



# Integrating Curriculum:

Lessons for Adult Education  
from Career and Technical Education

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## Executive Summary

Policymakers and educators are paying increased attention to determining how best to prepare those in adult education programs not only for immediate employment, but also for career advancement and further training or postsecondary education. This focus echoes current efforts among secondary educators, particularly those in career and technical education (CTE), to ensure that high school graduates are ready for both college and a career—not one or the other. Are there strategies currently in use in high schools that could inform efforts in adult education to prepare adults for both work and further education?

The authors examine one strategy—the integrated curriculum—now being implemented in various forms in high schools to see if adult education might benefit from a similar approach. The integrated curriculum combines academic and technical content in programs that focus on problem solving, active engagement in projects and real-world applications of the knowledge and skills taught. This paper reviews several types of curriculum integration and examines research on its effects, primarily in K–12 education, since research in adult education is sparse. After discussing two curriculum integration models in detail—the multiple pathways approach promoted by ConnectEd: The California Center for College and Career, and the Ford Partnership for Advanced Studies (PAS) program—the authors describe several efforts to incorporate integrated curricula in adult education. They conclude that three approaches have promising prospects for expanding integrated curriculum efforts already under way in adult education: course integration, cross-curriculum integration and program integration.

## Introduction: Adult Education in a Perfect Storm

U.S. adults lacking adequate literacy and numeracy skills find it difficult to succeed at work and to participate fully in their communities. These adults are especially vulnerable to the “perfect storm” identified by Kirsch, Braun, Yamamoto, and Sum (2007), a convergence of three powerful forces: divergent skill distributions, a changing economy and demographic trends. Recent labor market

statistics, for example, indicate that the demand for workers in high-wage, middle-skill jobs continues to be strong and that adults need help gaining the skills required for those jobs. Currently, about 50 percent of all jobs are middle-skill jobs, and the Bureau of Labor Statistics predicts that about half of all job openings in the next decade will be in occupational categories that include primarily middle-skill positions (Holzer & Lerman, 2009). Labor market data also predict a decline in the growth of skills at the middle level, which translates into a need for education and training that will enable low-skill adults and youth to move into these middle-skill jobs (Holzer & Lerman, 2009).

Several large-scale national and international surveys confirm that many U.S. adults lack sufficient literacy and numeracy skills to function effectively in an increasingly competitive work environment. The National Assessment of Adult Literacy (National Center for Education Statistics, 2003) puts the number at 93 million adults whose skills in prose, document and quantitative literacy are at basic or below-basic levels. These forces and figures pose a challenge to policymakers and adult educators: How can adult education better prepare these adults for today’s workplace, for further education and career advancement, and for their roles as citizens and parents?

Holzer and Lerman suggest that high-quality career and technical education (CTE), career academies, career pathways programs and apprenticeships can prepare youth for further education and training and, ultimately, for well-paid middle-skill jobs. The same holds true for adults. Holzer and Lerman advocate similar programs that can link adults with employers offering middle-skill positions, such as career ladders, apprenticeships provided by community colleges or private career schools, and pre-bridge and bridge programs (Holzer & Lerman, 2009; Women Employed with Chicago Jobs Council and UIC Great Cities Institute, 2005). They note that apprenticeships feature learning in context and can be an effective way to teach technical and other skills, such as communication and problem solving.

The pedagogical issues involved are not new, nor are they confined to the field of adult education. CTE programs in secondary schools face similar issues. The two fields also share a concern about preparing students for

both work and further education or training, not simply one or the other. CTE has adopted several approaches that may have potential for improving adults' prospects for a successful transition to postsecondary education and training and high-skill, high-wage employment. These include, for example, integrated curricula, multiple pathways, work-based learning and partnerships with business and industry. Various CTE approaches combine some or all of these features.

This paper focuses on one of these approaches, integrated curriculum, an instructional approach seeing a resurgence in high schools and community colleges, and asks, what can adult education learn from secondary education, particularly the CTE approach to integrating academic and career and technical curricula? Which, if any, secondary education integration strategies can be adapted for adult education or help expand integration efforts already under way in adult basic education (ABE), adult secondary education (ASE) (including GED), English as a second language (ESL) and workforce basic skills? After examining lessons learned primarily from secondary-level experience with curriculum integration, the paper discusses ways adult education might incorporate at least some elements of curriculum integration and the implications for broadening the role of adult education in preparing adults for success in the 21<sup>st</sup>-century workplace.

## What Is Curriculum Integration?

Curriculum integration takes a variety of forms, but in general, it is an attempt to connect academic and career and technical instruction in ways that will prepare students for further education or training, employment and careers. Researchers offer several overlapping definitions of curriculum integration. For example, Johnson, Charner, and White (2003) describe it as a series of strategies connecting academic and CTE content, so that, over time, one area becomes a "platform for instruction" in the other. Another definition states that integration is designed to strengthen the academic base of work-related skills while providing context and motivation for academic learning (Bailey, 1997; Brown, 1998, in Bailey & Matasuzuka, 2003). A more detailed definition comes from Chernus and colleagues (2001), who characterize curriculum integration as an instructional approach that incorporates key

content from two or more disciplines; has well-defined educational objectives (such as academic, industry and workforce-readiness standards) and uses authentic applied problems (problem-based learning) to engage and challenge students.

As discussed in this paper, curriculum integration not only joins academic and CTE content, it also incorporates academic, CTE and work-readiness standards and employs project- or problem-based learning focused on "real-world" issues relevant to students' lives and interests.

There is research evidence suggesting that many students learn better when courses are taught in a real-world context, when classroom learning connects to the workplace and when abstract concepts or knowledge are linked to real problems (Stasz, 1997, in Bailey & Matasuzuka, 2003; Stasz & Grubb, 1991, in Stasz, Kaganoff, & Eden, 1995). By providing students with both high-level academic and in-demand technical skills, curriculum integration may help promote transitions to postsecondary education and careers (Bradby, Malloy, Hanna, & Dayton, 2007). Using multiple instructional approaches, as is common in curriculum integration, also can enable students to master more challenging concepts and skills (Gardner, 1993; Hoachlander, 1999, in Chernus et al., 2001).

The overarching goal of curriculum integration is to expand students' options for the future, something equally important to high school graduates and to adults seeking to improve their economic prospects. Although many students want and need to go to work right away, an integrated curriculum keeps open the possibility of additional education and training. It enables them to prepare not just for their next job, but also for further education that can help them advance in a career.

## Background on Curriculum Integration

Curriculum integration is not new. As John Dewey wrote in "Democracy and Education," "Education through occupations...combines within itself more of the factors conducive to learning than any other method" (1916, p. 361). Problem-based learning—integrating academic and technical skills, theory and practice in the context of real-world problems—has been used in professional training for decades, in such fields as medicine, health sciences,

architecture, business, engineering, law and social work (Chernus et al., 2001).

Over time there has been a shift in the CTE field to an integrated approach. Educators and policymakers realized that traditional CTE programs, which taught students specific occupational skills and aimed them toward work rather than further education, no longer best served either students or our increasingly complex and global economy. Federal policymakers have endorsed the integration of academic and vocational/career and technical education. The 1990 amendments to the Carl D. Perkins Vocational Education Act of 1984, Public Law 98-524, specified that Perkins funds be used “to provide vocational education in programs that integrate academic and vocational education...through coherent sequences of courses so that students achieve both academic and occupational competencies” (Section 235). To be eligible for funds, schools were required to describe how they would integrate academic and vocational disciplines (Section 240). This goal was reiterated in the 1998 Perkins reauthorization, the Carl D. Perkins Career and Technical Education Act of 2006, Public Law 109-270 (Perkins IV) and the School-to-Work Opportunities Act of 1994, Public Law 103-239.

After the 1990 Perkins amendments, the percentage of secondary schools offering an integrated curriculum increased from 55 percent in 1997 to 69 percent in 1999. During the same period, the percentage of secondary students studying integrated curricula increased from 35 to 40 percent (Medrich, White, & Beltranena, 2001, in Johnson et al., 2003).

States increasingly are interested in the integrated curriculum approach. In 2008, the National Association of State Boards of Education Study Group on Promoting Excellence in Career and Technical Education identified key components of CTE and recommended that state boards adopt policies to integrate CTE and academic coursework and standards. The group also noted the importance of aligning academic and industry standards “to ensure transitions beyond high school, especially in creating pathways for students interested in pursuing a four-year degree.”<sup>1</sup>

1 Retrieved August 4, 2009, from [www.nasbe.org/index.php/news/49-spotlight/489-new-nov08?tmpl=component&print=1](http://www.nasbe.org/index.php/news/49-spotlight/489-new-nov08?tmpl=component&print=1) and page.

## Major Elements and Types of Curriculum Integration

Although the components of curriculum integration can vary according to the different types of integration (described below), there are common basic elements:

- Shared purpose among administrators and teachers in implementing curriculum integration to increase student achievement
- Content from two or more disciplines (academic and CTE)
- Well-defined educational objectives, such as academic content standards, industry skill standards and workforce-readiness standards (e.g., Secretary’s Commission on Achieving Necessary Skills [SCANS])
- Real-world context and authentic problems that engage and challenge students

Curriculum integration takes a variety of forms, including course integration, cross-curriculum integration, program integration, and schoolwide integration and career academies.

### *Course Integration*

Course integration combines academic and CTE content within courses and may include commercially produced curricula; curricula developed by researchers, curriculum developers, subject matter experts and industry representatives; and teacher-developed curricula. Academic content may be infused into CTE courses and vice versa. Teachers use work contexts to motivate students, but often focus mainly on basic skills to the neglect of higher-level academic content and skills (Grubb, David, Lum, Plihal, & Morgaine, 1991; Stasz et al., 1995). In the 1990s, “applied academics”<sup>2</sup> was the most common

2 The term “applied academics” generally refers to curricula that show how academic subjects relate to the world of work. Applied academics also refers to curricula developed by state consortia and organizations, such as the Center for Occupational Research and Development (CORD) and the Agency for Instructional Technology (AIT), in subjects such as applied communications, applied mathematics and principles of technology (applied physics). They include stand-alone units that can be used to structure a whole course or integrated into academic or CTE courses.

approach to course integration, and the best examples included team teaching by academic and CTE teachers (Grubb et al., 1991; Stasz et al., 1995). The most promising form of course integration uses examples from career and technical coursework to teach academic concepts, so that students see applications outside the CTE context in which the information and theories were originally presented. Instructors similarly use examples from academic coursework to illustrate real-world applications (Johnson et al., 2003). For example, the Ford Partnership for Advanced Studies (Ford PAS) curriculum in subject areas such as business, economics, engineering and technology may be incorporated into individual courses as well as across courses. A detailed description of the Ford PAS model is included below.

Another example of course integration is the Math-in-CTE model developed by the National Research Center for Career and Technical Education. The subject of experimental design research, Math-in-CTE is both a process and an instructional approach that incorporates math-enhanced lessons implemented in CTE courses, which result in improved math skills. The model first identifies areas in the CTE curriculum where math naturally occurs. Supported by in-depth professional development, CTE and math teacher teams then develop math-enhanced lessons using a pedagogic framework created for this approach (see <http://cehd.umn.edu/NRCCTE/Math-In/SevenElements.html>). Next, CTE teachers develop scope-and-sequence plans for their own curriculum. It requires a “critical mass” of CTE teachers from a particular career area who are paired with math teachers for professional development over the course of an academic year. Math-in-CTE is built on five core principles: developing and sustaining a community of practice among participating teachers, focusing first on the CTE curriculum rather than the math curriculum, recognizing that math is a fundamental workplace skill, maximizing the math in the CTE curriculum and acknowledging that CTE teachers teach Math-in-CTE, not math per se. For more information, see [www.cehd.umn.edu/NRCCTE/Math-In](http://www.cehd.umn.edu/NRCCTE/Math-In).

### ***Cross-Curriculum Integration***

Cross-curriculum integration involves teams of academic and CTE teachers and possibly others, including subject matter experts, curriculum developers and industry representatives, who work to connect curricula and develop authentic projects incorporating course content and academic, work-readiness and CTE or industry skills standards. Teachers find connections among classes for one or more projects or share plans for what they will cover during a course and modify the sequence of concepts taught so related units can be taught concurrently in different courses. They develop integrated projects building on points of intersection (Hoachlander, 1999).<sup>3</sup> As a result, students experience the subject matter as connected and reinforcing, rather than separate and unrelated (Grubb et al., 1991). One way to reinforce the alignment is to start with an industry theme and incorporate challenging academics, technical skills and real-world applications (Chernus et al., 2001). When properly implemented, this approach can help students integrate material from very different courses and disciplines and allows for maximum individualization (Grubb et al., 1991).

### ***Program Integration: Career Clusters, Career Pathways and Multiple Pathways, Career Majors and Tech Prep***

In this type of program integration, education focuses around specific careers or clusters of careers, so that while students are prepared for employment and advancement in a specific career area, they also acquire the knowledge and skills to pursue postsecondary education or training. The integrated curriculum is a component of each of these types of programs.

*Career clusters* group careers and occupations around common academic, technical and workplace knowledge and skills. Career clusters identify the requisite academic and technical knowledge and skills for a broad range of careers, from entry level through management and professional levels. The U.S. Department of Education identified 16 career clusters: agriculture, food and natural resources;

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<sup>3</sup> Integrated projects or units can take from one or two weeks to an entire term.

science, technology and engineering; architecture and construction; arts, audio/visual technology and communications; business management and administration; education and training; finance; government and public administration; health science; hospitality and tourism; human services; information technology; law, public safety, corrections and security; manufacturing; science, technology, engineering and mathematics; and transportation, distribution and logistics.<sup>4</sup> The integrated curriculum is among 15 components critical to implementing career clusters. Some others are career development, shared planning, administrative support, professional development, parent and community support, business and industry partnerships and education partnerships. Each career cluster is made up of multiple career pathways. For more information about career clusters, see [www.career-clusters.org/](http://www.career-clusters.org/).

*Career pathways and multiple pathways* offer students coherent programs of study within the context of broad industry themes. They integrate challenging academic instruction and career and technical curricula with real-world applications. Pathways cut across traditional departments, prepare students for postsecondary education degree and certificate programs, employment training and careers, and facilitate articulation with postsecondary institutions. Additional partners include business and industry and other community organizations (ConnectEd, [www.connectedcalifornia.org/pathways/index.php](http://www.connectedcalifornia.org/pathways/index.php); Grubb et al., 1991; Hoachlander, 1999; Stasz et al., 2004; Warford, 2006).

*Career pathways* are defined in different ways. The U.S. Department of Education College and Careers Transition Initiative (CCTI) defines career pathways as “a coherent, articulated sequence of rigorous academic and technical courses commencing in the ninth grade and leading to an associate degree, an industry recognized certificate or licensure, and/

or a baccalaureate degree and beyond.”<sup>5</sup> CCTI describes a secondary-level model career pathway as meeting state academic standards and grade-level expectations; responding to high school testing and exit requirements; and meeting college entrance and placement requirements. An ideal secondary-level pathway also provides academic and career-related education in student-selected career clusters and offers opportunities for students to take college-level courses and earn college credit while in high school. At the postsecondary level, a model career pathway provides opportunities for students to earn college credit through dual enrollment or articulation agreements; gain knowledge and skills in career clusters that meet industry standards; and access employment, business and entrepreneurship opportunities in selected career areas. In addition, the pathway aligns and articulates with four-year college degree programs (Warford, 2006, pp. 21–22).

In a paper describing the economic rationale for career pathways, the Workforce Strategy Center defines career pathways as “a series of connected education and training programs and support services that enable individuals to secure employment within a specific industry or occupational sector, and to advance over time to successively higher levels of education and employment in that sector” (Jenkins, 2006, p. 6). Career pathways are designed to prepare current and future workers to meet the local labor market needs of key industries.

*Multiple pathways*, like career pathways, are defined in different ways. ConnectEd: The California Center for College and Career describes multiple pathways as comprehensive programs of study that combine rigorous academic and technical content and practical applications organized around an industry theme, with the goal of preparing all students for college and careers (Hoachlander, Sterns, & Studier, 2008). In New York City, “multiple pathways” is shorthand for Multiple Pathways to Graduation, an alternate route

<sup>4</sup> Retrieved September 20, 2009, from [www.careerclusters.org/16clusters.cfm](http://www.careerclusters.org/16clusters.cfm).

<sup>5</sup> Retrieved September 23, 2009, from the CCTI Web site, [www.league.org/league/projects/ccti/cp/characteristics.html](http://www.league.org/league/projects/ccti/cp/characteristics.html)

to earning a high school diploma or GED designed especially for students at risk of dropping out.<sup>6</sup> This definition is also used to describe similar programs in other cities supported by the U.S. Department of Labor and Jobs for the Future (Richmond, 2009). The first definition is most relevant to the discussion in this paper.

The ConnectEd approach to multiple pathways emphasizes both in-school and out-of-school student-adult relationships and helps students meet the demands of challenging coursework and postsecondary and career goals through academic support services and career counseling (Hoachlander et al., 2008). These types of multiple pathway programs take a variety of forms, such as academies, small learning communities, other small schools with career themes and occupational centers. The description of ConnectEd below provides detailed information on how the curriculum is integrated in multiple pathways.

*Career majors* are coherent sequences of courses or fields of study that prepare students for their first jobs, integrate academic and occupational content and work-based learning, create connections between secondary and postsecondary education and prepare students for employment in broad occupational clusters or industry sectors. They usually include a minimum of two years of secondary education and one or two years of postsecondary education, provide students with substantial experience in and understanding of all aspects of the industry and result in the award of a high school diploma or its equivalent, postsecondary certificate, skill certificate or diploma. They may also lead to further education and training, including apprenticeship programs or admission to two- or four-year postsecondary education.<sup>7</sup>

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6 Retrieved September 23, 2009, from *Education Week*, High School Connections blog, [http://blogs.edweek.org/edweek/high-school-connections/2009/07/multiple\\_pathways\\_new\\_york\\_and.html](http://blogs.edweek.org/edweek/high-school-connections/2009/07/multiple_pathways_new_york_and.html).

7 School-to-Work Opportunities Act of 1994, Public Law 103-239, Section 4.

Career majors integrate CTE and academic instruction, often in occupational high schools emphasizing preparation for related occupations, such as schools focused on aviation and aerospace careers. In some cases, schools replace traditional departments with career-focused departments including both academic and CTE teachers. This approach often, but not always, includes integrated coursework (Grubb et al., 1991; Stasz et al., 2004).

*Tech Prep* programs combine a minimum of two years of secondary education with at least two years of postsecondary education in a sequential course of study that integrates academic study and CTE, meets state academic and technical standards and incorporates work-based learning for the purpose of preparing young people for high-skill, high-wage or high-demand occupations. Tech Prep requires articulation agreements between secondary and postsecondary institutions.<sup>8</sup> Some Tech Prep programs offer students dual high school and community college credit for completing certain Tech Prep courses. Like other CTE programs, Tech Prep supports the use of contextual and applied curricula, instruction and assessment.

### ***Schoolwide Integration and Career Academies***

Schoolwide integration and career academies are the most challenging types of curriculum integration to implement because they involve multiple teams of teachers. *Schoolwide integration* includes collaboration among teams of academic and CTE teachers to integrate the curriculum and applications in real-world contexts within a school or academy career theme. Examples of schoolwide integration sites include occupational high schools and magnet schools.

*Career academies* are small learning communities that focus on a career theme and offer courses combining academic and CTE content, including authentic applications. Examples of common themes are health, business and finance, arts and communications, computers, engineering, and law and government (Stern & Stearns, 2006). Career

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8 Carl D. Perkins Career and Technical Education Act of 2006, Public Law 109-270, Title II, Section 203(c).

academies bring together groups of students and teams of teachers by industry sectors. Teachers use common planning time to develop interdisciplinary units. Students participating in these units may receive credit in more than one class (Stern & Stearns, 2006). Often academies provide support for integrating the curriculum through block scheduling (making it easier to ensure common planning time). Academies also establish partnerships with local employers to provide work-based learning opportunities. As of 2008, the United States had approximately 2,500 career academies (Kemple & Willner, 2008).

### Research on Curriculum Integration

Research on curriculum integration is limited. Most studies cited in this paper provide suggestive evidence, with the exception of random-assignment studies, including Stone, Alfeld, and Pearson (2008); Kemple and Willner (2008) and Zambrowski and Gordon (1993). The limited research evidence on curriculum integration is mixed. According to Stern and Stearns (2006), “Getting clear-cut research results has been difficult because most studies have not been able to determine whether apparent effects are due to particular programs or to the selection of particular kinds of students into those programs” (p. 1).

Stasz and colleagues (1995) reviewed the literature on curriculum integration in the late 1980s and early 1990s and found little hard evidence of effectiveness in the few evaluation studies at that time, with the exception of an experimental-design evaluation of New York City’s career magnet schools.<sup>9</sup> That study identified benefits to students with weak academic records, atypical candidates for a magnet school. These benefits included reduced likelihood of dropping out between middle and high school; improved reading scores; and additional credits toward graduation. In a companion study, the same researchers found that students in career magnets had more confidence in their ability to secure employment and more varied future plans than did comprehensive high school students.

A study of eight high schools implementing an integrated curriculum found that the approach was promoted

as a response to perceived problems in a system that separated academic and vocational education. Problems included students’ poor basic and work-related skills, inability to apply theory to practical problems, lack of engagement in school and poor transition from high school to college or the workplace (Bodilly, Ramsey, Stasz, & Eden, 1993). A study of seven high school curriculum integration sites found that many teachers involved in integration considered themselves more effective teachers as a result of the experience (Johnson et al., 2003).

Stone and colleagues (2008) emphasize the importance of collaboration between academic and CTE teachers. The authors cite findings from the recent evaluation of the Urban Systemic Initiative, a program funded by the National Science Foundation that supports reform in K–12 science and math education. The evaluation showed that “schools in which teachers reported the most involvement in learning communities had the highest gains on student test scores” (p. 23).<sup>10</sup> In the same report, the authors found that, in an experimental-design study of enhanced math instruction in CTE, students in the experimental classrooms performed equally on technical skills and significantly better on two standardized tests of math ability compared with control students.

A study of California’s Partnership Academies showed that at least half of academy students are considered at risk. Academy students were much more likely than their nonacademy counterparts to complete the 15 academic courses required for admission to California’s public colleges and universities; 50 percent of graduating academy seniors had completed the requirements, compared with 39 percent of graduates statewide. Researchers found higher pass rates on the state’s high school exit examination among black academy students, as compared with all black students. Graduation rates also were higher among academy seniors (96 percent) than among high school seniors statewide (87 percent) (Bradby et al., 2007). Further, data show that 59 percent of students in California Partnership Academies met entrance requirements for state postsecondary institutions, compared with only 39 percent of students not in Partnership Academies

9 Crain, R., Heebner, A., & Si, Y.-P. (1992). *The effectiveness of New York City’s career magnet schools: An evaluation of ninth grade performance using an experimental design*. Berkeley, CA: National Center for Research in Vocational Education. Quoted in Stasz et al., 1995, p. 53.

10 For more information on the evaluation, see Borman, K., and Associates. (2005). *Meaningful urban education reform: Confronting the learning crisis in mathematics and science*. Albany, NY: SUNY Press.

(ConnectEd: The California Center for College and Career, 2008).

The Manpower Development Research Corporation conducted a 10-year random-assignment study of career academies in nine high schools across the country. The study examined the effects of career academies on students' labor market prospects and postsecondary educational attainment in the eight years following their expected graduation. Participants were more than 1,700 students, of whom about 85 percent were Hispanic or black. Some findings (Kemple & Willner, 2008) include:

- Academy students had sustained earning gains averaging 11 percent more per year than their non-academy counterparts.
- Increased earnings for young men resulted from increases in wages and/or hours worked or employment stability.
- Results demonstrated the possibility of strengthening the preparation of students for the workforce and transition to employment “without compromising academic goals and preparation for college” (p. iii).
- Programs only partially implemented or using only some features of the academy approach may not see similar results. Further research is needed to determine the effects of key academy components.

A job-training program that integrated basic skills with occupational content was the subject of experimental-design research conducted in the early 1990s; results showed higher earnings for participants (Zambrowski & Gordon, 1993). This study examined four community-based organizations operating employment training programs for minority single mothers. One site, the Center for Employment Training (CET) in San Jose, Calif., stood out because of its approach, which included concurrent and integrated work and learning opportunities, supplemental GED and English language courses, and collaboration with employers on curricula. Job training focused on competencies required by employers for work in high-demand fields. Researchers found that CET participants demonstrated significant earnings gains during

the fifth follow-up year. Earnings effects were greater for participants with 12 years of schooling.

## Research on Learning in Context: K–12 and Adult Education

The integrated curriculum is a form of contextualized learning that uses the context of the real world, including the world of work, to engage students and prepare them for transition to postsecondary education and careers. Contextualized learning has been employed in both K–12 and adult education.

In K–12 education, much of the research on contextualized learning looks broadly at this approach to instruction, which, like curriculum integration, is defined in many different ways. Although the integrated curriculum is a type of contextualized instruction, there are others, such as problem-based learning—using academic knowledge and skills to solve real-world personal, family or work-related problems. Research findings are mixed, but some studies demonstrate positive effects of contextualized learning on student performance. This topic clearly needs more rigorous research.

In an experimental-design study, Stone, Alfeld, Pearson, Lewis, and Jensen (2006) looked at whether the math-enhanced CTE curriculum improves student math performance. This study of more than 230 CTE teachers, 100 math teachers and 3,900 students found that, after one year, students in the experimental group performed significantly better on traditional and applied tests of math knowledge and skills than did other students.

According to the President's National Mathematics Advisory Panel, there are only a few high-quality studies on learning in context. A meta-analysis of four of 10 studies that met the panel's criteria for high-quality research found that “if mathematical ideas are taught using ‘real-world’ contexts, then students' performance on assessments involving similar problems is improved.” Performance on assessments of other aspects of mathematics learning, however, did not improve. The meta-analysis also showed that, for upper elementary, middle school and remedial ninth-graders in some math domains, incorporating real-world contexts into instruction has a positive impact on certain types of problem solving. The panel concluded that further research on the use of real-world problems in other grade

levels is necessary (National Mathematics Advisory Panel, 2008, pp. 49–50).

Stone and colleagues (2008) highlight an issue of some concern to researchers who have studied contextualized learning in K–12: the possibility that knowledge acquired in one context may not transfer to another because it is “embedded” in the situation in which it was learned (p. 6). The researchers point out the importance of being able to apply skills learned in an education setting to other settings, especially in today’s workplace, where workers must adapt to changing situations and demands.

In adult education, there are fewer studies of contextualized learning, and, as in K–12, results are mixed and more research is needed. The U.S. Department of Education What Works Clearinghouse recognized “functional-context education,” which integrates job content with literacy skills, as an effective approach in 2002 (Fletcher, 2006, in Hoachlander et al., 2008). Using both quantitative and qualitative methods, researchers in England studied more than 1,900 adult learners enrolled in 16 vocational programs that integrate (or “embed”) basic skills with vocational training. Participants had higher retention rates and increased achievement in adult literacy, numeracy, English as a second/other language and vocational training than learners not enrolled in the integrated courses (Casey et al., 2006).

## Models of Curriculum Integration

Several current secondary school curriculum integration initiatives, including the following well-documented models, incorporate the major elements and types of curriculum integration described above:

- ✦ California Partnership Academies ([www.cde.ca.gov/ci/gs/hs/cpagen.asp](http://www.cde.ca.gov/ci/gs/hs/cpagen.asp))
- ✦ ConnectEd: The California Center for College and Career ([www.connectedcalifornia.org](http://www.connectedcalifornia.org))
- ✦ Ford PAS ([www.fordpas.org](http://www.fordpas.org))
- ✦ Math-in-CTE ([www.cehd.umn.edu/NRCCTE/Math-In](http://www.cehd.umn.edu/NRCCTE/Math-In))
- ✦ National Academy Foundation (<http://naf.org/>)

This paper describes ConnectEd and Ford PAS in depth. They were selected because of their potential applicability to adult education. Adult educators could consider ways to adapt these approaches to fit the broad range of programs, settings, structures, student demographics, and student interests and needs found in adult education. The other three models include components that may be useful to adult educators as well, but as a whole, are not as easily transferable.

### *ConnectEd: The California Center for College and Career*

Founded by the James Irvine Foundation in 2006, ConnectEd: The California Center for College and Career works to advance practice, policy and research on multiple pathways to college and career in California high schools. ConnectEd provides schools and districts committed to multiple pathways with grant support, technical assistance, shared resources and other forms of assistance (see [www.connectedcalifornia.org/about/index.php](http://www.connectedcalifornia.org/about/index.php)).

ConnectEd’s approach includes challenging academic instruction that meets state standards and California public postsecondary education entrance requirements, taught in the context of real-world applications; demanding technical instruction emphasizing workplace applications; and work-based learning, such as internships and virtual apprenticeships. To implement the multiple pathways approach, ConnectEd has established a network of 16 pathway programs throughout the state. Members of the network were selected to help ConnectEd document and replicate innovative and effective career-themed teaching and learning practices in California high schools. These districts receive technical assistance to support the development of high-quality pathways programs, including, for example, leadership development training, teacher professional development, and development of and training in using an integrated curriculum.

Since late 2008, ConnectEd also has been working on whole-district high school education improvement in 11 districts. Ten of these districts received initial planning grants to establish communitywide partnerships and identify strategies to expand their pathways. Six districts received implementation grants in June 2009, while the other four received continued planning and development

grants. An 11th district recently joined the initiative and is supporting participation with internal funding.

In addition to working with the network and district sites, ConnectEd provides technical assistance to other local schools and districts seeking to adopt a multiple pathways approach and develops state and local support for multiple pathways among policymakers and such community partners as industry, postsecondary institutions, parents and others.

Designing and implementing curricula for multiple pathways schools is a major ConnectEd activity. As a foundation dedicated to this work, ConnectEd is identifying and evaluating innovative, effective curriculum models, methods of instruction and school organization and is developing tools to evaluate the success of rigorous real-world learning. To help teachers create the integrated curriculum, ConnectEd has produced “Designing a Multidisciplinary Integrated Curriculum: A Practical Manual.”

ConnectEd also has developed integrated curriculum materials for a variety of industry sectors (see [www.connectedcalifornia.org/curriculum/units.php](http://www.connectedcalifornia.org/curriculum/units.php)). These materials include integrated units in the health sciences, built around authentic industry problems and created in partnership with the National Consortium on Health Science Education, and integrated engineering units, designed for Academies of Engineering ([www.academyofengineering.org](http://www.academyofengineering.org)). In collaboration with the Education Development Center, Inc. (EDC), ConnectEd is also developing full high school programs of study that include integrated curricula for the arts, media and entertainment and law and justice fields. Integrated curriculum units will be developed for other industry sectors.

At ConnectEd sites, integrated curricula are based on applied learning theory research, address both academic and industry skill standards and connect academic content with the real world through interesting, practical applications. Teachers use curriculum integration for a variety of purposes:

- To engage students through challenging academic and technical content and by using active learning approaches
- To build education and career planning skills

- To address various learning styles and achievement levels
- To differentiate instruction
- To link students with professionals in various careers

Consistent with guidance in the “Practical Manual,” ConnectEd has provided professional development and has used the following approach to design integrated curriculum units.

Each integrated curriculum unit is structured by an Essential Question and Key Questions. Units include a unit summary, subunits and major topics, lesson plans, resources, necessary materials, classroom management and support strategies, student activities and assessments, possible extensions and descriptions of the culminating event (described below), learning scenarios and the roles of teachers and other partners.

ConnectEd follows a series of steps in developing integrated curricula. The first step is curriculum mapping, which identifies key topics and standards across disciplines in the existing curriculum, helps to establish interdisciplinary connections and shows how course material can be combined into an authentic career-related theme (Clayton, Ho, & Hudis, 2007). On the basis of this work, a career-related topic is selected, along with subtopics, learning outcomes and the specific content standards to be addressed in each subject.

Instructional designers then formulate an Essential Question for the entire curriculum unit, along with Key Questions for individual subjects. An Essential Question is one that drives the inquiry across disciplines, reflects a problem of interest and relevance to students, is open-ended with multiple possible solutions and challenges students to solve real-world problems. Subject-specific Key Questions help students to answer the Essential Question and are related to disciplinary content and the overall theme.

The curriculum sequence and map are then revised on the basis of the integrated unit. Teachers develop a learning scenario, a “hook” enabling students to see the real-life application of the academic and technical content they will master to answer the Essential Question. Student assessments, which include both traditional and

performance-based summative and formative assessments, are created. Materials are checked for their alignment with standards, and connections are made with local partners from industry, postsecondary education and other organizations. These partners play a variety of central roles, including helping students with project work, assessing their performance, providing feedback on the curriculum and hosting site visits.

Finally, lesson plans are developed. Each lesson plan addresses one or more of the Key Questions and contributes to students' ability to answer the Essential Question as part of the culminating event. Lesson plans should also result in products that will be part of the formative assessment. The culminating event is an opportunity for students to demonstrate their learning and present their conclusions about the Essential Question. These events also give teachers and partners in the community a chance to assess student learning relevant to the content standards that were the foundation of the integrated unit. Culminating events can involve an individual student or a group of students and may take a variety of forms, such as making a PowerPoint presentation, developing a Web site or demonstrating an activity to industry partners.

One example of a fully developed integrated curriculum unit is "Crime Scene Investigation," a curriculum unit on forensic investigation for a health science pathway. See [http://www.connectedcalifornia.org/downloads/curriculum/CSI\\_CA.pdf](http://www.connectedcalifornia.org/downloads/curriculum/CSI_CA.pdf)

### ***Outcomes of ConnectEd's Multiple Pathways Approach***

An early assessment of ConnectEd's multiple pathways approach was recently completed (Farr, Bradby, Hartry, Sipes, Hall, & Tasoff, 2009). The evaluation report indicates that students enrolled in multiple pathways at ConnectEd sites were more likely to pass the California High School Exit Exam on their first attempt in 10<sup>th</sup> grade than were high school students generally. With regard to state standards tests, students at ConnectEd sites generally performed better than students statewide in 2007–08 on the English/language arts 10 and 11 and U.S. history tests; they performed less well on the math and science tests. Attendance, promotion and graduation rates for these students were all above 90 percent. The report emphasizes that students at these sites were highly

engaged and motivated: "They develop a keener awareness of what skills they will need in the workplace as well as more awareness of their options and preferences than do students in traditional high schools" (p. 67).

The evaluation also found that implementing an integrated curriculum was a challenge for many ConnectEd sites, despite extensive efforts to develop and use integrated projects. Although most staff appreciated the potential of the integrated curriculum, many lacked the capacity and time to develop an integrated approach. It is important to note, however, that the integrated curriculum is just one feature of ConnectEd sites and that other factors undoubtedly influenced these and other program outcomes.

### ***The Relevance of the ConnectEd Model for Adult Education***

Components of the ConnectEd model could be adapted for use in adult education. These include developing integrated curriculum units on career-related themes; structuring an integrated curriculum around academic and technical content standards; engaging business and industry partners to contribute to the curriculum and provide work-based learning opportunities; linking classroom instruction to the workplace through work-based learning opportunities, including virtual apprenticeships; incorporating an integrated curriculum into bridge programs and career pathways for adults; and producing a guide to developing the integrated curriculum similar to the "Practical Manual" for adult education programs, with input from adult education program administrators and instructors.

Relevant elements of the ConnectEd approach to the integrated curriculum include identifying topics that connect across disciplines; formulating open-ended, problem-based, essential questions that are of interest to students; developing a "hook" to illustrate the real-life application of the content; creating performance-based assessments and involving industry, postsecondary and other community partners throughout the process of developing and implementing the integrated unit.

### ***Ford Partnership for Advanced Studies (PAS)***

Ford PAS is an academically rigorous, interdisciplinary curriculum and program that offers students the knowledge and skills for success in such areas as business, economics, engineering and technology. Developed by Ford Motor Company Fund in partnership with EDC, Ford PAS encourages high school students to pursue education and build careers in these areas (see [www.fordpas.org/about/default.asp](http://www.fordpas.org/about/default.asp)).

Ford PAS provides interdisciplinary learning experiences designed to develop students' problem-solving, critical thinking, teamwork and communication skills. Instruction is organized in curriculum modules connecting rigorous academic and technical content. Key components of Ford PAS include inquiry and project-based learning; interdisciplinary content; links between academic learning and authentic applications; assessable learning goals tied to national standards; multiple types of assessments; teamwork; integration of technology; and partnerships with business, postsecondary education and other community organizations.

Ford PAS sites generally are high schools, but they also can be colleges, universities, and community, professional and industry organizations. High school sites include comprehensive high schools, CTE programs, career academies and other small learning communities. Ford PAS also is being used in college bridge programs, including several in historically black colleges and universities. Ford PAS has also been used with adjudicated youth and in alternative schools, where students who have failed in other high schools take a full-day program of exclusively Ford PAS courses. There are more than 300 sites in 26 states.

The various sites implement the Ford PAS curriculum in different ways. Comprehensive high schools may offer the curriculum as electives or organize their full curriculum around the program by incorporating the modules into academics and electives. CTE programs may use the curriculum to address the 16 national career clusters, since it is aligned to standards for the career clusters. Community colleges may offer Ford PAS to high school students, providing college credit for those who complete the courses, and to first-year college students taking introductory math, engineering and business courses.

Partnerships are a significant component of Ford PAS. Business and postsecondary education partners serve on local Business/Education Advisory Councils, which provide experiences, such as classroom speakers, mentoring, job-shadowing, and tours of worksites and college campuses, directly linked to students' projects and learning. These partners help students understand the connections among classroom learning, postsecondary education and careers. Their involvement is most effective when they take a leadership role in partnership with the school district. Ford PAS's experience has shown that building community and employer support for curriculum integration is essential. Principals and other administrators may come and go, but strong and broad community involvement and buy-in can keep such programs going over time, as well as provide essential industry connections and work-based learning opportunities.

The Ford PAS curriculum is contained in 20 modules, organized by the following themes: Foundations in 21<sup>st</sup>-Century Skills; Working Toward Sustainability; Getting Smart About Business; Manufacturing for Tomorrow; Data, Decisions, and Design; Living in a Global Economy; and Putting Math to Work. Module learning goals are aligned with national academic standards. Curriculum materials pose issues and problems, and students acquire information and skills through investigation and hands-on learning experiences. Modules incorporate Student and Teacher Guides, including detailed lesson plans (Ford Motor Company Fund, 2008). Curriculum components are available in print (at cost), multimedia (videos, simulations and software) and online (at no cost to users who sign up and receive a password).

Modules incorporate a variety of assessments, including performance-based assessments, such as oral presentations and real-world simulations. Each module also includes teacher and peer assessments of products, self-assessments of core skills, quizzes and tests. Many questions have more than one right answer, with Teacher Guides providing possible answers.

Ford PAS professional development takes place through summer and academic-year institutes, an online forum, and online courses and webinars. Ford PAS expects teachers to take part in professional development for the modules included in the Foundations in 21<sup>st</sup>-Century

Skills theme and recommends additional training for teaching other modules.

Articulation with postsecondary education is an important part of Ford PAS. Through articulation agreements with local postsecondary institutions, some high school students receive both high school and college credit for completing Ford PAS modules

### ***Outcomes of Ford PAS***

A multiyear evaluation of Ford PAS is under way to determine its impact on participants; components of the program that do and do not work well; and how program inputs may vary across student populations. The evaluation is examining context, including how teacher factors affect outcomes, and implementation, including models used, effects on classroom practices and barriers to implementation. Evaluators also will look at program quality; support provided by training, partnerships, program coordinators and agencies; and outcomes for teachers and students.

Some preliminary findings suggest the potential of Ford PAS to have a significant impact on teaching and learning across the country. An action-research study conducted at a Lancaster, Pa., charter school looked at student outcomes in terms of acquisition of knowledge and skills necessary for future success as well as motivation to remain in school and pursue further education, in addition to changes in teacher practice resulting from professional development. The research included classroom observations, analysis of classroom artifacts, and student interviews and surveys. Analysis of the study data has not yet been completed, but the teacher-researcher found preliminary evidence that students in the class were more motivated and achieved at higher levels, and the teacher felt her own practice was more reflective and evidence-driven.

A 2005 implementation study (CNA Corporation, 2005) consisted of interviews with teachers and selected students as well as classroom observations at a small sample of schools. The results suggested that the program was realizing many of its initial goals and that even partial implementation, such as short-duration summer workshops, can affect students' academic and career aspirations, as well as improve critical thinking, communication and teamwork skills. The results of a 2006 case study noted the

potential of the Ford PAS, while providing cautionary evidence that implementation (specifically, teachers' capacity to use the materials with fidelity to the principles behind its design) and contextual factors make a significant difference (Hwalek, 2006). Finally, the 2008 implementation survey conducted as part of the evaluation provided further self-reported evidence of effects (Farr, Pedroso, & Sipes, 2009).

### ***The Relevance of the Ford PAS Model for Adult Education***

Like ConnectEd, the Ford PAS has elements that could be applied in adult education. These include implementing integrated curriculum modules on career-related themes; building the curriculum on academic and career cluster standards; linking classroom instruction to authentic applications; using a variety of assessments; incorporating technology; partnering with business and industry, postsecondary institutions and other community partners; and providing professional development face to face and online.

Some Ford PAS modules could be adapted for use with adults, such as Careers, Companies, and Communities, which explores careers through a project focused on local employment opportunities and personal career interests.<sup>11</sup> Because the units are modular, adult education programs could consider integrating one or more Ford PAS modules as the curriculum and class schedule allow. The Ford PAS emphasis on problem-solving, critical thinking and communication skills is consistent with many state adult education content standards. State or local programs could crosswalk the national standards reflected in the modules with their own adult education standards.

Like secondary CTE programs, adult education programs could use the Ford PAS curriculum to address some of the 16 national career clusters. They could consider partnering with nearby high schools that are Ford

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<sup>11</sup> In this module, students learn about the businesses and industries in their region, the range of positions employers may offer and the changing nature of the workplace. They gain information through interviews, classroom speakers, a worksite visit and other resources. Throughout the module, students develop technology skills: working with databases, creating and delivering presentations and doing Internet research.

PAS sites and build on the schools' existing relationships with business, postsecondary education and other community partners. Alternatively, programs could create their own Business/Education Advisory Councils to help develop an integrated curriculum, provide work-based learning opportunities and help students see the links among adult education, postsecondary education, employment and careers.

## Supports and Challenges

Like most other education reform efforts, curriculum integration requires a series of supports and enabling conditions to be successful. These include resources, such as well-designed curriculum materials, and other forms of support—for example, policies supporting integration and the commitment of school staff to the approach.

State, local, district and institutional policies and regulations can facilitate or impede curriculum integration. States can support curriculum integration by providing technical assistance and guidance to districts and schools in developing models, training teachers to develop and use integrated instruction and sharing curricula through clearinghouses (Brand, 2008). For example, in the late 1990s, the Maryland State Department of Education provided statewide training for teams of secondary academic and CTE teachers, school administrators, industry partners, postsecondary educators and others to develop projects integrating high-level academic and technical content. Teams then developed integrated curricula that incorporated the state academic and workplace readiness standards and national industry skill standards into one of four career clusters (Health and Biosciences; Manufacturing, Engineering Technology; Environmental, Agricultural and Natural Resources; Business Management and Finance). More experienced teams not only developed integrated units, they also aligned their curricula around an industry theme in one of the four clusters. The goal of each project was to engage and motivate students to master more complex materials by connecting concepts to real-world applications. The state encouraged local team efforts by providing grants to support the

integrated projects and by publishing and disseminating a collection of project descriptions statewide.<sup>12</sup>

Government also can help by reducing barriers, such as eliminating requirements for “seat time,” which can conflict with efforts to implement integrated curricula (Bodilly et al., 1993). Further, governments should recognize that legislative mandates on integration, while they can be helpful, do not necessarily create the elements that promote innovation in schools, such as vision, leadership, support, and financial and other resources (Stasz et al., 1995, 2004).

District and school staff need to share a vision for curriculum integration and a commitment to its implementation and success (Bodilly et al., 1993; Grubb et al., 1991; Johnson et al., 2003). This shared vision must be reflected in clearly defined core learning goals, such as academic and CTE content standards. Support by administrators is critical, and their leadership should demonstrate commitment, energy, organizational skills and the ability to be innovative, flexible and willing to take risks (Bodilly et al., 1993; Grubb et al., 1991; Johnson et al., 2003). Commitment and leadership are often evident in an investment of resources (Johnson et al., 2003). This includes providing sufficient funds for teacher preparation and ongoing professional development, curriculum development, planning time, materials and other resources (Bailey & Matasuzuka, 2003; Bodilly et al., 1993; Stasz et al., 2004).

Teacher buy-in can be a challenge when introducing any new instructional approach. According to a study of teacher participation in school improvement strategies, the key predictors of teacher buy-in are training, support from program developers and other staff, administrator buy-in and control over implementation in the classroom (Turnbull, 2002). In a study of eight schools with integration programs, researchers found that additional funding was needed for incentives and capacity building to avoid teacher burnout and their interpretation that integration was not really considered important (Bailey & Matasuzuka, 2003). In addition, teacher champions who show other teachers how curriculum integration can

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<sup>12</sup> For more information on this process, see Maryland State Department of Education (1999). *Blended instruction: Integrating curriculum through projects and curriculum alignment*. Baltimore: Author.

improve student outcomes can help make curriculum integration an accepted ongoing instructional practice (Johnson et al., 2003).

Administrative mandates, however, can get in the way and evoke teacher resistance (Stasz et al., 1995). Administrators should empower teachers and facilitate, but not force, integration (Finch et al., 1992, in Bodilly et al., 1993). Moreover, pedagogical change does not have to start from the top down; it can occur within and across classrooms. A study of enhanced math in CTE curricula found that the communities of teachers created by the study made the critical decisions and were able to improve measured performance in mathematics where the performance gap among students was most pronounced (Stone et al., 2008).

Developing teachers' capacity to implement integrated instruction is essential. Sustained professional development to build teacher capacity should include time for teachers to collaborate, learn about industry practices (for academic teachers), strengthen academic knowledge (for CTE teachers), participate in regular training and observe one another. According to the ConnectEd model, professional development for teachers in multiple pathways programs should:

- ✦ Build capacity among CTE teachers to recognize, reinforce and supplement key academic concepts and skills well suited to the industry that is the pathway's organizing theme
- ✦ Build capacity among academic teachers to apply their academic discipline to authentic problems and projects in the industry
- ✦ Develop model teacher preparation programs for training new academic and CTE teachers who will teach in multiple pathways (Hoachlander, 2007)

To address the challenges of identifying or developing high-quality curricula that integrate academic and technical content, in a recent study, curriculum developers and CTE and math experts enhanced the math and expanded the CTE content of the Automotive Youth Educational System and Ford PAS curricula. One goal of this approach was to increase the use of the integrated curriculum without asking teachers to develop integrated

units. On the basis of this experience, researchers identified lessons learned for enhancing academics within CTE curricula, including securing the requisite time and effort to change the content to accommodate math problems; incorporating academic and CTE expertise in curriculum development; and providing professional development for teachers to strengthen their math skills and learn to implement the integrated curriculum (Haimson, Stone, & Pearson, 2008).

Well-developed instructional materials are a must, as are projects and curricula based on academic, industry and workforce-readiness standards that combine CTE and academic content and skills (Bailey, 1997). Like other education reforms, integrated curriculum efforts can suffer if educational goals are not clearly defined. Goals can help define how resources should be allocated, for example, and set benchmarks for success (Hoachlander, 1999).

Student engagement is also essential to developing an effective integrated curriculum. Identifying and using students' interests in planning and implementing the integrated curriculum is key to their engagement in learning. Providing contexts, questions, materials and activities relevant to them is necessary, but it takes time and effort to integrate these into effective instruction (Hoachlander, 1999).

Industry and postsecondary partners can help engage students by providing work-based learning experiences, feedback to teachers on curriculum materials and feedback to students on their performance. Business partners should reinforce the importance of learning both technical and academic competencies, in addition to providing employment opportunities (Grubb et al., 1991).

### Curriculum Integration in Adult Education: Some Promising Initiatives

Several approaches to curriculum development in adult education resemble the secondary-level curriculum integration models explored in this paper. They include I\*CANS: Integrated Curriculum for Achieving Necessary Skills, integrated theme-based (ITB) instruction, I-BEST (Integrating Basic Education Skills Training), project-based learning for adult English language learners, workplace literacy and workforce basic skills education, and bridge programs.

*I\*CANS: Integrated Curriculum for Achieving Necessary Skills* was developed and implemented in the state of Washington by the Washington State Board for Community and Technical Colleges (SBCTC) in the 1990s to deliver basic skills instruction to youth and adults. With guidance from an advisory committee representing business and industry, employment and training agencies, and basic skills providers, I\*CANS was designed to help young people and adults develop the skills necessary for employment and their personal lives. The goals of the project included creating an instructional system for basic skills providers that combined ABE curriculum with the Job Training Partnership Act<sup>13</sup> skills program—basic competencies and essential workplace skills such as the American Society for Training and Development, Workplace Basics and SCANS; using contextualized instruction like ConnectEd and Ford PAS to increase student motivation and outcomes; and coordinating referrals among employment and training and basic skills providers. I\*CANS defined basic skills as learning to learn, thinking skills, personal management for the job, group effectiveness, math, reading, writing and communication. I\*CANS curriculum developers recognized that engaging students required creating authentic learning situations that were meaningful to students.

We also realized that each of us felt that learning, just like life, was a complex weaving of skills and experience—multi-modal, cross-disciplinary, and integrated. The traditional divisions between language and mathematics, science and art, politics and communication are no longer appropriate; instead, we saw the need to show the connections that bind these fields of inquiry together ([www.literacynet.org/icans/chapter01/themes.html](http://www.literacynet.org/icans/chapter01/themes.html)).

By encouraging students to become involved in decisions about what they wanted to learn, I\*CANS

was able to teach skills within real-world contexts or themes related to employment or other relevant issues students identified. This approach to developing and implementing theme-based learning relied heavily on learners' interests, reasons for participation and previous knowledge. Once learners completed a unit, they joined instructors in analyzing issues that emerged during the project and examining the processes used to address these issues (Dirkx & Prenger, 1997).

*Integrated theme-based instruction* (ITB) builds on I\*CANS and incorporates additional guidance on identifying themes and processes to fully integrate thematic instruction with basic skills and process skills. The "Guide for Planning and Implementing Instruction for Adults: A Theme-Based Approach," developed by Dirkx and Prenger (1997), outlines an approach to developing adult education curricula around themes integrating academic knowledge and skills with life, technical and process skills, such as problem-solving, critical thinking, teamwork, learning-to-learn and interpersonal skills. Based on interviews with instructors experienced in ITB instruction and on classroom observations, the guide describes the ITB process and offers guidelines for instructors interested in implementing ITB instruction.

Like the ConnectEd and Ford PAS models, ITB programs engage students in active learning within relevant contexts, and instruction responds to learning styles and incorporates cooperative learning and teamwork. Instructors identify themes—interrelated clusters of problems, issues or concerns—with input from students. ITB instruction advocates incorporating contexts, tasks, materials and procedures from settings in which students will be functioning.

The ITB approach is based on David Kolb's theory of experiential learning, in which adults move from concrete experiences and reflective observation to more abstract learning and then to action and experimentation with new knowledge (Kolb, Boyatzis, & Mainemelis, 1999). ITB students are actively involved in deciding what to learn and how they should learn it. ITB instruction does not emphasize rigorous academics, standards-based education and links to postsecondary education as much as the ConnectEd and Ford PAS models. However, some proponents have noted the need to include rigorous academics

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<sup>13</sup> The purpose of the Job Training Partnership Act (JTPA) of 1983, Public Law 97-300, was to improve occupational skills and employment opportunities for disadvantaged adults and youth by providing on-the-job training, job search assistance, basic skills education and work experience. The basic skills competencies included in JTPA were gaining proficiency in elementary reading, developing the ability to read effectively, learning to communicate ideas in written English, gaining knowledge of fundamental mathematics and understanding customary standards of measure.

within integrated curricula to help students transition to postsecondary education or training (Dirkx, 2006).

*I-BEST*, sponsored by SBCTC, is a well-documented approach to integrating workforce and basic skills training with the goal of accelerating the learning of low-skill adults. The program is based on research that suggests contextualized instruction can result in improved basic skills for adults (Jenkins, Zeidenberg, & Kienzl, 2009). *I-BEST* offers a minimum of one year of college, including employment opportunities, within a professional-technical certificate or associate's degree program. Research shows that a combination of at least two semesters of college credit and a certificate or other credential is the "tipping point" for improving earnings gains, meeting employer requirements and increasing postsecondary achievement (Prince & Jenkins, 2005).

*I-BEST* programs focus on occupations locally in demand. Like ConnectEd and other high school CTE integration models, *I-BEST* requires substantial coordinated planning among basic skills and workforce program administrators and faculty and depends on partnerships among campus academic and occupational departments, student services and local businesses. Students learn language, basic skills and college study skills within the context of workforce education in an occupation of their choice. Teams of adult basic education/English as a second language (ABE/ESL) instructors and professional-technical instructors align their curricula and co-teach an integrated course of language/literacy and workforce skills. Instructor teams share responsibility for outcomes, examine data and make changes on the basis of student progress. In 2007, SBCTC launched the Student Achievement Initiative to help more students reach the tipping point. The initiative provides a way to measure student outcomes and to identify incremental gains or "momentum points" that help students approach the tipping point.

Preliminary research is promising. In a 2005 study, *I-BEST* students earned five times more college credits and were 15 times more likely to complete workforce training than similar adult education students not participating in *I-BEST* (Washington State Board for Community and Technical Colleges [SBCTC], 2005). A recent report that examines students enrolled in basic skills and their transition to and success in college

(SBCTC, 2008) indicates that ABE/GED students in *I-BEST* and ESL students as a whole who combined basic skills with other instruction showed larger gains than students who studied basic skills only. Most recently, Jenkins and colleagues (2009) compared the educational outcomes over a two-year tracking period of *I-BEST* students with other basic skills students and found that *I-BEST* students attained better outcomes than the other students, including students taking a workforce course that was not an *I-BEST* course. Specifically, researchers found a higher probability that, compared with other basic skills students, *I-BEST* students would:

- Continue into credit-bearing coursework
- Earn credits that count toward a college credential
- Persist into a second year of college
- Earn an occupational certificate
- Make point gains on basic skills tests (such as Comprehensive Adult Student Assessment Systems [CASAS]) (Jenkins et al., 2009, pp. 3, 26).

Researchers caution, however, that the analysis results do not definitively prove a causal relationship between the *I-BEST* program and the higher student outcomes; the study may not account for other intervening factors, such as selection bias, participant motivation and other personal characteristics. In future studies, researchers plan to examine the student selection process further, identify solutions for selection bias and explore experimental-design research on the program (Jenkins et al., 2009).

*Problem-based learning for adult English language learners (ELLs)* provides contextualized learning by presenting learners with problems to solve or products to develop (Mathews-Aydinli, 2007; Moss & Van Duzer, 1998). The goal of problem-based learning in this context is to help adult ELLs develop problem-solving, language and literacy skills. In this approach, students learn the language by using it. Problem-based learning builds on participants' previous experience and may involve them in planning and choosing the focus of the project. Like CTE curriculum integration methods, problem-based learning for adult ELLs involves students in addressing open-ended, authentic problems without set solutions. Rather than presenting

information, teachers serve as facilitators by identifying problems for students to work on, introducing the problem and vocabulary related to the problem, providing assistance in locating resources, offering feedback and assessing student participation and outcomes (Mathews-Aydinli, 2007; Moss, 1998). Like similar approaches in CTE, the success of problem-based learning requires support from administrators, including providing professional development for instructors, making resources available for students and regularly assessing student progress.

Speaking, listening, reading and writing skills are incorporated, as are collaborative teamwork and problem-solving, negotiating and other interpersonal skills. Learners are encouraged to acquire new information that is important to them and challenged to use English in new and different contexts outside the class. Problem-based learning for adult ELLs may or may not integrate academic (English language acquisition) standards and CTE curriculum and standards.

Benefits of using problem-based learning in adult ELL instruction are documented in second language acquisition research, which shows the importance of classroom interactions in promoting language acquisition. Mathews-Aydinli (2007) reports that focusing on real-world issues results in more meaningful interactions among adult ELLs and in turn may advance second language acquisition (p. 5). However, this instructional strategy is not without challenges. One challenge occurs when teachers approach students working together. Citing research by Smith, Harris, and Reder (2005), Mathews-Aydinli (2007) reports that students may respond by interrupting their interaction with one another and turning to the teacher to solve the problem; as a result, they “may [refrain] from trying out linguistic strategies to solve problems on their own” (p. 5).

*Workplace literacy and workforce basic skills education* programs provide training in academic and workforce readiness skills essential for employee success and employer competitiveness. Basic skills typically include prose, document and quantitative literacy; communicating in English; critical thinking and problem-solving skills; and using technology and information systems (Bloom & Lafleur, 1999). Workforce basic skills education also may focus on improving workers’ academic skills unrelated to the workplace or other contexts.

Contextualized workforce basic skills programs often begin with an analysis identifying essential job tasks and the basic skills necessary to carry them out, followed by an assessment of workers’ skills. The result is a curriculum tailored to the needs of the workers and the workplace. These programs may focus on narrow job skills needed in the short term, rather than on knowledge and skills leading to high-skill, high-wage employment and careers (Jurmo, 2004).

A more collaborative approach to contextualized workplace basic skills instruction emphasizes the value of input from a variety of stakeholders (employers, unions and workers) in developing and implementing workplace education. This model is designed to increase learner motivation by building on the knowledge and expertise of program participants. As in ITB and adult ELL project-based learning, learners play a central role in determining the course content. This approach integrates “problem-posing and problem-solving,” important elements in the secondary CTE and other adult education models (Jurmo, 2004). However, the emphasis is on preparing adults for specific jobs rather than for broader careers.

*Bridge programs* help prepare adults with limited academic or English language skills to transition to and succeed in postsecondary education and training leading to employment in high-demand occupations (see [www.shifting-gears.org](http://www.shifting-gears.org)). For example, Illinois has a statewide initiative to promote bridge programs to offer adults the requisite academic, employability and occupational skills through contextualized instruction, career development and support services. Current efforts include supporting an action-research project to enhance education and work opportunities for low-wage and low-skill workers and to develop bridge programs in partnership with community-based organizations, community colleges and employers (see [www.iccb.state.il.us/docs/adulted/bridge/Bridge%20Grant.pdf](http://www.iccb.state.il.us/docs/adulted/bridge/Bridge%20Grant.pdf)).

Another example, the Instituto del Progreso Latino in Chicago, prepares adults for entry-level skilled manufacturing jobs and community college certificate programs in its Manufacturing Technology Bridge program. Spanish-speaking adults who test at the eighth grade level or higher on the Test of Adult Basic Education or CASAS in reading and math are eligible to enroll. Using contextualized materials from the manufacturing workplace, the program teaches applied mathematics, computer applications,

workplace communication and job-specific technical skills, such as blueprint reading and machining. Employment data show increased salaries and improved job retention for those who complete the program (Women Employed with Chicago Jobs Council and UIC Great Cities Institute, 2005).

## Curriculum Integration: Some Implications for Adult Education

What can adult education learn from secondary-level curriculum integration models? While adult education has already incorporated various approaches to the integrated curriculum, high school models may provide additional ideas for ways adult education programs could better prepare adults for further education and the workplace. Clearly, some models hold more promise than others, depending on a variety of factors.

Adult education is more heterogeneous than secondary education in many respects, including its diverse settings (ranging from community colleges to libraries to correctional institutions, among others); types of programs (ranging from ABE and ESL to family literacy, among others); curricular contexts (bridge programs, career pathways, etc.); schedule and structure (open or managed enrollment); and financial resources. Moreover, program leadership, student goals, accessibility of industry partners, relationships with postsecondary institutions and opportunities for professional development all influence the capacity of adult education programs to develop and implement the integrated curriculum.

That said, the integrated curriculum has the potential to help adult education instructors engage students in content relevant to their needs and interests, better prepare them for postsecondary education and the workforce and incorporate standards into curricula and instruction. Many states<sup>14</sup> have adopted adult education content standards in a variety of subjects, including reading, writing, mathematics, English language acquisition, science, social studies and citizenship preparation. Building an integrated

curriculum around these standards and national or state industry skill standards would both ensure clear educational goals and encourage the implementation of standards in adult education classrooms.

Three approaches might serve as useful templates for adult education: course integration, cross-curriculum integration and program integration.

### *Course Integration*

Adult education programs (including ABE, ASE and ESL programs) in community-based organizations, libraries and other settings with limited or no access to CTE teachers could integrate curricula by developing units that incorporate state adult education content standards and skill standards in local industries. Units focusing on cross-industry concerns, such as reducing workplace injuries, might be particularly useful.

Existing secondary programs, such as ConnectEd and Ford PAS, might be willing to collaborate with adult education organizations or programs to adapt their units and modules for use with adults (for example, see ConnectEd's Safety First and Ford PAS's Careers, Companies, and Communities units). Safety First is available at [http://review.mprinc.com/connected\\_beta/curriculum/downloads/SafetyFirst\\_CA.pdf](http://review.mprinc.com/connected_beta/curriculum/downloads/SafetyFirst_CA.pdf). To download a copy of the Careers, Companies, and Communities module, register at the Ford PAS Web site, [www.fordpas.org](http://www.fordpas.org).

Local businesses also might be willing to collaborate on developing integrated units incorporating career and technical content. Some adult education programs already have built partnerships with local businesses to develop curricula, improve programs and services, and expand employers' pipeline of prospective employees (Fowler & Chernus, 2004). Adapting a modular curriculum, such as that used by Ford PAS, also potentially could accommodate the open enrollment policies at many adult education programs.

### *Cross-Curriculum Integration*

Adult education instructors who have the opportunity to work with CTE instructors (such as in community colleges, other postsecondary institutions, correctional institutions and high schools) could develop inquiry-based projects integrating academic and CTE content and standards. This approach also could be used in pre-bridge programs that

14 Thirty-four states were in various stages of planning, developing and implementing adult education content standards as of 2006, according to an unpublished document: Chernus, K. (2006). *Support for state-level adult education content standards final report* (Contract No. ED04CO0121/0003). U.S. Department of Education. Berkeley, CA: MPR Associates, Inc.

have established relationships with bridge programs and industry partners. With ConnectEd's permission, the steps outlined in its "Designing a Multidisciplinary Integrated Curriculum: A Practical Manual" could be adapted for use in adult education, or a similar guide could be developed with input from adult education program administrators and instructors. Such a guide could serve as the basis for staff development provided either by states, as Maryland did, or by professional developers with knowledge of both curriculum integration and adult education.

***Program Integration: Career Pathways and Multiple Pathways, Career Clusters, Career Majors***

I-BEST is an example of how program integration can be implemented to serve adult students within a community college. A growing number of career pathways programs at other community colleges incorporate adult education. Although this approach is still relatively new, communities are beginning to recognize the need to provide a seamless path to further education, employment and careers for adults as well as young people.

Using ConnectEd's approach to integrating curricula into multiple pathways, adult education programs within career pathways could take advantage of opportunities to integrate ABE/ASE/ESL curricula with CTE curricula by developing integrated units on career-related themes with authentic applications; structuring the integrated curriculum around academic and technical content standards; providing academic and career advising support; engaging industry partners in developing curricula and providing work-based learning opportunities; and connecting the classroom to the workplace through work-based learning. As described above, ConnectEd's manual could be adapted, or a guide could be developed for adult education administrators and instructors to support staff development on curriculum integration. Adult education programs participating in career pathways could build or strengthen existing partnerships with business, industry and postsecondary education using the experiences of ConnectEd, Ford PAS or other CTE and adult education integration models as a guide.

***Adapting a Model for Adult Education:***

***The TechSMART Project-Based Learning Program***

TechSMART is an integrated curriculum that has been explicitly adapted from secondary CTE for use in adult education. TechSMART, a program being implemented in Boston, is based on the South Carolina Advanced Technical Education (SCATE) Technology Gateway industrial and engineering technology curriculum for high school and technical college students. Technology Gateway serves as the bridge to the South Carolina Advanced Engineering Technology program. Designed to improve student readiness for postsecondary education, Technology Gateway is an integrated, problem-based approach to teaching and learning that incorporates mathematics, physics, technology and communications in the context of solving industry-based problems.

TechSMART is a 28-week college prep program for adults with an interest in technical careers. Designed to improve the academic skills and achievement of unemployed and underemployed adults, TechSMART uses a modular, hands-on, problem-based curriculum integrated with math, science and communications courses. The program is offered through a partnership of the Benjamin Franklin Institute of Technology and Jewish Vocational Services, with funding from the City of Boston Neighborhood Jobs Trust.

The TechSMART curriculum includes scientific method and measurement; motion and simple machines; heating, ventilation and air conditioning (HVAC); electricity; light, optics and medical technology; and career exploration. Structured around a workplace problem to be solved by teams of students, instruction is built on the needs of industry and the students' prior knowledge. Each unit includes discussion, activities, experiments and projects, and provides a true integration of course content. To accomplish this integration, instructors work closely to align discussions, activities and skills needed for each project (Leonelli, 2008). Students begin by identifying what they know, what they need to know and how to learn what they need to know. Working with a team of communications and science/math instructors, students participate in oral and written activities, including discussions, reflection and research. They also have the opportunity to participate

in apprenticeships. An evaluation of TechSMART is in process, but initial results look promising.<sup>15</sup>

## Supports and Challenges in Implementing the Integrated Curriculum in Adult Education

Many of the supports identified in the secondary CTE curriculum integration models may also apply to curriculum integration in adult education:

- State and local policies supporting curriculum integration
- Shared vision and commitment by program administrators and instructors
- Sustained professional development, including time for instructors to collaborate
- Human and financial resources necessary to support ongoing professional development, curriculum development and planning time
- Clearly defined core learning goals based on academic, industry and workforce readiness standards
- Involvement of industry and postsecondary partners
- Well-developed integrated curriculum materials

Although research is needed to confirm these assumptions, it is reasonable to assume that many of the challenges of implementing curriculum integration in high schools may also apply to adult education. Such challenges include lack of teacher expertise in curriculum integration, administrators' lack of familiarity with integrated curriculum models and materials, loss of instructional focus resulting from lack of clearly defined educational goals and state and local policies that inhibit integration efforts.

Other challenges to implementing the integrated curriculum in adult education may come from the diverse

types of adult education programs and settings, limited access to instructors or others with occupational content expertise, lack of formal teacher preparation and limited staff development opportunities. It is important to note, however, that challenges related to instructor preparation and staff development are not unique to adult education, since teacher capacity and time to implement an integrated curriculum continue to pose barriers in secondary CTE programs, even where ongoing staff development and other support are available.

Despite these challenges, however, promising integration initiatives already under way in adult education demonstrate that an integrated curriculum approach is feasible, with positive results in student achievement, persistence, earnings and college credits (as noted in the description of I-BEST). States could support local curriculum integration efforts by offering staff development to adult education program administrators, instructors and postsecondary and business or industry partners and collecting and disseminating descriptions of different types of integration and products, such as project lesson plans, to adult education program administrators and instructors, as Maryland did.

Interest in curriculum integration may get a boost from anticipated changes in the reauthorized Adult Education and Family Literacy Act that may call for integrating adult education, including ESL, and occupational training to accelerate learning and help low-skill adults transition to the workforce and postsecondary education (Ganzglass & Strawn, 2009).

## Conclusion

High school educators have been wrestling for years with some of the same issues faced by adult educators, including how best to prepare students for a full range of future options: postsecondary education and training, employment and careers. To prepare students, high schools have begun to explore a combination of strategies for meshing academic instruction with career and technical education. These efforts include multiple pathways, work-based learning, collaboration with industry and the integrated curriculum.

Based on the experience of such initiatives as ConnectEd and Ford PAS, as well as efforts to integrate curricula in

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<sup>15</sup> Personal communication with Jackie Cornog, Chair, Humanities and Social Sciences Department, Assistant Dean of Academic Affairs Benjamin Franklin Institute of Technology, August 13, 2009.

adult education, it appears that blending academic and technical curricula can help both adults and youth prepare for postsecondary education and training. Recent labor market analyses suggest that adopting an integrated curriculum approach could help prepare adults for high-wage employment in middle-skill jobs in industries that will continue to need qualified workers. Research indicates that demand for workers in middle-skill jobs is expected to continue, despite labor market data highlighting increased demand projected for high-skill and low-skill occupations (Holzer & Lerman, 2009). Examples of middle-skill occupations include medical therapists, carpenters, computer specialists, electronic technicians, paralegals, HVAC technicians, machinists and police officers, among others. These positions typically require some education and training (e.g., certificate programs, apprenticeships, associate's degrees or substantial on-the-job training), but less than a four-year college degree.

Although more rigorous research is clearly needed, there are promising indications that an integrated curriculum can help adults acquire the knowledge and skills needed to transition to further education, employment and careers. Adult education programs can help prepare learners by considering the lessons learned from secondary programs that are integrating academic and technical curricula, as well as by expanding the curriculum integration efforts already under way in adult education.

## References

- Bailey, T. R. (1997). *Integrating academic and industry skill standards*. Berkeley, CA: National Center for Research in Vocational Education.
- Bailey, T. R., & Matasuzuka, Y. (2003). *Integration of vocational and academic curricula through the NSF Advanced Technology Education Program (ATE)*. New York: Teachers College, Columbia University.
- Bloom, M. R., & Lafleur, B. (1999). *Turning skills into profit: Economic benefits of workplace education programs*. New York: The Conference Board. Retrieved November 19, 2008 from [http://www.conferenceboard.ca/Libraries/EDUC\\_PUBLIC/Skills\\_Profits.sflb](http://www.conferenceboard.ca/Libraries/EDUC_PUBLIC/Skills_Profits.sflb)
- Bodilly, S., Ramsey, K., Stasz, C., & Eden, R. (1993). *Integrating academic and vocational education: Lessons from eight early innovators*. Santa Monica, CA: RAND.
- Bradby, D., Malloy, A., Hanna, T., & Dayton, C. (2007). *A profile of the California Partnership Academies 2004–2005*. Berkeley, CA: ConnectEd: The California Center for College and Career and the Career Academy Support Network, University of California, Berkeley.
- Brand, B. (2008). *Supporting high quality career and technical education through federal and state policy*. Washington, DC: American Youth Policy Forum.
- Carl D. Perkins Career and Technical Education Act of 2006 (Public Law 109-270). Retrieved November 21, 2008, from [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109\\_cong\\_bills&docid=f:s250enr.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:s250enr.txt.pdf)
- Casey, H., Cara, O., Eldred, J., Grief, S., Hodge, R., Ivanic, R., Jupp, T., Lopez, D., & McNeil, B. (2006). *Embedding literacy, language and numeracy in post-16 vocational programmes—The impact on learning and achievement*. London: National Research and Development Centre for Adult Literacy and Numeracy.
- Chernus, K., Sanborn, J., Hoachlander, E. G., Rahn, M., Alt, M., Jackson, M., Klein, S., Ramer, C., & Rossi, K. (2001). *Getting to work: Integrated curriculum*. Berkeley, CA: MPR Associates and National Center for Research in Vocational Education, University of California, Berkeley.
- Clayton, M., Ho, P. S., & Hudis, P. M. (2007). *Designing a multidisciplinary integrated curriculum: A practical manual*. Berkeley, CA: ConnectEd: The California Center for College and Career. Retrieved November 19, 2008 from <http://www.connectedcalifornia.org/curriculum/PracticalManual.pdf>
- CNA Corporation. (2005). *Ford PAS Implementation Study (2003–2005)*. Unpublished report.
- ConnectEd: The California Center for College and Career. (2008). *Why pathways? A better approach to transforming*

- high school education in California*. Berkeley, CA: Author. Retrieved April 23, 2009 from [http://www.connectedcalifornia.org/publications/CE\\_Pathways\\_8.pdf](http://www.connectedcalifornia.org/publications/CE_Pathways_8.pdf)
- Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education*. New York: E. P. Dutton.
- Dirkx, J. M. (2006). PowerPoint presentation, "Curriculum Integration for Alternative Education and Adult Learners," at 2006 MAC2 Conference.
- Dirkx, J. M., & Prenger, S. M. (1997). *Guide for planning and implementing instruction for adults: A theme-based approach*. San Francisco: Jossey-Bass.
- Donovan, M. S., Bransford, J. D., & Pellegrino, J. W. (2000). *How people learn: Brain, mind experience and school*. Washington, DC: National Academic Press. Retrieved December 31, 2008, from <http://www.nap.edu/open-book.php?isbn=0309070368>
- Farr, B., Bradby, D., Hartry, A., Sipes, L., Hall, L., & Tasoff, S. (2009). *Evaluation of demonstration sites in the ConnectEd Network*. Berkeley, CA: MPR Associates, Inc.
- Farr, B., Pedroso, R., & Sipes, L. (2009). *2008–09 Evaluation of Ford PAS Implementation*. Unpublished report.
- Ford Motor Company Fund. (2008). *Using the Ford PAS curriculum materials*. Retrieved November 18, 2008, from [http://www.fordpas.org/downloads\\_public/UsingFordPASMaterails.pdf](http://www.fordpas.org/downloads_public/UsingFordPASMaterails.pdf)
- Fowler, D., & Chernus, K. (2004). *Commitment comes in all shapes and sizes*. Washington, DC: MPR Associates, Inc., and U.S. Department of Education. Retrieved May 5, 2009 from <http://www.c-pal.net/profiles/complete/synthesis.pdf>
- Ganzglass, E., & Strawn, J. (2009). *Using increased funding under the Workforce Investment Act to create multiple pathways to marketable postsecondary credentials and middle-class employment*. Washington, DC: Center for Law and Social Policy (CLASP).
- Gardner, H. (1993). *The unschooled mind: How children think and how schools should teach*. New York: Basic Books.
- Grubb, W. N., David, G., Lum, J., Plihal, J., & Morgaine, C. (1991). "The cunning hand, the cultured mind": *Models for integrating vocational and academic education*. Berkeley, CA: National Center for Research in Vocational Education.
- Haimson, J., Stone, J., & Pearson, D. (2008). Infusing academics into career and technical education. *Issue Brief: Trends in education research*. Princeton, NJ: Mathematica Policy Research. Retrieved May 5, 2009 from <http://www.mathematica-mpr.com/publications/PDFs/cet.pdf>
- Hwalek, M. (2006). *Ford Partnership for Advanced Studies at the Advanced Technology Academy*. Dearborn, MI: Advanced Technology Academy.
- Hoachlander, E. G. (1999). Integrating academic and vocational curriculum—Why is theory so hard to practice? *Centerpoint*, 7. Berkeley, CA: National Center for Research in Vocational Education.
- Hoachlander, E. G. (2007). *Transforming today's education for tomorrow's economy: New directions for career technical education in California*. Presentation to California's Little Hoover Commission. Retrieved January 2, 2009, from <http://www.lhc.ca.gov/lhcdir/CTE/HoachlanderMar07.pdf>
- Hoachlander, E. G., Sterns, R. J., & Studier, C. (2008). *Expanding pathways: Transforming high school education in California*. Berkeley, CA: ConnectEd: The California Center for College and Career.
- Hollenbeck, K., & Timmeney, B. (2009). *Lessons learned from a state-funded workplace literacy program*. Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.
- Holzer, H. J., & Lerman, R. I. (2009). *The future of middle-skill jobs*. Washington, DC: Brookings Institution.
- Jenkins, D. (2006). *Career pathways: Aligning public resources to support individual and regional economic advancement in the knowledge economy*. New York: Workforce Strategy Center.

- Jenkins, D., Zeidenberg, M., & Kienzl, G. (2009). *Educational outcomes of I-BEST, Washington State Community and Technical College System's Integrated Basic Education and Skills Training program: Findings from a multivariate analysis*. New York: Community College Research Center, Teachers College, Columbia University.
- Johnson, A. B., Charner, I., & White, R. (2003). *Curriculum integration in context: An exploration of how structures and circumstances affect design and implementation*. Minneapolis: National Research Center for Career and Technical Education. Retrieved November 24, 2008 from <http://aer.sagepub.com/cgi/content/abstract/45/3/767>
- Jurmo, P. (2004). Workplace literacy education: Definitions, purposes and approaches. *Focus on Basics: Connecting Research and Practice*, 7(Issue B). Cambridge, MA: National Center for the Study of Adult Learning and Literacy. Retrieved November 16, 2008 from <http://www.ncsall.net/?id=629>
- Kemple, J. J., & Willner, C. J. (2008). *Career academies: Long term impacts on labor market outcomes, educational attainment and transitions to adulthood*. New York, NY: Manpower Development Research Corporation (MDRC). Retrieved June 11, 2009 from <http://www.mdrc.org/publications/482/full.pdf>
- Kirsch, I., Braun, H., Yamamoto, K., & Sum, A. (2007). *America's perfect storm: Three forces changing our nation's future*. Princeton, NJ: Educational Testing Service. Retrieved December 22, 2008 from [http://www.ets.org/Media/Education\\_Topics/pdf/AmericasPerfectStorm.pdf](http://www.ets.org/Media/Education_Topics/pdf/AmericasPerfectStorm.pdf)
- Kolb, D., Boyatzis, R. E., & Mainemelis, C. (1999). *Experiential learning theory: Previous research and new directions*. Cleveland, OH: Case Western Reserve University. Retrieved December 5, 2008 from <http://www.learningfromexperience.com/images/uploads/experiential-learning-theory.pdf>
- Leonelli, E. (2008). Engaging adults in active learning: The TechSMART project-based learning program. *Field Notes*, 17(4). System for Adult Basic Educational Support (SABES). Boston: Adult and Community Learning Services, Massachusetts Department of Elementary and Secondary Education. Retrieved August 3, 2009 from <http://www.sabes.org/resources/publications/fieldnotes/vol17/fn174.pdf>
- Mathews-Aydinli, J. (2007). *CAELA Brief: Problem-based learning and adult English language learners*. Washington, DC: Center for Adult English Language Acquisition, Center for Applied Linguistics.
- Moss, D. (1998). *Project-based learning and assessment: A resource manual for teachers*. Arlington, VA: Arlington Education and Employment Program (REEP).
- Moss, D., & Van Duzer, C. (1998). *Project-based learning*. Washington, DC: Center for Applied Linguistics. Retrieved January 4, 2009, from [http://www.cal.org/Caela/esl\\_resources/digests/ProjBase.html](http://www.cal.org/Caela/esl_resources/digests/ProjBase.html)
- National Center for Education Statistics. (2003). *National assessment of adult literacy*. Retrieved August 3, 2009 from <http://nces.ed.gov/naal/index.asp>
- National Mathematics Advisory Panel. (2008). *Foundations for success*. Washington, DC: U.S. Department of Education.
- Prince, D., & Jenkins, D. (2005). *Building pathways to success for low-skill adult students: Lessons for community college policy and practice from a statewide longitudinal tracking study* (CCRC Research Brief No. 25). New York: Columbia University, Teachers College, Community College Research Center. Retrieved February 9, 2009 from <http://ccrc.tc.columbia.edu/Publication.asp?UID=288>
- Richmond, E. (2009, June). Preparing students for college and career: California's multiple pathways. *Issue Brief*. Washington, DC: Alliance for Excellent Education. Retrieved August 20, 2009 from <http://www.all4ed.org/files/IssueBriefCAMultPathways.pdf>
- Smith, C., & Gillespie, M. (2007). Research on professional development and teacher change: Implications for adult basic education. In J. Comings, B. Garner,

- & C. Smith (Eds.), *Review of adult learning and literacy: Connecting research, policy, and practice*, 226-234. Philadelphia: Lawrence Erlbaum Associates, Inc.
- Stasz, C., Bodilly, S., Remes, S., Oyadomari-Chun, T., McCaffrey, D., Kaganoff, T., & Barnes, D. (2004). *Efforts to improve the quality of vocational education in secondary schools: Impact of federal and state policies*. Santa Monica, CA: RAND.
- Stasz, C., Kaganoff, T., & Eden, R. A. (1995). *Integrating academic and vocational education: A review of the literature, 1987–1992*. Santa Monica, CA: RAND.
- Stern, D., & Stearns, R. (2006). *Combining academic and career-technical courses to make college an option for more students: Evidence and challenges*. Berkeley, CA: ConnectEd: The California Center for College and Career.
- 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. Retrieved November 11, 2008, from <http://aer.sagepub.com/cgi/content/abstract/45/3/767>
- Stone, J. R., Alfeld, C., Pearson, D., Lewis, M. V., & Jensen, S. (2006). *Building academic skills in context: Testing the value of enhanced math learning in CTE*. St. Paul, MN: National Research Center for Career and Technical Education. Retrieved November 11, 2008, from <http://136.165.122.102/UserFiles/File/Math-in-CTE/MathLearningPilotStudy.pdf>
- Stone, J. R., Kowske, B. J., & Alfeld, C. (2004). Career and technical education in the late 1990s: A descriptive study. *Journal of Vocational Education Research*, 29(1). Blacksburg, VA: American Vocational Education Research Association. Retrieved November 11, 2008, from <http://scholar.lib.vt.edu/ejournals/JVER/v29n3/stone.html>
- Svinicki, M. D. (2002). *Some applied learning theory*. Austin, TX: Center for Teaching Effectiveness, University of Texas, Austin. Retrieved January 2, 2009, from <http://www.utexas.edu/academic/cte/sourcebook/learningtheory.html>
- Tamassia, C., Lennon, M., Yamamoto, K., & Kirsch, I. (2007). *Adult education in America: A first look at results from the adult education program and learner surveys*. Princeton, NJ: Educational Testing Service. Retrieved November 24, 2008 from [http://www.ets.org/Media/Research/pdf/ETSLITERACY\\_AEPS\\_Report.pdf](http://www.ets.org/Media/Research/pdf/ETSLITERACY_AEPS_Report.pdf)
- Turnbull, B. (2002, Spring). Teacher participation and buy-in: Implications for school reform initiatives. *Learning Environments Research*, 5(3), 235–252. Netherlands: Kluwer Academic Publishers.
- Warford, L. (Ed.). (2006). *Pathways to student success: Case studies from the College and Career Transitions Initiative*. Phoenix, AZ: League for Innovation in the Community College. Retrieved August 26, 2009 from [http://www.league.org/league/projects/ccti/files/CCTI\\_Pathway\\_Book.pdf](http://www.league.org/league/projects/ccti/files/CCTI_Pathway_Book.pdf)
- Washington State Board for Community and Technical Colleges (SBCTC). (2005). *I-BEST: A program integrating adult basic education and workforce training*. Olympia, WA: Author.
- Washington State Board for Community and Technical Colleges (SBCTC). (2008). *Increasing student achievement for basic skills students* (Research Report No. 08-1). Olympia, WA: Author.
- Women Employed. (n.d.). *Building bridges to college and careers for Illinois adults*. Chicago: Author. Retrieved May 28, 2009 from <http://www.womenemployed.org/fileadmin/templates/docs/BridgeFactSheet.pdf>
- Women Employed with Chicago Jobs Council and UIC Great Cities Institute. (2005). *Bridges to careers for low-skilled adults: A program development guide*. Chicago: Women Employed.
- Zambrowski, A., & Gordon, A. (1993). *Evaluation of the minority female single parent demonstration project: Fifth-year impacts at CET*. Princeton, NJ: Mathematica Policy Research, Inc.