



Charting a New Course for Career and Technical Education

Issue Papers The High School Leadership Summit

For much of the 20th century, vocational education in American high schools had a clear objective: preparing students for entry-level jobs in occupations that did not require additional education or training beyond high school. The largest high school programs were agriculture, business (primarily clerical), and trade and industry, which included, among other fields, automotive, construction trades, food services, and cosmetology. These programs were designed mainly to serve students who did not plan to go to college. Academic expectations for “vocational” students were generally low, and the math, science, and English courses to which they were assigned were typically less rigorous than those provided for their college bound peers.

This strategy prevailed for a good part of the last century. Americans with lower-level academic skills and a set of narrow, job-specific technical skills could fare relatively well in the economy if they possessed a solid work ethic. Jobs requiring low- and medium-level skills were plentiful and provided sufficient wages to support a family.

This is no longer true.

Technology and global economic competition are combining in unprecedented ways to change work and redefine the American workplace. Unlike jobs a half-century ago, most of today’s jobs that pay family-supporting wages and offer opportunities for advancement demand strong academic and technical skills, technological proficiency, and further education and training beyond high school.

Policy-makers, school and college administrators, educators, and employers across the nation are rising to these challenges and charting a new course for career and technical education (CTE). They are forging new pathways to success for young people interested in technical careers by:

- Setting and helping CTE students to meet higher academic and technical skill expectations;
- Easing the transition of CTE students to postsecondary education and advanced training; and
- Raising the rigor of CTE instruction.

Setting and Helping CTE Students to Meet Higher Expectations

To succeed in our economy, all high school students, regardless of their post-graduation plans, must acquire a high level of academic knowledge and skills during high school. Employers are demanding stronger reading, writing, and math skills of all of their workers—and reporting that too many recent high school graduates are not making the grade. Seventy-three percent of employers rate the writing skills of recent high school graduates as fair or poor, while 63 percent express dissatisfaction with graduates’ math skills.¹

Certainly, there are jobs available for young people who decide to enter the job market immediately after high school. However, without strong academic skills they may have difficulty accessing on-the-job or other training opportunities they will need to advance in their careers. Moreover, in such a dynamic economy as ours, a young person just starting out can expect to change jobs as many as 15 times over the next half-century they will participate in the workforce.² Men and women who have a solid academic foundation will be the most able to adapt nimbly to changes in the economy, family circumstances, and personal interests that may require them to learn new skills.

Thoughtful education leaders and practitioners are working on several fronts to ensure that all students, including those choosing a technical program of study, leave high school with the solid academic foundation they will need for a lifetime of employment and education.

High Schools That Work (HSTW) is a comprehensive school reform strategy initiated by the Southern Regional Education Board in 1987 to improve the academic achievement of CTE students. It has now expanded its mission to encompass the entire high school curriculum. HSTW expects students to combine their technical studies with college preparatory academics consisting of at least:

- 4 credits of English;
- 3 credits of mathematics including Algebra I, Algebra II, and Trigonometry;
- 3 credits of science, including 2 in college preparatory biology, chemistry, or physics;
- 3 credits of social studies; and
- One-half credit in basic computing technology.

This reform model also strongly encourages participating high schools to offer a “major” in a technical or non-technical area, more intensive career guidance and academic counseling, and tutorial assistance for students who need extra help. HSTW has become one of the most widely recognized high school reform strategies in the United States, with a network of 1,100 participating high schools in 27 states. Student performance on math and reading assessments has significantly improved at many of the participating high schools.³

Talent Development High School. The educational needs of young people attending high poverty, urban high schools are particularly acute. By some estimates, the typical 9th grade student in a high poverty, urban community enters high school with 5th to 6th grade reading and math skills.⁴ *Talent Development High School with Career Academies* is a research-based reform model created by the Center for Research on the Education of Students Placed At Risk that is designed to help troubled urban high schools increase student achievement and provide quality career and technical education. Ninth grade students attend small, self-contained “success academies” taught by interdisciplinary teams of teachers. All students complete a study skills course and instructional time is doubled in math and English for those students with below grade level skills. Grades 10 through 12 are structured as career academies that offer a common core of academic courses with a blend of career and technical education courses. Tutoring and extra help are easily accessible. Teachers are provided time during the school day to plan and consult with their colleagues. “Coaches” also provide teachers with sustained, intensive professional development to support their work with students.⁵

Some high schools implementing the model are seeing promising results. At 2 Philadelphia high schools that began implementing Talent Development 3 years ago, for example, the number of 9th grade students who have remained in school through 11th grade has doubled. Student performance on standardized academic assessments is also rising. At one school, the percentage of 11th graders scoring “below basic” on the Pennsylvania math assessment dropped from 91 percent to 56 percent in a single year.⁶

First Things First. Developed by the Institute for Research and Reform in Education, *First Things First* is another promising comprehensive school reform model that uses smaller learning communities, such as career academies, as one of its central improvement strategies.⁷ Kansas City, Kansas began implementing First Things First in all of its schools in 1997 and is now reporting some impressive results. The graduation rate has increased significantly and student achievement has improved in reading and math at all grade levels.⁸

Easing the Transition of CTE Students to Postsecondary Education, Advanced Training, and Apprenticeships

Entering most high-demand, technical occupations that pay family-supporting wages now requires completion of some training or education beyond high school. Making the pathway from high school to further education seamless and easily navigable is essential to preparing young people for the future.

Tech-Prep. Tech-Prep was designed to prepare students for technical careers through a 4-year program of related academic and vocational course work. The Tech-Prep program was conceived to span the last 2 years of high school and first two years of community college. Now more than a decade old, the federal initiative has spawned more than 1,000 local consortia of community colleges, local educational agencies, and businesses that promote the pursuit of higher education by CTE students. Many outstanding programs have emerged from this movement, but they are too few in number. Only an estimated 10 percent of Tech-Prep consortia offer the comprehensive “2 + 2” model envisioned by the proponents of the program, serving about 5 percent of Tech-Prep students. Only 15 percent of Tech-Prep high school students earn and use college credits for “articulated” technical courses offered through Tech-Prep programs⁹

The engineering technology program established by the *Miami Valley Tech-Prep Consortium* in Dayton, Ohio, demonstrates how effective the Tech-Prep model can be when it is implemented comprehensively. The program begins in high school with a mix of rigorous academics and technical coursework and culminates with one of the 15 associate degree engineering programs at Sinclair Community College. While in high school, students may earn up to 15 articulated credits toward their degrees. To assess their academic preparation for college, students take the COMPASS math and reading placement test during their junior year, giving them more than a year to address skill deficits that might cause them to be placed in remedial classes in college. Students who complete the high school portion of the program and continue in their studies at Sinclair receive a \$3,000 scholarship that is paid from non-federal funds. A 2002 quasi-experimental evaluation found that participants in the program were less likely to need remediation when they entered college and were more likely to return to continue their studies the following year.¹⁰

Middle colleges. A growing number of community and technical colleges are creating high schools on their campuses that support and accelerate the transition to college through a blend of secondary and postsecondary coursework. Many of these “middle colleges” focus on helping average to low-achieving students make successful transitions to postsecondary education. *Washtenaw Technical Middle College* (WTMC) is a charter high school that serves approximately 300 at-risk students on the campus of Washtenaw Community College in Ann Arbor, Michigan. Many of its students have low literacy skills or diagnosed learning or other disabilities. To help entering students transition successfully to college credit courses, WTMC offers academic “core transition” courses, career development seminars and study skills courses. Students then proceed to dual credit academic and technical courses offered by the college, as they continue to receive academic support, counseling, and other services from WTMC. Paid workplace internships are part of the curriculum. Students must earn a postsecondary certificate or an associate degree in one of 37 career areas in order to graduate. During the 2000-01 school year, 73 percent of WTMC graduates earned at least a postsecondary certificate in addition to their high school diploma. More than half earned an associate degree.¹¹

Distance learning. Community and technical colleges also are taking advantage of distance learning technologies to give CTE students in rural, geographically isolated communities, the opportunity to participate in dual credit technical courses. For example, through an innovative distance learning partnership with *Garden City Community College*, small high schools in southwest Kansas are now able to offer their students a full complement of agriculture courses that they otherwise could not afford to provide on their own. Garden City instructors use live, interactive television to teach a sequence of dual credit agriculture courses to students across southwest Kansas. Students may earn up to nine college credits that they may apply toward degrees offered by Garden City and other area community colleges, as well as Kansas State University and Fort Hays State University.

Apprenticeships. Apprenticeships that combine classroom instruction with paid work-based learning provide another important avenue to careers that offer family-supporting wages. Employers, employer groups, and employee associations currently sponsor apprenticeships in more than 500 occupations. They are particularly common in construction and manufacturing occupations. Apprentices must complete a minimum of 2,000 hours of closely supervised on-the-job training for which they are paid wages that are often about half of what is paid a fully trained worker. They must also complete related academic and technical coursework that is often provided by a community college or other educational institution. Graduates of registered apprenticeship programs are awarded journey worker certificates that are recognized by employers nationwide.¹²

Apprenticeships in many higher-paying occupations are very competitive, and applicants with strong communication and math skills, as well as some foundation technical skills related to the occupation, have a clear advantage. To help more

young people access apprenticeship opportunities, a number of high schools, community colleges, and apprenticeship sponsors have created “pre-apprenticeship” programs that offer high school students academic and technical instruction and part-time, on-the-job training that lead seamlessly into a full-time apprenticeship after they graduate from high school.

Raising the Rigor of CTE Instruction

Many of the fastest-growing and better-paying occupations also now require a higher level of technical skills than ever before. Automotive industry experts, for example, note that the cars and trucks sold today “feature more sophisticated components than were in the NASA Apollo 11 spacecraft,”¹³ demanding more advanced technical know-how from service technicians than in previous decades. To help students meet these higher expectations, CTE leaders are working closely with industry partners to create a new generation of more technically rigorous CTE programs.

State standards and assessments. A number of states are implementing content standards for CTE courses and assessments that measure the technical skills of CTE students. For example:

- Through its Vocational Competency Achievement Tracking System (VoCATS), *North Carolina* has developed industry-validated blueprints for 129 CTE courses that include curricula, instructional strategies, and item banks for use by teachers to construct classroom tests and by the state to develop assessments for accountability purposes. CTE students must complete a criterion-referenced, end-of-course assessment, the results of which count as part of their final grade. The state also uses the assessment results to evaluate local programs.¹⁴
- *Pennsylvania* assesses the technical skills of all students who complete a CTE program using an array of tests developed by the National Occupational Competency Testing Institute and industry associations, such as the Air Conditioning and Refrigeration Institute and the Computer Technology Industry Association. The state uses student performance data to evaluate local CTE programs. Each student who scores at or above the national norm on the assessment is awarded a state skills certificate.¹⁵
- The *Utah* Skill Certificate Program awards incentive funding to participating school districts on the basis of the performance of their CTE students on industry certification tests, state licensing exams, and skill assessments developed by the state in partnership with industry. Students who perform well on the assessments are awarded skills certificates.¹⁶

Industry-developed curricula. In many career areas, industry is expanding beyond its more traditional role as a curriculum advisor to take the lead in developing and supporting the implementation of a specific curriculum. For example:

- Launched in 1990 by the Ford Motor Company, the *Ford Academy of Manufacturing Sciences* (FAMS) includes a paid internship and courses in manufacturing systems and processes, technology, science, and math that promote teamwork and the use and application of math and science knowledge to solve workplace problems. More than 70 high schools are now using the FAMS curriculum.¹⁷
- Founded by the Associated Builders and Contractors and other national construction associations, the *National Center for Construction Education and Research* (NCCER) offers

Who Participates in CTE?

Participation of High School Graduates in CTE: 1998

- 96 percent of 1998 public high school graduates earned one or more credits in any form of career and technical education
- 44 percent of 1998 public high school graduates earned three or more credits in occupational courses
- 25 percent of 1998 public high school graduates earned three or more credits in a *single* occupational program area (health care, agriculture, business, technology, marketing, food service and hospitality, protective services, child care and education, personal and other services, and trade and industry precision)
- 19 percent of 1998 high school graduates earned three or more credits in *more than one occupational* program area (e.g., business services and agriculture)

Interim Report to Congress, National Assessment of Vocational Education, U.S. Department of Education, 2002.

modular training curricula in carpentry, plumbing, and other skilled crafts for students who aspire to careers in construction and related fields, as well as current professionals who want to update their skills.

- Supported by major automobile manufacturers and dealer associations, *Automotive Youth Educational Systems* (AYES) provides young people with the foundation technical and applied academic skills they need to secure entry-level employment as service technicians and to pursue college-level studies in automotive technology or advanced technical training offered by automobile manufacturers. Local automobile dealers are actively involved in the implementation of the program, offering each student a paid internship and mentoring by an experienced mechanic. More than 330 schools in 44 states currently offer an AYES program.¹⁸

A Challenge for a New Century

Innovation and creative reform in CTE abounded at the close of the 20th century. Forward-looking men and women in many communities across the United States recognized the dramatic changes unfolding in our economy and began the difficult work of re-tooling, and sometimes rethinking, how we prepare young people for occupations in many technical fields. Our challenge as we enter a new century is bringing their innovations to scale—helping all schools in all communities rise to the new standards of excellence that are being set by these pioneers.

College and Career Transitions Initiative

Launched by the U.S. Department of Education in 2002, the College and Career Transitions Initiative (CCTI) will identify effective strategies, program models, and curricula that ease student transitions from high school to postsecondary technical programs in the high-demand occupational areas of information technology, health care, engineering, law and public safety, and teacher education.

CCTI is supporting 15 community college/high school partnerships that will develop academically rigorous programs of study that connect course offerings at the secondary level with increasingly advanced academic and technical courses at the postsecondary level. Projects must implement the following elements:

- A coherent sequence of high-level academic and technical skill coursework in high school that includes dual credit technical education courses;
- Rigorous academic instruction that is based on state standards;
- Sustained and intensive professional development for teachers and college instructors;
- Academic and career related counseling and other student services;
- Creative delivery strategies, such as distance learning and computer assisted applications; and
- Articulation between associate and bachelor degree programs.

More information about the initiative is available at: <http://www.league.org/league/projects/ccti>.

Endnotes

¹ Public Agenda. 2002. *Reality Check 2002*. New York, NY.

² Business-Higher Education Forum. 2003. *Building a Nation of Learners, 2003*. Washington, DC.

³ Bottoms, Gene and Presson, Alice. *Finishing the Job: Improving the Achievement of Vocational Students*. (Atlanta, Georgia: Southern Regional Education Board, 1999).

⁴ Balfanz, Robert, McPartland, James and Shaw, Alta. *Re-conceptualizing Extra Help for High School Students in a High Standards Era*. (Baltimore: Center for Social Organization of Schools, Johns Hopkins University, 2002).

⁵ Talent Development High Schools, Center for the Social Organization of Schools. 2003. *What is the Talent Development High School?* Philadelphia. <http://www.csos.jhu.edu/tdhs/>.

⁶ Spiridakis, Kurt. *Year Three of the Talent Development High School Initiative In Philadelphia: Results from Five Schools*. (Philadelphia: Philadelphia Education Fund, 2002).

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- ⁷ Institute For Research and Reform In Education. 2003. *First Things First: An Introduction* .2000.; *First Things First: A Framework for Successful School Reform*. Philadelphia, PA.
- ⁸ Kansas City, Kansas Public Schools. 2003. "State reading, math scores skyrocket for KCK schools," May 28, 2003; and Institute for Research and Reform in Education. 2003. "Kansas City, Kansas Public Schools report dramatic district-wide gains in student achievement unprecedented in an urban public school district," May 29, 2003.
- ⁹ Hershey, et al. *Focus for the Future*. Princeton, NJ: Mathematica Policy Research, Inc., 1999.
- ¹⁰ Krile, Donna J. and Parmer, Penelope. *Tech Prep: Pathways to Success? The Performance of Tech Prep And Non-Tech Prep Students at a Midwestern Community College*. (Dayton, Ohio: Office of Institutional Planning and Research, Sinclair Community College, 2002.).
- ¹¹ Kazis, R. and Liebowitz, M. (2003). *Opening Doors to Earning Credentials: Curricular and Program Format Innovations that Help Low-Income Students Succeed in Community College*. (New York, NY: Manpower Demonstration Research Corporation, 2003).
- ¹² Crosby, O. "Apprenticeships: Career Training, Credentials—and a Paycheck in Your Pocket." *Occupational Outlook Quarterly, Summer 2002*. (Washington DC: Bureau of Labor Statistics, U.S. Department of Labor (2002).
- ¹³ AYES - Automotive Youth Education Services, *Changing the Face of Technical Education*. Internet website. 2003. www.ayes.org.
- ¹⁴ North Carolina North Carolina Department of Public Instruction website, North Carolina North Carolina Department of Public Instruction website. 2003. http://www.dpi.state.nc.us/workforce_development/vocats/index.html.
- ¹⁵ Bureau of Career and Technical Education, Pennsylvania Department of Education. 2003. *A Guide to Student Occupational Competency Testing in Pennsylvania*. Harrisburg, PA.
- ¹⁶ *Utah Skill Certificate Program*. Utah State Office of Education website. 2003. <http://www.usoe.k12.ut.us/ate/Skills/skills.htm>.
- ¹⁷ *Ford Academy of Manufacturing Sciences: A Learning Community for the 21st Century*. Internet. 2003. <http://www.famsonline.org>.

This paper is one of a series produced in conjunction with the U.S. Secretary of Education's **High School Leadership Summit**. For more information about the U.S. Department of Education's work on high schools, visit <http://www.ed.gov/about/offices/list/ovae/pi/hsinit/index.html>.