over their comparison schools on measures of academic achievement.

Engagement

The odds of dropping out declined as the proportion of the high school experience invested in CTE courses increased.

Transition to Postsecondary

More students reported having a post-high school plan than their comparison peers at two of the three study schools.

Many of the students at the study schools aligned their next step with their high school course of study.

Regarding the achievement findings, researchers said: "as academic standards were being mandated at all three schools. CTE program areas had not yet had a chance to respond."

Castellano, M., Sundell, K. E., Overman, L. T., Richardson, G. B., & Stone, J. R. III. (2014, April). *Rigorous tests of student outcomes in CTE programs of study: Final report*. Louisville, KY: National Research Center for Career and Technical Education.

Key Relevant Findings: Completing a POS was not associated with more college credits (e.g. dual enrollment) or earning an industry-recognized credential.

Across all three districts, earning more CTE credits was associated with boosting the probability graduation.

Students in POS/career pathways outperformed their peers on the number of credits earned in STEM and AP classes, while also earning higher GPAs in their CTE classes.

Both the treatment and the control group planned full-time attendance at a four-year college to the same degree.

The treatment group (POS/career pathways) however, indicated their studies would relate to their high school pathway.

Castellano, M., Sundell, K. E., & Richardson, G. B. (2017). Achievement outcomes among high school graduates in college and career readiness programs of study. *Peabody Journal of Education*, 92(2), 254-274. doi: 10.1080/0161956X.2017.1302220

Key Relevant Findings: Outcomes (GPA, STEM credits) for high school students completing HS portion of CTE program of study (POS) were better than those of CTE concentrators who did not complete, and better than other students taking CTE courses outside a program of study.

Method: Multiple regression

Chimuma, L., Patton, M.K., & Horowitz, J. (2017). *Understanding the relations between high school students' pathway programs and the associated industry sectors*. [Unpublished manuscript.] Encinitas, CA: IEBC.

Key Relevant Findings: There are systematic differences among student demographic groups (gender, ethnicity, disability, etc.) and pathway participation.

These differences tend to match the industry composition for the demographic (e.g., males are over represented in engineering; females are over represented in affiliated health care).

Constantine, J. M., Seftor, N. S., Martin, E. S., Silva, T., & Myers, D. (2006). *Study of the effect of the talent search program on secondary and postsecondary outcomes in Florida, Indiana and Texas. Final report from Phase II of the National Evaluation*. Washington, DC: U.S. Department of Education.

Key Relevant Findings: The Talent Search Programs, which typically include career advising, visiting college campuses, and developing students' knowledge of financial aid assistance, had positive effects on students staying in and completing high school

Method: Analysis of administrative data compiled in 3 states; a quasi-experimental design to create matched comparison groups

Cooper, K.S. (2014). Eliciting engagement in the high school classroom: A mixed-methods examination of teaching practices. *American Educational Research Journal*, 51, 363–402.

Key Relevant Findings: Identified connective teaching, academic rigor, and lively teaching as strong predictors of student engagement, with connective teaching most predictive. Study introduces a typology for thinking systematically about teaching for engagement.

Mixed methods: case studies of classrooms, factor analyses of practices, and multilevel regression analyses

Corrin, W., Sepanik, S., Rosen, R., & Shne, A. (2016). *Addressing early warning indicators: Interim impact findings from the Investing in Innovation (i3) evaluation of DIPLOMAS NOW*. New York, NY: MDRC.

Key Relevant Findings: Program produced significant effects on students to stay above lower early warning threshold of 85 percent attendance, fewer than 3 suspensions or expulsions, and no fails in math or English.

Program did not produce significant effects to stay above higher threshold of 90 percent attendance, no suspensions or expulsions, and no fails in any academic courses.

Program did not produce significant effects on any single lower or higher threshold indicator.

Method: Longitudinal random assignment

Data Quality Campaign. (2015). *Preparing students for jobs: Ensuring student success in the workforce*. Washington, DC: Author.

Key Relevant Findings: To develop and support a strong workforce, policymakers, educators, school and business leaders, students, and the labor force can use data to inform improvements to the variety of routes through education and careers.

States can securely link limited K–12 data with postsecondary and workforce data, such as program completion or employment status, to evaluate which schools, programs, and pathways help students be successful in college and careers.

States can also collect and report information on students' readiness for college and careers to provide transparency and inform decisions about how to best prepare students for college and beyond.

Dougherty, S. (2016) *Career and technical education in high school: Does it improve student outcomes?* Washington, D.C.: Thomas B. Fordham Institute.

Key Relevant Findings: Dougherty found CTE course taking associated with higher 4-year high school graduation rates, employment rates, and earnings. He found greater effects for “concentrators,” students who took a sequence of 3 or more CTE courses. He did not find evidence for significant tracking or overrepresentation of low-achieving students taking CTE courses. Although he found graduation rate gains for males and female CTE concentrators, he only observed earning gains for men.

Method: QED (regression controlling for 8th grade achievement, attendance, disciplinary actions and demographics including FRPM eligibility)

Dougherty, S. (2016). *Career and technical education in high school: Does it improve student outcomes?* Washington, DC: Thomas B. Fordham Institute.

Key Relevant Findings: The more CTE courses students take, the better their education and labor market outcomes

CTE Concentrators are 21 percentage points more likely to graduate high school their identical non-concentrator peers.

CTE Concentrators are 0.9 percentage points more likely to be employed and earn higher wages than similar non-concentrator peers the year following high school.

CTE Concentrators are 1.3 percentage points more likely to be enrolled in a two-year college than similar non-concentrator peers the year following high school.

Male and low-income students see the greatest benefit to concentrating.

Low-income concentrators are 25 percentage points more likely to graduate than their low-income non-concentrating peers.

**AR offers 62 programs of study across 42 career pathways.*

Dougherty, S. M. (2016). *Career and technical education in high school: Does it improve student outcomes?* Washington, DC: Thomas B. Fordham Institute.

Key Relevant Findings: CTE concentration dramatically improves graduation rates but has modest effects on other outcomes

Method: Analysis of Arkansas database

Dougherty, S. M. (2016). *Career and technical education in high school: Does it improve student outcomes?* Washington, DC: Thomas B. Fordham Institute.

Key Relevant Findings: Taking more CTE courses, as well as concentrating, had positive effects on HS graduation rates, college enrollment, employment, and wages; larger effects of concentration for male and lower-income students.

Method: Longitudinal state data; regression, instrumental variables, and matching

Engberg, M. F., & Wolniak, G. C. (2013). College student pathways to the STEM disciplines. *Teachers College Record*, 115(1), 1-27.

Key Relevant Findings: Students who report greater preparedness in HS math were more likely to declare STEM majors, indicating that dual enrollment programs where students take college level math stands to increase the number of students declaring STEM. Authors note this may be especially the case for under-represented students “by linking them directly to apprenticeships and easing the burden of later college costs” (p. 23).

Method: Using 2002 ELS with 2006 follow up. Cross-classified hierarchical general linear modeling

Fletcher, J., Edward, C., & Tyson, W. (2017). A longitudinal analysis of young adult pathways to STEMH occupations. *Career and Technical Education Research*, 42(1), 35-55. doi:10.5328/cter42.1.35.

Key Relevant Findings: Science course-taking, math GPA, and science GPA did not predict entering STEMH occupations, but Calculus did. Women entered at lower rates than would be expected given HS achievement. SES did not predict technician or professional STEMH attainment when HS achievement was controlled. Participation in STEMH CTE in HS had stronger results for PSE enrollment, degree attainment, vocational certifications and obtaining STEMH professional careers than a traditional HS college prep curriculum.

Method: 1997-2009 National Longitudinal Survey of Youth; HLM

Guha, R., Caspary, K., Stites, R., Padilla, C., Arshan, N., Park, C., Tse, V., Astudillo, S., Black, A., & Adelman, N. (2014). *Taking stock of the California Linked Learning District Initiative. Fifth-year evaluation report.* Menlo Park, CA: SRI International.

Key Relevant Findings: SRI's 5th year evaluation of the LL District focused on students: Who enrolls in pathways? How do students feel about their experiences? What are their perceptions of the skills they are gaining? And, what effect does participation in a Linked Learning pathway have on students' high school outcomes?

Researchers used two measures to assess student engagement: attendance and retention within the district. They found:

In general, average attendance rates for pathway and non-pathway students were high. No evidence that students enrolled in certified pathways had better attendance than similar peers in traditional high school programs.

On average, students enrolled in certified pathways were 2.2 percentage points more likely to stay within their district from 9th to 10th grade, 4.6 percentage points more likely to stay through 11th grade, and 5.2 percentage points more likely to remain through 12th grade, compared with similar peers in traditional high school programs.

Method: quasi-experimental

Harper, S. R., & Davis III, C. H. (2012). They (don't) care about education: A counternarrative on Black male students' responses to inequitable schooling. *The Journal of Educational Foundations*, 26(1/2), 103.

Key Relevant Findings: Too often the onus is put on the African American student assimilate; the responsibility to bridge the divide must be on the institution to shift their pedagogical practices to match the needs of the disenfranchised.

Students reported pathway practices that include peer buddy system to support connectedness as an integral part of freshmen experience.

Harper, S. R., & Quaye, S. J. (2009). Beyond sameness, with engagement and outcomes for all: An introduction. In S. R. Harper & S. J. Quaye (Eds.), *Engaging racial/ethnic minority students in predominately white classroom environments* [pp. 1–12]. New York, NY: Routledge.

Harper, S., & Patton, L. (2007). *Responding to the realities of race on campus. New directions for student services*. (Vol. 120). San Francisco, CA: Jossey-Bass.

Key Relevant Findings: These authors explain the alienation, marginalization, and isolation that many African Americans students experience appears to be directly related to their lack of engagement.

To counterbalance these harsh realities, the school community could intentionally focus on culturally or ethnically-based student organizations, cultural awareness, and student support services to potentially affect positive mediation.

Hill, L.D. (2008). School strategies and the “college-linking” process: Reconsidering the effects of high schools on college enrollment, *Sociology of Education*, (81)1, 53-76.

Key Relevant Findings: Found three (3) distinctive college-linking strategies:

Traditional: School offers limited resources and limited organizational commitment to facilitating students' access to resources

Clearinghouse: Fairly substantial school structure of resources but weak organizational commitment

Brokering: Exceptional structure of college resources plus norms promoting equitable distribution of resources to students and families.

Method: Quantitative study; used two-level multinomial, hierarchical models to measure school strategies that facilitate college enrollment & students' postsecondary outcomes

Holland, N.E. & Farmer-Hinton, R.E. (2009). Leave no schools behind: The importance of a college culture in urban public schools, *High School Journal* (92)3, 24-43.

Key Relevant Findings: Students in small schools/small learning communities perceive greater access to and involvement in school's college-going culture, e.g. more college-prep instruction & activities, in-depth conversations with staff, encouragement & support from staff, interactions with counselors, and hands-on, school-based college/career planning activities.

Method: Quantitative study: used descriptive analyses, ANOVA, & correlations of school size and college support measures

Hughes, K. L., & Karp, M. J. M. (2004). *School-based career development: A synthesis of the literature*. New York, NY: Community College Research Center, Teachers College, Columbia University.

Key Relevant Findings: These studies, well-regarded for their strong methodology and useful findings, give evidence that, as a whole, career guidance interventions can positively influence students' career development.

... guidance activities directed at junior high school students had the largest effect sizes ...

Students do seem to benefit, both vocationally and academically, from participation in career courses. In particular, they seem to increase their knowledge of careers and their ability to make career-related decisions.

On most career-related measures, students did see increased outcomes when compared with students not enrolled in a career course...

However, there is little evidence that any gains—either academic or career-related—are maintained over time.

In most cases no follow-up research was conducted over time to see the lasting nature of any knowledge gain or attitude change, or the relationship of these with actions taken later.

Method: Literature review

Institute for Entrepreneurship in Education. (n.d.). *Creating alternative pathways to postsecondary education: Da Vinci Schools Extension Program*. San Diego, CA: School of Leadership and Education Sciences, University of San Diego. Retrieved from <https://drive.google.com/file/d/0B6QNXpGJG2HLUdaSUoyVUpBVWc/view>

Key Relevant Findings: Program evaluation study found that structured academic opportunities, intensive mentoring, and internships provided strengthened student focus and interest in post-secondary persistence.

Method: Interviews with students in program and comparison group

Kautz, T., Heckman, J. J., Diris, R., Ter Weel, B., & Borghans, L. (2014). *Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success* (No. w20749). National Bureau of Economic Research.

Key Relevant Findings: This is a synthesis of literature related to how to foster and measure the types of non-cognitive skills that are necessary for success in the workplace.

Method: Literature review/research synthesis

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

Key Relevant Findings: Career academy students earned an average of 11% more annually than their non-academy counterparts, and were more likely to live independently of their parents, 8 years after high school. No difference between the groups with respect to postsecondary educational attainment. In high school, test scores did not improve but academy students who entered high school with highest risk of dropping out had better outcomes than similar non-academy students.

Method: Longitudinal random assignment

Kemple, J. J., & Snipes, J. C. (2000). *Career academies: Impacts on students' engagement and performance in high school.* New York, NY: MDRC. Retrieved from <https://eric.ed.gov/?id=ED441075>

Key Relevant Findings: This study focuses explores the extent to which career academies can alter the high school environment in ways that better support students academically and developmentally, and how the context in which career academies are implemented influence their effects on student outcomes. Findings suggest that increasing both the level of interpersonal support students experienced during high school and their participation in career awareness and work-based learning activities can substantially improved high school outcomes among students at high risk of dropping out. For this group, the academies reduced dropout rates, improved attendance, increased academic course-taking, and increased the likelihood of earning enough credits to graduate on time. Note that when averaged across the diverse groups of students and sites participating in the study, academies produced only modest improvements in students' engagement and performance during high school.

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.

Key Relevant Findings: Career academy graduates from a large California district who entered a local university were more likely to complete their bachelor's degrees, and less likely to need remediation, than other graduates from the same high schools.

Method: Longitudinal comparison with statistical controls

McCharen, B. (2008). *The success of implementing programs of study in health careers through career clusters and pathways.* *Career and Technical Education Research*, 33(3), 203-215.

Key Relevant Findings: 54% (lower than state average) of HS program completers continued to 2 or 4-year IHEs in health-related programs. Of those who entered certificate programs, 78% completed them. Only 2% completed degrees at the IHEs.

Method: Descriptive, longitudinal study using institutional data, follow-up surveys and phone calls.

Moore, C., Venezia, A., Lewis, J., and Levkovitz, B. 2015. *Organizing for success: California's Regional Education Partnerships*. Sacramento, CA: EdInsights.

Key Relevant Findings: This report describes the following strategies suggested by representatives of the studied partnerships:

- Start with a coalition of the willing,
- Focus on a few main goals,
- Foster involvement of key leaders,
- Leverage existing networks,
- Create opportunities for cross-system communication and collaboration,
- Embed activities in existing organizations, and
- Use data to motivate action and inform activities.

The report concludes with suggestions to help state policy and philanthropic communities better support regional partnerships.

Method: The information used in this report came from 37 interviews with stakeholders from 19 regional consortia located throughout California.

National Research Council. (2004). *Engaging schools: Fostering high school students' motivation to learn*. Washington, D.C.: National Academies Press.

Key Relevant Findings: The National Research Council and Institute of Medicine (2004) summarized decades of research to identify school conditions that promote strong student engagement and positive academic mindsets. These included: presenting students with challenging but achievable tasks; communicating high expectations for student learning and providing supports that allow students to meet these expectations; making evaluation practices clear and fair and providing ample feedback; reinforcing and modeling a commitment to education and being explicit about the value of education to the quality of one's life; providing students with opportunities to exercise autonomy and choice in their academic work; requiring students to use higher-order thinking to compete academic tasks; structuring tasks to emphasize active participation in learning activities rather than passively "receiving" information; emphasizing variety in how material is presented and in the tasks students are asked to do; requiring students to collaborate and interact with one another when learning new material; emphasizing the connection of schoolwork to students' lives and interests and to life outside of school; and encouraging teachers to be fair, supportive, and dedicated to student learning while holding high expectations for student work.

Neumark, D., & Rothstein, D. (2007). Do school-to-work programs help the "forgotten half"? In Neumark D. (Ed.), *Improving School-to-Work Transitions* (pp. 87-133). New York, NY: Russell Sage Foundation. Retrieved from <http://www.jstor.org/stable/10.7758/9781610444262.7>

Key Relevant Findings: Neumark and Rothstein examined initial postsecondary outcomes for six types of school-to-work programs: job shadowing, mentoring, coop, school enterprise, the prep, and internship/apprenticeship. Focusing on students in the bottom half of the distribution of predicted college attendance ("the forgotten half"), they found evidence for increased postsecondary education enrollment and earnings for men who participated in coop, school enterprise, or internship/apprenticeship programs, and for women who participated in internship/apprenticeship programs.

Method: QED (regression controlling for student demographics and prior achievement)

Page, L. C. (2012). Understanding the impact of career academy attendance: An application of the principal stratification framework for causal effects accounting for partial compliance. *Evaluation review*, 36(2), 99-132.

Key Relevant Findings: Academy students who participated in WBL had significantly better outcomes than those who did not, both in the program and treatment groups

Method: Re-analysis of Kemple 2008 career academy study

Phelps, L. A., & Chan, H. (2016). Optimizing technical education pathways: Does dual-credit course completion predict students' college and labor market success. *Journal of Career and Technical Education*, 31(1), 61-85.

Key Relevant Findings: Completing an average of 6 units of Transcribed Credit and Advanced Standing dual enrollment courses was related to college success and annual earnings at age 22. Enrollment in longer, diploma granting manufacturing and engineering programs resulted in better labor market outcomes than shorter term and health and other non-STEM programs. Better preparation in math (as measured by higher Accuplacer scores) was related to better labor market outcomes. Dual enrollment offered on the HS campuses, taught by HS CTE instructors predicted greater levels of college success and labor market outcomes.

Method: HLM using data from K-12 data systems with unemployment insurance wage records in Wisconsin

Scrivener, S., Weiss, M. J., Ratledge, A., Rudd, T., Sommo, C., & Fresques, H. (2015). *Doubling graduation rates: Three-year effects of CUNY's Accelerated Study in Associate Programs (ASAP) for developmental education students*. New York, NY: MDRC. Retrieved from https://www.mdrc.org/sites/default/files/doubling_graduation_rates_fr.pdf

Key Relevant Findings: An accelerated developmental education model had large effects on students' college persistence and degree completion.

Method: RCT

Stern, D., Saroyan, P., & Hester, C. H. (2012). *Comparing students in each California Partnership Academy with non-academy students at the same high school, 2009-10*. University of California, Berkeley.

Key Relevant Findings: Within most schools, participation in a California Partnership Academy was not associated with differences in performance on the state standardized achievement test, but significant positive or negative relationships were found in some schools.

Method: Multiple regression, including prior achievement scores, performed separately within each school

Steven, H., Matthew, L., & Collen, P. (2016). Building better bridges to life after high school: Experimental evidence on contemporary career academies. Proceedings of research symposium, *"What Shapes a Student's Path Forward?": The tenth annual conference on the National Center for the analysis of longitudinal data in educational research (CALDER)*. Washington D.C.

Key Relevant Findings: We find that enrollment in this academy increases the likelihood of high school graduation and college enrollment each by about 8 percentage points, with the attainment gains concentrated among male students. We also find that academy participation reduces 9th grade absences but has little influence on academic performance, AP

course-taking, or AP exam success during high school. Analysis of candidate mechanisms suggests that roughly one fifth of the overall high school graduation effect can be attributed to improved student engagement in high school.

Sun, J., & Spinney, S. (2017). *Transforming the American high school experience: NAF's cohort graduation rates from 2011-2015*. Fairfax, VA: ICF.

Key Relevant Findings: Students who participated in NAF academy had graduation rates 3 percentage points higher than non-NAF students, 5 percentage points higher for at-risk students, and 6 percentage points higher for NAF students with full participation

Method: Longitudinal quasi-experimental

Sun, J., & Spinney, S. (2017). *Transforming the American high school experience: NAF's cohort graduation rates from 2011-2015*. Fairfax, VA: ICF.

Key Relevant Findings: Students who participated in NAF academy students are more likely to graduate, especially among at-risk students. This study replicates the SRI study's findings that academies that show a high level of implementation fidelity have strong student outcomes.

Method: Longitudinal quasi-experimental (PSM)

Swanson, J. L. (2008). *An analysis of the impact of high school dual enrollment course participation on post -secondary academic success, persistence and degree completion* (Order No. 3323472). [Doctoral dissertation]. University of Iowa. Retrieved from <https://search.proquest.com/docview/304633260?accountid=14496>

Key Relevant Findings: Purpose: To investigate the impact of high school students' participation in dual enrollment courses upon college persistence and degree attainment. • Dual enrollment participants were 11% more likely to persist through 2nd year of college and were more likely to enroll in Post-Secondary Education directly after HS than were non-participants.

Method: Inferential statistics on a casual model developed for this study

Theodos, B., Pergamit, M. R., Hanson, D., Edelstein, S., Daniels, R., & Srini, T. (2017). *Pathways after high school: Evaluation of the Urban Alliance High School Internship Program*. Washington, DC: Urban Institute. Retrieved from <https://theurbanalliance.org/wp-content/uploads/2017/08/08292017.pdf>

Key Relevant Findings: Students in Urban Alliance internships performed better than a control group that did not experience internships:

- Increased the likelihood of young men who've gone through the program attending college by 23 percentage points
- Increased the likelihood of middle-tier students (2.0 – 3.0 GPA) enrolling in a 4-year college by 18 percentage points
- Increased students' comfort with and retention of critical professional skills over time, especially young men.

Method: Random assignment

Vargas, J., and Venezia, A. (2015). *Co-design, co-delivery, and co-validation*. Boston, MA: Jobs for the Future. Retrieved from www.jff.org/publications/co-design-co-delivery-and-co-validation.

Key Relevant Findings: This report focuses on defining and “unpacking” what it means to co-design, co-deliver, and co-valid curricula and other components of pathways across systems. It also outlines barriers to those approaches.

Method: This is a thought piece that draws from the authors’ own research (over the past 20+ years) and from a literature review.

Visser, M. G., Altuna, J. N., & Safran, S. (2013). *Making it happen: How career academies can build college and career exploration programs*. New York, NY: MDRC.

Key Relevant Findings: Three-year study of the implementation of the ECCO program. ECCO was launched in 18 career academies in six school districts in three states: (1) California; (2) Florida; and (3) Georgia. The purposes of the study are to document the experiences of these schools in adopting the program and to assess the extent to which, when given support and resources, programs like ECCO can be fully implemented.

Method: Descriptive data collected to assess the promise to improve student participation in career and college exploration activities and to improve their awareness of postsecondary options.

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.

Key Relevant Findings: Students in certified and noncertified had lower dropout rates, high graduation rates, and more credits than non-pathway students.

Students in certified pathways earned slightly more college prep credits than non-pathway students, but were not more likely to meet full requirements for UC/CSU or had higher GPAs than non-pathway students.

Pathway and non-pathway students had similar rates of postsecondary enrollment and persistence.

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.

Key Relevant Findings: The seventh annual evaluation report finds: compared with similar peers in traditional high school programs, students participating in certified Linked Learning pathways were more likely to graduate from high school, were less likely to drop out, and earned, on average, more credits. In addition, certified pathways were doing just as well as traditional high school programs at helping students complete the a–g requirements even as they retained more students who might otherwise have dropped out and were unlikely to pursue the full college preparatory curriculum. Certified pathway students were as likely as similar peers in traditional high schools to enroll in college. Conditional on enrollment in any postsecondary institution, pathway students were also equally likely to enroll in a 4-year college and to persist in school to a second year. Although the finding for enrollment in a 4-year college is not significant in the overall sample, it is significant and positive for African American students and students with low prior achievement. Finally, 1 year out of high school, pathway students were more likely than their non-pathway peers to obtain jobs with benefits such as vacation and sick leave.

Method: Longitudinal quasi-experimental

Zinth, J. (2015). *Aligning K-12 and postsecondary career pathways with workforce needs*. Denver, CO: Education Commission of the States.

Key Relevant Findings: Workforce data is being used to identify disciplines for pathways. There is legislation in some states promoting this.

