SCHOOL TO WORK OPPORTUNITIES
U.S. DEPARTMENT OF EDUCATION ★ U.S. DEPARTMENT OF LABOR

Building Strong School-to-Work Systems

Illustrations of Key Components

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PREPARING YOUTH FOR THE FUTURE

Acknowledgments

The project that led to this report was suggested to us by Sam Halperin. Irene Lynn encouraged us to carry it forward. We are grateful to all the people who spoke with us and sent us written information about their systems in progress. Our greatest debt is to those we visited, who gave generously of their time and experience. Some are identified in the text; they represent many more who are not.

We were ably assisted by staff, including Ilaria Keogh, Amy Levitt, and Amy Tietjen-Smith, and by students, including Annette Gifford, Tara Howard, and Natasha Serrant. Judith Stewart and her colleagues edited the text. Robin Werner assisted with the publication. Linda Haylor Mikula designed the publication. We are grateful for their care, their talent, and their speed.

This project was conducted and the report prepared with funds from the National School-to-Work Opportunities Office, a partnership of the U.S. Department of Education and the U.S. Department of Labor. Authors undertaking such projects are encouraged to express their professional judgment freely. Therefore, points of view or opinions expressed in this document do not necessarily reflect the official position or policy of the National School-to-Work office or of the two departments.

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Executive Summary

The purpose of the School-to-Work Opportunities Act of 1994 is to stimulate the creation of systems that foster young people's transition from being primarily students to being productive workers. We define a system as being inclusive, internally coherent, externally connected, and enduring. Case studies are presented here to illustrate how people around the country are building school-to-work systems and to guide readers who are building systems of their own.

We looked for good examples—not necessarily the best—at four different levels: single schools, school districts, regional consortia of school districts, and states. We added a fifth level, corporate initiatives. To identify case study sites, we consulted experts, read printed material and information on the World Wide Web, and conducted telephone interviews to screen prospective sites. We visited at least two sites representing each level, interviewed participants, and collected more documents.

Our portrayal of systems in progress mirrors the three key components identified by the act: school-based learning aimed at high academic standards; work-based learning organized around skill standards; and connections between school-based and work-based learning. When all three components are well developed, a system is imminent if not present. However, because some aspects of system building do not fall neatly within these categories, such as inclusiveness and endurance, we added a fourth section to each case study and called it "system building." These categories have permeable boundaries; the components are mutually reinforcing, and comprehensive systems cut across the five levels.

Schools

Schools are the fundamental unit for education reform. Whether academic standards are set by the school, the district, or the state, they can be met only in classrooms. We visited two schools that are raising standards and using school-to-work as a means of helping students meet them. Alamo Navajo Community School introduces students to work in spite of a desperate lack of work on the reservation. Students travel as long as an hour each way to get to work sites. They also run enterprises based at the school. Howard Technical High School is located much closer to work sites but still invests heavily in transporting students. In both schools nearly all students progress through a sequence of work-based learning opportunities, moving from less intensive, exploratory types of work-based learning, such as field trips and job shadowing, into more intensive types that teach

general and specific work skills, such as internships and cooperative education. Quest for Quality, a process of planning and documenting achievement, guides students through their four years at Howard. Brief descriptions of three additional schools illustrate some of the variety in work-based learning experiences.

School Districts

School districts can set districtwide standards, adopt school reform policies and programs, deploy substantial resources in support of school-to-work, and develop work-based learning opportunities with multiple schools and employers simultaneously. Philadelphia and the Thompson School District in Colorado differ sharply in location, population, and size, but both use school-to-work as a means to enable students to attain higher academic standards.

Philadelphia has produced new curriculum frameworks emphasizing an applied or constructivist approach to learning. Although schools are moving at different rates of speed, some have made good progress in placing students in work-based learning, including community service as well as paid internships. Career academies and other "small learning communities" reduce the anonymity of large high schools and assure that students receive advice and support about school and careers. School-to-work in Philadelphia is closely tied to school reform and economic development; staff responsibilities have been substantially redefined to align with new goals and modes of operation. Employers, community-based organizations, the Private Industry Council, and foundations have been essential partners.

In the Thompson School District, school-to-work is an instrument for improving schools that most communities would consider quite good already. Finding typical career majors too restrictive, they have developed the Career and Academic Plan as an alternative that organizes and directs each student's progress. All students participate in work-based learning, though most are at low levels of intensity. Like Philadelphia, Thompson has created staff positions to coordinate and foster school-to-work, especially work-based learning.

Regions

Regions are natural units for involving employers because they can be defined according to labor markets, but they are less than optimal agents for changing schools because they have no authority in that realm. Regional consortia can encourage school reform, but states and school boards and their officials have the power to make change. However, when employers

in a region unite behind their need for well-educated workers and spell out their needs in terms of academic, skill, and work readiness standards, they can have a powerful effect. They also can establish efficient lines of communication between schools and workplaces, notably by creating intermediary organizations that, among other tasks, can coordinate work-based learning opportunities; this avoids the chaos and inefficiency that results from each school's trying to make arrangements with multiple employers.

LEED (Linking Education and Economic Development) was established by employers in the Greater Sacramento region and has grown using a clever internal structure. Members began by identifying the economic sectors in the region that were growing fastest, and then grouped employer partners in them (e.g., health care, banking and financial services, and high tech). In each sector one corporation is identified as the "champion" and serves as a member of the board. The corporation designated as a champion is then responsible for recruiting other employers in the sector to join the partnership. CEOs serve on the board, but by explicit agreement much of the work is done by their designees, who meet more regularly; this arrangement recognizes both the need for commitment from the top and the reality that CEOs' time is limited.

The developing Local Industry-Education Consortium in North Metropolitan Atlanta is rooted in the high-tech sector but has expanded its occupational areas beyond manufacturing to include others that make use of advanced technology (e.g., medical services, finance). Like LEED, it benefits from corporate leadership. A new workforce development initiative by the state of Georgia gives postsecondary technical institutes a key role, and the consortium has been able to adapt to this change by drawing on support from presidents of those technical institutes, which they sought and received during the initial stages.

Corporations

Schools, districts, and states are geographical and governmental entities that organize formal education. One pitfall in looking at school-to-work in terms of these units is that it may lead to an overemphasis on the role of schools, neglecting employers. In addition to the regional consortia, examples of employer leadership can be found in systems initiated by employers themselves. Both of the corporate cases were inspired by German apprenticeship. Siemens literally imported instructors and materials from Germany. Automotive Youth Educational Systems (AYES) substantially adapted elements of apprenticeship.

Siemens began with a strong emphasis on the technical aspects of manufacturing but has since broadened the range of careers that appren-

tices may enter. General Motors founded AYES but quickly enlisted other automobile manufacturers. By operating through franchised dealers, AYES is potentially available to communities throughout the country, especially as more manufacturers continue to join. Working together, manufacturers and dealers are enabling more young people to achieve nationwide skill standards.

Though initiated by corporations, both systems rely heavily on education partners. They invest resources in improving curricula and instruction and they set high standards for both academic and technical accomplishment. Corporations' resources are not limited to money. They also contribute crucial human resources to building systems.

States

The strongest commitment a state can make to school-to-work is to incorporate its principles in legislation as part of a broader education reform agenda. However, the meaning of this commitment varies depending on the degree of control states exert over education. West Virginia has a relatively centralized education system and has produced a detailed prescription for local schools that spells out graduation requirements, career majors (further subdivided into career clusters and courses of study), and the requirement that all students participate in work-based learning. The standards are a baseline; districts may choose to exceed them. Districts also retain considerable latitude in putting into operation the state's prescription. They are expected to put the new system in place in a grade level each year rather than all at once. West Virginia's approach has been informed by several years of experience with tech prep and High Schools That Work.

Washington State has a less centralized K–12 education system. It has been engaged in reform through the 1990s. Higher academic standards are most critical not at graduation but at the time of qualification for the Certificate of Mastery, usually grade ten. This timing provides a period of two years or more after attaining foundational academic knowledge and skills in which students may focus on a career area and take more specialized courses. Partnerships have been a major emphasis in Washington State, not only with its leading employers but also with organized labor.

Conclusions

Examining schools, districts, regions, corporations, and states as system-building units reveals how important it is for all to function in harmony. Raising academic standards, which was a key selection criterion for case study sites, can be done at the school, district, or state levels, but it is best done at all three simultaneously with the support and sometimes leadership of employers. School-to-work is used as a means to this end in all the sites.

High-quality work-based learning is as carefully planned and assessed as school-based learning. Small schools can much more readily involve all students in intensive work-based learning than can large schools, districts, regions, and states. Regional consortia are critical to creating work-based learning opportunities on a large scale, because they can be defined to coincide with labor markets and they can support intermediary organizations that achieve economies of scale.

Among the key connections between school-based learning and work-based learning are career majors, career academies, planning and advising schemes oriented to career paths, and standards generated by employers and by postsecondary educators to help shape K–12 curricula. Projects and exhibitions that engage students deeply in work-related issues with support from teachers and from workplace mentors are especially potent connections. One of the most important connections is the communication that occurs among all the parties and partners, which can be facilitated by intermediary organizations.

Systems are *inclusive*, internally *coherent*, *connected* to other systems, and *enduring*. The School-to-Work Opportunities Act specifies that all youth are involved. This poses the challenge of maintaining high quality with large scale. It also means involving "middle students" along with students aiming for selective colleges, students with disabilities, and dropouts. All paths must lead to postsecondary education, not only to include students who see themselves as college bound, but to ensure that all students' career paths remain open. Added supports and appropriate matching between person and environment are essential to involving disabled students. Dropouts cannot be reached through school-only programs. Partnerships with employment training and other agencies are essential.

Internal coherence and external connectedness are closely related to each other and to "connecting activities." Standards enhance both. People in case study sites were setting standards for academic achievement, for general employability, and for specific industries. When standards are well stated and appropriately assessed, they communicate important messages. They tell students and parents what is needed for graduation. They tell

teachers what employers expect, and they tell employers which applicants meet their expectations. To be most effective, standards must be widely recognized.

Strong partnerships are crucial to the endurance of school-to-work after the federal legislation terminates. Schools, districts, regions, and states that began to build systems before they received federal funding are likely to continue without it, as are corporations whose initiatives reflect their needs for employees. Strong connections to other systems and state legislation also promise continuing progress. Restructured staff responsibilities will assure that school-to-work activities persist. A question that remains at the national level is whether and how this enduring effort will be stimulated and supported without the research and development, training and technical assistance, and other resources that are now available.

Although our perspective on system building has emphasized organizational features, we are keenly aware that what matters is how systematically young people move into adult work, family, and civic roles. The most revealing portrait of a system is drawn by the young people who move through it.

Introduction

The School-to-Work Opportunities Act of 1994 is an ambitious piece of legislation, especially in its aspiration to create systems rather than simply new programs. The magnitude of that ambition has become clearer as states and communities have used the modest "venture capital" committed by the federal government to leverage other resources both to undertake new activities and to link previously disparate activities. As the act's termination or sunset date of October 2001 approaches, we need to summarize the lessons that have been learned. The purpose of this report is to convey some of what practitioners have learned about building school-to-work systems.

The act does not define a system, but we see it as having several characteristics that distinguish it from a program. First, a system is *inclusive*; it is large enough to accommodate all those who qualify. A public school system, for example, which must find classroom space and teachers for every first grader who enrolls each fall, may be contrasted with a Head Start program, which typically turns away half to two-thirds of eligible applicants. Second, a system is *internally coherent*. It provides guidance to participants on how to move through it. And what a person does in one part of the system counts in another. Thus, for example, a student who participates in job shadowing in middle school has a chance to select an internship or apprenticeship during high school from the industry group in which the shadowing experience occurred. The two experiences are not independent: one builds on another just as Algebra II builds on Algebra I. Third, a system is *externally connected*, or formally linked to other systems. In the case of school-to-work, key links are between the K–12 school system, postsecondary education, and the labor market. The need to strengthen links between these systems is indicated by the number of employers who hire high school graduates without any information on their performance in high school and the number of students who enroll in postsecondary education but drop out because they are unprepared for the academic demands. Finally, a system *endures*; it is not dependent on year-to-year allocations of "soft" money.

A system can be viewed and described from two distinct perspectives. The perspective we employ could be described as structural. We are interested in and attempt to convey the organizational and operational features of systems. But we constantly remind ourselves that what really matters is not what the system looks like as a schematic drawing but how it is experienced by young people. When an eighth grader and parents select a high school course of study without any sense of the possibilities and limita-

tions that follow from that choice, they are not experiencing a system that provides pathways from one level or component to another. The youth or student perspective reveals that the system-building challenge for education in the United States is not that there is no system but that the system functions much better for the privileged minority than for the majority of young people. A fourteen-year-old who aspires to become a physician can clearly see the intermediate steps she must take in the next few years because the system is well defined. In contrast, a fourteen-year-old who hopes to become an electronics technician will be hard-pressed to find authoritative guidance specifically on what to do in high school. A more comprehensive system gives all young people a sense of what they have to do to get from where they are now to where they would like to be. This clarity does not need to result in rigidity. A would-be physician or electronics technician who changes her mind at the age of eighteen or twenty has earned the prerequisites to make many other career choices. Eighteen-year-olds who did not plan for anything in particular and merely took the minimum set of courses required for graduation from high school find themselves with limited options.

This publication describes several school-to-work systems under construction. It portrays for practitioners and policy makers what systems look like and how real people are trying to build them. The sites included are not necessarily the best systems in the country. We lacked the means to gather and weigh the evidence required to evaluate all possible candidates for that designation. But the sites we selected had made good progress, and we believed their stories would be informative to others. We chose not to include several sites that are excellent models but have been thoroughly described elsewhere.

We began with the idea that systems can be created at four nested levels: individual schools, school systems, regional consortia of school systems, and states. Our plan was to identify and describe at least two cases of each. We also planned to include briefer portraits of other sites to illustrate features not present in the case study sites. As we proceeded, we added a fifth type of system that does not fit so neatly into this schema but seemed important: corporate systems created by employers and supported in multiple locations. In addition to applying the definition of a system given above, we used the following criteria to identify strong systems in progress.

School-Based Learning

School-to-work is a component of broader education reform based on high academic standards for all youth, with provisions for assisting those who are severely challenged by those standards. Academic and vocational education are integrated.

Indicators/Criteria:

A comprehensive plan relates school-to-work to broader standards-driven reform.

- Specific strategies are devised for improving the academic performance of low achievers.
- Clear and effective methods are planned for integrating high academic achievement with vocational instruction.
- Evidence of effectiveness is shown by elimination of a "general" track, increased enrollment in demanding academic courses, improved scores on standardized tests, and higher rates of enrollment in postsecondary education.

Work-Based Learning

Youth learn advanced technical competence, personal and social competence, and all aspects of the industry and earn skill certificates.
Work-based learning opportunities address a range of purposes appropriate to different youth.

Work-based learning is well planned, monitored, and documented.

Indicators/Criteria:

- Different types of work-based learning are related to distinctive purposes and participants.
- Learning plans are made and used for work-based learning.
- Work-based teachers evaluate learners' progress and communicate regularly with them, their parents, and school-based teachers.
- Objectives for work-based learning are comprehensive, including both specific and general work-related knowledge and skills, understanding of the workplace as a system, and broad knowledge about the occupation or industry.
- Successful work-based learning is certified by formal credentials that have value in the labor market.
- Workplace teaching roles are formally assigned and well defined.

Connections

School-based learning is related to work-based learning. Extensive communication occurs among teachers, parents, and employers. Sound career information (including postsecondary education), advising, and placement are available.

Indicators/Criteria:

- Academic studies are explicitly oriented to workplace applications, for example, through career majors and career academies.
- Projects illustrate and strengthen the links between school and work.
- Several venues exist for communication among school, work, and home.
- Youth have access to many sources of career information and advising.

System Building

All youth participate, including those not currently in school. Partners include employers, employees, parents, community-based organizations, and others. A vigorous intermediary organization supports employer involvement, provides training and technical assistance, and fosters coordination and communication among partners.

Youth move through a coherent sequence of learning activities with complementary purposes.

Secondary and postsecondary education are strongly linked. Established programs and funding sources are incorporated. A plan exists for financing the system after school-to-work funding terminates.

Indicators/Criteria:

- Out-of-school youth are served.
- Leaders can document the proportion of the eligible youth population currently involved and have a realistic plan for involving all youth.
- Participation of partners is active and effective.
- Employers provide an adequate number of places for youth (or a plan has been adopted for achieving this goal).
- Links and coordination among partners are visible, reliable, comprehensive, and effective.
- High school graduates enter desirable postsecondary programs with advanced credit or at least without the need for remediation.
- The school-to-work effort includes other resources than school-to-work funding.

Those familiar with school-to-work will notice that the first three headings come from the legislation's definition of the three key components: school-based learning, work-based learning, and activities that link the two. Although it is plausible to argue that the combination of all three key components creates a system, we chose to add system building as a fourth set of criteria incorporating our definition of a system.

These criteria are clearly ideals; we did not expect to find any site that met all of them. But they helped us choose among sites according to both their accomplishments and their aspirations.

With these criteria in mind, we reviewed written reports, questioned experts who are knowledgeable about multiple sites, solicited nominations from relevant organizations and networks (i.e., American Youth Policy Forum, Big Picture Company, Council of Chief State School Officers, Jobs for the Future, Manpower Demonstration Research Corporation, Mathmatica Policy Research, Inc., National Center for Research in Vocational Education, National Employer Leadership Council, National School-to-Work Office and Resource Center, and Southern Regional Education Board), then screened nominations based on that information and additional information acquired from sites via telephone interviews and documents. Using this information and with an eye toward geographical distribution and location (urban, suburban, rural), we selected two sites at each of the four original levels to visit. The visits lasted three to five days and afforded opportunities to interview participants, individually and in groups, to observe classes and sit in on meetings, and to collect additional documents. We also made side trips to visit supplemental sites or drew on visits made and documents collected for other purposes.

We tape-recorded interviews with individuals and groups and have used quotations whenever possible to allow participants to speak for themselves. Any individual who is quoted or named has had a chance to review and correct the statement attributed to her or him. Quotations were lightly edited before review to achieve the coherence and continuity expected in print. In sites that have adopted the term "school-to-career" we use that term when referring to their system.

Schools

Schools directly affect the experiences of individual students. They can orchestrate a sequence of opportunities that feel coherent to students. Indeed, schools can meet some of the criteria for systems more readily than larger units can simply because their scale is more manageable. Schools can use their resources more efficiently, however, when their systems are supported by the policies and infrastructure of districts, regions, and states. We describe two schools that have developed progressive sequences of work-based learning for all their students and add briefer portraits of three more schools to demonstrate different ways this may be accomplished.

Alamo Navajo Community School: Confronting Rural Poverty

The Alamo Navajo Indian Reservation (population 1,800) is located in the Galinas Mountains of central New Mexico, in the desert among rolling hills and mesas. Legend has it that the area was settled by members of the Navajo nation who escaped during the Long Walk (1864–68). Archaeological remains that have recently been discovered, however, date the settlement two centuries earlier. The Alamo Navajo Community School (enrollment 350) is on a campus of buildings that include a health center; federal program centers for Head Start, Families and Children Education, Job Training Partnership Act (JTPA), and adult education; and trailers housing additional classrooms and the school board. Until the early 1960s, Alamo youth were sent to boarding school in Magdalena and later were bused there daily to school. In 1979 the tribal council started its own school in trailers on the reservation. A new school building was constructed in 1987. The school's central entrance, in the shape of a hogan, the traditional Navajo dwelling, symbolically affirms the tribal identity and the importance of family and community in the educational process.

Both geographic isolation and the desert landscape have contributed to the area's limited economic development. A trading post and an arts and crafts store are the only commercial sites. Socorro (population 8,500) lies seventy miles southeast, more than an hour by car, and has limited opportunities for employment and college education. Albuquerque is an hour north of Socorro but can be reached from the reservation in forty-five minutes over private roads that are impassable in inclement weather. The school-to-career program, if successful, will lower the 67 percent unemployment rate on the reservation by helping Navajo graduates qualify for jobs or higher education. Navajos who pursue higher education will

have the option to return to the reservation to assume professional positions now held primarily by non-Navajos.

School-Based Learning

Classes meet for four ninety-minute periods. Gail Campbell, the coordinator for federal programs, explains that block scheduling "gave us an enormous amount of flexibility in the elective areas kids have the opportunity to take." Students can complete graduation requirements by the end of the first semester of their senior year and spend their spring semester working for elective credits outside the reservation through work experience and tech prep courses carrying college credit.

Faculty try to develop students' English language skills as part of classroom work because many students use English as a second language and speak Navajo with friends in the halls as well as in classes. Language arts scores on standardized tests are well below national norms, but math scores are within one year of national norms. Many faculty report that seniors are notably more fluent in English after spending three months at a work site. Approximately 97 percent of the ninth graders graduate within four years.

Learning Language Skills in the Classroom

In his ninth grade language arts class, Ken Maynard helps twelve students improve their English fluency by teaching communication and thinking skills rather than nouns and pronouns. He points to a banner with words that signal his goals: reflectiveness, skills, strategies, confidence, experience, knowledge, understanding. As students speak, he recognizes each one's progress and achievements.

Maynard gives the youth a minute to list "Things I want" in logs. They then break into pairs or groups and read their lists to each other. Next, students report their partners' wishes to the class, most naming possessions such as a car, a truck, money, a house, or a TV. Maynard asks how they will get these things, eliciting responses like "Stay in school," "Jobs," "Training." One student, Sam, says that he was left out. Maynard walks over to his group. One youth wants nothing, and Maynard prompts "Pretend" and "What would you like now" but gets no response. A second reporter lists "a Sega, baseball glove, swimming pool, and a gun." Sam wants "a diploma and a scholarship." Maynard responds, "Sam, you can get those things if you choose." The exchange between Maynard and his students is stacatto—the youth use single words and at times short phrases; all remain attentive during the dialogue.

Next, Maynard assigns an essay topic that builds on an entry students made in their logs a week earlier. Maynard says that they can use the computers to write their papers in the business class that follows.

For the last activity, students take parts reading a scene from a *Scholastic* magazine play. A wide range of reading levels is apparent: one youth is incomprehensible and inaudible, one loud and distinct, a third struggles to utter choppy, single words without expression or meaning. Maynard praises his progress in not repeating words.

Work-Based Learning

Alamo students are offered several forms of work-based learning. Elementary school youth participated in an entrepreneurial project by marketing and selling corn grown as part of the JTPA summer program. A school-based 4-H club offers instruction and support for raising and selling livestock. Eighth graders spent a day job shadowing. Lynda Middleton, the administrative assistant for the Alamo Community School Board, described her experience with an Alamo student: "When we had job shadow day I saw firsthand the skill level of our students, and I was really impressed. [They had] very good reading and writing skills. [The student] has come back to me and asked if she can come in during study hall a couple of days a week and keep working with me. I thought, wow, what a neat thing; that really shows that we are building some motivation."

Students who have completed all graduation requirements by January of their senior year have the option of participating in work-based learning for four to five hours per day. Since 1993 different federal grants (Dropout Prevention Demonstration, School-to-Work) have funded student lunches, transportation, and wages. Vital to the work-based learning program is transportation to and from work. The school system buses the youth daily seventy miles each way to and from work. Gail Miller, the Alamo school-to-work coordinator, guides each student's placement, but deciding where to work is generally the student's choice.

Larry Daniel, a mentor in automotive technology, praised the students' ability to use their Navajo culture to their benefit: "The Alamo students have a very strong sense of cooperation. They work as a team. Their analytical skills and problem-solving skills are outstanding. If they do not understand what is going on they will ask questions or they will converse among themselves and change it over to a graphic representation as opposed to something technical. Since the Navajo language is very much more graphic than the English language, they will describe things in their

language that they are used to dealing with and make it fit what they are doing."

Youth Entrepreneurship

More than one hundred students are enrolled in the Alamo 4-H Club. Marvin Martin, the agriculture and horticulture teacher, explained that the club's favorite project is raising sheep. This year, forty students raised $4,000 toward the purchase and feeding of the animals by organizing a basketball tournament with concession stands. "This way we ensure that all youth can buy at least one animal, and it is not such a hardship on the family. Some of these youth will get four, five, or six lambs."

A Navajo club leader, Dave Pino, teaches the students about raising and showing the sheep. During the summer months students raise their animals at home in pens they build, taking responsibility for feeding, watering, grooming, and exercising their animals. Part of this routine involves running the animals through the arroyos—sand-filled dry streambeds—to reduce their fat. They keep records of the animal's development, which are turned in at the end of the year to compete for medals and awards. Pens at the school are available for shearing and washing the animals before showing and selling in the fall. The goals of the program are to help youth start saving money for college and to teach them enough about raising sheep that they could start their own business after graduation.

In another youth entrepreneurship project, the horticulture class grows and markets tomatoes.

Mentoring

Martin Chavez is the district ranger of the U.S. Forest Service in the Cibola National Forest. He was raised in Magdalena and has spent the past twenty-three years in the Forest Service, moving nine times to different assignments around the country. Chavez considers mentoring a key role for himself and other employees responsible for students. One student, Haven Guerro, worked at the station four and a half days a week during the second semester of his senior year. He assisted his supervisors with filing, radio inventory, welding, forest protection, weather monitoring, aerial maps, forest management, and law enforcement.

Chavez explained his philosophy: "The technical stuff is secondary to the work ethic—being on time and being a team member. The technical stuff comes later, and anybody can learn the processes. Being a former personnel officer, I'm a stickler for giving constructive feedback. Prior to Haven's performance evaluation meeting, I met with his supervisors and we discussed the suggestions that we could offer to improve his performance to help him learn and gave him that feedback. Just a typical 'Here's where you can improve and you would have made this mark,' and 'You could have done some of these things,' and 'This is why we're coaching you in these areas.' It's a pretty directed self-improvement concept."

Chavez is keenly aware of his debt to many mentors across the country who supported his own development. "My challenge here is to set a positive tone and take the lead and provide the support for that. This is a challenge for my people. It's a stretch for them, and it takes time to supervise and work with the individual. I feel you need to be with them, mentally and physically, through the whole period of time that they're here. Haven is a valued person for who he is, and we're going to invest the time to show him. That's what we're all about."

Connections

Alamo teachers link the disciplines to career opportunities throughout the twelve years of schooling. Elementary students begin learning about employment opportunities in their career awareness classes. On the day of our visit, class groups gathered in the library while a wildlife rehabilitator demonstrated her work with animals and explained the contributions of biologists and veterinarians.

In an eighth-grade social studies class students described their job shadow experiences. Hector Guerro shadowed two people while they worked on the water system at the city hall and in the field. He explained that he hoped to be an engineer. He did not yet know what kind of an engineer he wanted to be, but he knew he would need to go to college, and he liked to work on computers. Rosa Gutierrez, the school counselor, noted that several years ago students did not know about these possibilities. To help them get the most from their interviews and job shadows, staff give them a handout with questions they can ask their mentor about their educational history, their skills, and job requirements.

Before starting high school, students choose one of five "career strands"—health services, business and management, natural resource systems, the arts and communication, and industrial and engineering systems. The career strand provides an orientation for their four-year learning plan. The student, counselor, and parents review the plan annually

and make modifications to fit the intended career direction.

Speaking about the relation between students' career strands, their work experience, and their courses, Gail Campbell reflected: "You would like to have every student placed at a work site that relates to their classroom activities and make a beautiful connection, but reality says that we are not able to do that with all the students. We do have some incongruency."

She explained that students' choices are sometimes influenced by a desire to be in a class with friends or to explore new career directions. For example, Farrah Mexicano, in a business career strand, worked at a store that purifies and sells bottled water and enrolled in the nursing assistant tech prep class. She "hoped to go to college for nursing and accounting." The previous summer she attended a program in math, science, and computers at the University of Colorado. Campbell explained that "Farrah hasn't decided whether she actually wants to be in the health care provider field or the business end of that area. I think a lot of what our kids do is experimentation. They *do* think they are going to be successful. And this is a safe way to experiment."

Algebra for Future Engineers

Omar Qureshi started his pre-algebra class, with fifteen eighth, ninth, and tenth graders, by describing engineering software he purchased:

> Anybody know what an engineer is? Have you driven down to Socorro lately? When I went down there I almost broke the wheel of my car off. This conference that I went to yesterday was run by the state highway department and engineers. One of the things that a civil engineer does is supervise the construction of roads: where to build the road and what materials to use to build the road so that they get a good road that lasts a long time. It looks to me like the engineer for that construction job didn't do well. The road's starting to fall apart already.
>
> Civil engineers also design bridges. I've got some software that I'm going to try to get loaded on my computer here this week. One is a bridge-building program that I think you'll enjoy. You've got to try to build a bridge. You can make metal beams however you want and connect them together, and you've got to come up with a way to make them strong enough that this truck will be able to drive over it and not have the whole thing fall in. And there's a bunch of other math applications that go with it—things about percents, about the strength, about how much the bridge material weighs.

Learning Another Culture

During a group interview, parents described how school-to-work benefits their children by helping them learn what they view as an Anglo work ethic, which is different from Navajo culture. Sixty-seven percent of the adults on the reservation are unemployed, and many who do work are not tied to an eight-to-five work schedule often typical of the Anglo society. For example, several parents are self-employed as silversmiths.

Nora Secatoro described how her adult son gradually learned basic job skills and the value of money and a post–high school education:

> Getting on a routine schedule on a daily basis. It seems that we go in cycles five days a week and that's what they're getting used to. When you work you have a commitment to be there to do the job, and I think that's what they are learning. And to manage their money. To know how to deal with and to get along with other people. Being at work every day. If he's going to miss a day to call his supervisor. It taught him what the real world is about after graduation. He spent his own money when he got paid. From that I think he learned that if you work, there is money. After graduation he went straight into the army for three years. He learned to work and to try to improve himself, and now he is taking classes so he can step up bigger steps. Presently my son's working for the Navajo Tribal Police Department. I know that going through school-to-work, he became very aware of the life skills of the real world.

System Building

The measure of Alamo's success in opening career paths for youth will be the number who become doctors, lawyers, heavy equipment operators, health care managers, teachers, landscape architects, small business entrepreneurs, and accountants. The challenge for Alamo is to build a system to make that happen. Multiple partners are taking steps to set a system in place for this purpose.

The primary purpose of school-to-work at Alamo has been helping students gain motivation, explore careers, learn basic personal and social work behaviors including communication skills and a work ethic, and acquire certification for entry-level jobs. In addition, it tries to prepare graduates for postsecondary education. The third component of Alamo's school-to-work system is economic development; because no jobs are available on the reservation, many youth who want to succeed leave permanently.

Tech prep has linked secondary with postsecondary education through a six-year articulated career strand beginning in ninth grade and continuing through two years at Eastern New Mexico University (ENMU) at Roswell. Betty Campbell, the School-to-Work coordinator at ENMU-Socorro, explained that the program starts them toward a certificate or a postsecondary degree. That they can earn five college credits while still in high school demonstrates to Alamo students that they can succeed in college; they are admitted upon graduation from high school, and the credit may be transferred to any two-year institution. One barrier is that attending community college requires moving off the reservation, which is not only expensive but stressful. People on the reservation are trying to bring college courses to Alamo to reduce the expenses and amount of time students spend away from home.

Because of limited land, water, and mineral rights and the lack of resources on the land they do have, most see human resources as their hope. Raymond Apachito, Marlene Thomas-Herrera, and Emerson Horace are trying to develop a strategy for education and economic development, coordinating efforts funded by several federal programs. Their vision is to improve the educational levels of their adult population so they can qualify for college degree programs. They also hope to increase employment opportunities through economic development on the reservation. Navajos could benefit from incentives to start their own businesses, such as a gas station, a grocery store, and a laundromat, now available only in Magdalena. Increasing access to degree programs will eventually enable Navajos to fill jobs available on the reservation such as those for teachers and health care workers.

Emerson Horace, the adult education director, stated: "We need to develop some type of economy out here that would serve as a gauge. If you have ten people who are interested in a restaurant or maybe eight people interested in agriculture or auto mechanics, you could give them training, but where are we going to put these people when they complete their training? We could develop something for them so that we don't have to have them working off the reservation. These things will begin to play a role, and maybe by the time they finish we'll have some of these businesses or enterprises going. And many folks from here are proud of it; they would rather stay here than go off the reservation."

Raymond Apachito, the JTPA coordinator, stated: "Instead of spending [the money on services] over there, you can keep the money here, keep it recycled so that those monies can also provide employment opportunities because you would need people to run these businesses. I guess we're hoping to work toward having all of our young graduates coming through and going on to a postsecondary education because I think we really need doctors, we need attorneys, and we need all these people who can come back and help the community here."

Howard High School of Technology: Staging Work-Based Learning

In 1990 Howard Vocational High School in Wilmington, Delaware, was in danger of closing. Students, who may choose to enroll in any of New Castle County's schools, were not choosing Howard. Enrollment fell by 40 percent in five years. Prospective students and their parents were deterred by the prisonlike appearance of the building and by news reports that routinely described drug arrests and other incidents as occurring "near Howard High School," even though they could just as accurately have been described as happening near the Hotel DuPont. Students who lived within two miles of Howard could take the school bus to a suburban school but had to walk to Howard. Discipline problems and absenteeism impeded student performance. Teachers' morale was low.

Yet Howard also had strengths. Among its loyal alumni were many community leaders who graduated from Howard when it was the only high school in the state that African Americans could attend. The faculty was experienced and competent. What the school needed, according to a prestigious task force appointed by the board of education, was "strong, visionary leadership" and "a new sense of mission." A new principal, Henry Stenta, was appointed to provide that leadership. He immediately set to work with the faculty and others to realize a vision, inspired by the task force's audacious goal not just to salvage Howard but to make it a model school: Howard High School of Technology.

School-Based Learning

The task force's recommendations were not universally accepted at first. The school board had to be convinced to pay for physical improvements to the building to make it more appealing and safer. An attractive fence was built around the parking lot, designed with community input to assure that it increased security without isolating the building. A new entry gave the building a front door for the first time.

Some teachers feared that raising standards would drive even more students away and assure the school's demise, but after a steering committee headed by a teacher, Terry Ireland, reviewed and affirmed the recommendations, the teachers adopted them. Students responded with better performance. The dropout rate declined from 7.6 percent per year in 1990 to 0.6 percent in 1997. Over the same period, average daily attendance rose from 89.0 percent to 93.1 percent, an increase that equates to an average of 7.2 additional school days per pupil per year. In a statewide writing assessment, graded on a scale of one to four points, only 3 percent

of Howard students scored 3.5 or higher in 1993, but 22 percent achieved this level in 1997; 89 percent of Howard students scored at or above 2.5 in 1997.

High Schools That Work (HSTW), a school reform network sponsored by the Southern Regional Education Board, helped to focus and monitor Howard's push for higher standards. HSTW encourages a mutually reinforcing blend of demanding academics and high-quality vocational education, achieved by setting ambitious goals and then rigorously assessing progress. When Gene Bottoms, director of HSTW, visited Howard in 1993, he noted the progress that had been made but insisted that the aims were not high enough. Though stung by the criticism after working hard and seeing improvement, faculty and administrators accepted Bottoms's analysis and his challenge and began pushing their students even harder. A new writing program was introduced into English classes. All students were required to take math at least to the level of Algebra I. The number of credit hours required for graduation was set higher than state requirements.

Raising Academic Standards

Fran Smart: "I think in mathematics there definitely is a push to make it relevant. We try to incorporate all of the disciplines and all of the career areas through the kinds of problems that we do in the math classroom. We're very practically oriented. We try to bring out a reason for doing everything we do. One of the strengths of the Core Plus program that was written in Michigan is that we're taking problems out of everyday situations. For example, in our statistics program students examine how to evaluate the performance of different cars. They analyze data from statistical studies that have actually been done on the amount of cholesterol and the amount of calories in a McDonalds' or Hardee's hamburger. The kids see that and they relate to it."

Mary Gammgort: "When you are setting goals and high expectations in a vocational technical school, just as you would in a traditional academic school, you identify students' weaknesses in different areas, address them, and then push your students to overcome their weaknesses. We try to make our work relate to real-life situations, and in English a great deal of our writing is technically based. Students create résumés, cover letters and other types of technical pieces in addition to normal compositions. In the end, our students actually receive a better education in that regard because they not only get the academic writing, but they also get the technical writing, which oftentimes the other schools neglect."

Work-Based Learning

Howard provides a sequence of work-based learning opportunities for every student. All Howard students participate in at least three types of work-based learning. Tenth graders go on two or more job shadows. Eleventh graders spend a minimum of twenty hours in an unpaid practicum at a nonprofit agency related to their field. The practicum is simultaneously a community service and a career exploration experience. It leads to a paid cooperative education placement in grade twelve, in which about 95 percent of students participate.

Howard's downtown location, which was once a liability, has been transformed into an asset because it places students within a few blocks of a variety of work sites. Seniors are responsible for their own transportation to their cooperative education placements because they are paid. This is easiest for seniors who drive to school. Getting students to and from job shadows and practicums requires a bus, two vans, and considerable driving in staff members' cars. Aides and lunchroom monitors are licensed and paid for extra hours to do some of the driving.

Job Shadowing

The following exchange about job shadowing conveys a sense of how work-based learning is organized:

Terry Ireland (electrical trades instructor): "Our job shadowing is always career specific. All the students in the nurse tech program are going to job shadow at the medical center, and they have choices in that career area. All the kids in electrical trades are going to spend time with an electrician or somebody who's doing related work."

Dominic Pedante (career counselor and work-based learning coordinator): "And it's one-on-one. It's not a field trip."

Kathleen Williamson (nurse technician instructor): "I think that's the key. A lot of people want to make it a field trip, and they want to take a couple of people out and spend a couple of hours. It's not the same thing. Our students get to know what it's like to be on break and what it's like to be in the ER when it's really, really slow. We have a good relationship with the employers, and we've already been to the work sites ourselves so we know in advance the kinds of things they're going to see and we'll tell them as we take them there what they do there along with the safety prep that we have to do for them."

Preparing Local Area Network Managers

Howard's program to prepare local area network (LAN) managers is its most popular career area; a major attraction is that graduates can readily find jobs immediately after high school paying $30,000 or more per year or go on to college. The centerpiece of the program is a series of examinations that have been developed by the industry to qualify people to set up and maintain LANs, computer networks in organizations. There are seven examinations in all, beginning with a general one for the entire industry. Different software companies have different examinations after that; Howard has chosen Microsoft's examinations, leading up to the qualifying examination for Microsoft network engineers. The shortage of qualified people is so great that one 1997 graduate who had not passed any of the examinations was hired anyway at $27,000 per year.

The program was instigated by one of Howard's most important partners, MBNA, one of the country's largest credit card companies, which has a huge office complex two blocks from the school building. The program attracts some of the county's best students to Howard, and they help raise the school's academic performance level. Only students who are prepared to work hard apply for the program because of the rigors of preparing for the examinations. This year the tenth graders began by assembling components of computers that had been ordered by the district and testing them before they were sent on to the school where they would be used. LAN managers must know both the hardware and the software, the individual machines and the wiring of entire networks. The culminating activity for seniors, all of whom do their cooperative education at MBNA, is the preparation and presentation of a plan explaining how the student team will meet the network needs of a fictional business, including hardware and software recommendations and costs. Business partners attend the presentations and provide realistic feedback as if they were potential customers.

Connections

Quest for Quality is the name of a student performance guide that embodies the current Howard program and illustrates its newfound strength. Quest for Quality is simultaneously a planning guide, setting out what students will do during their four years, and a portfolio, recording progress and collecting work samples to inform teachers' assessments and prospective employers' hiring decisions. By identifying the academic, personal, and group interaction skills that employers seek, Quest for Quality also serves as a

reference point for teaching and instruction. Teachers use it to determine whether they are helping students to achieve a common set of educational goals and objectives. A fourth skill category, shop skills, lists those appropriate to the specific career area a student is learning. The career teacher in that area certifies the achievement of these skills.

The Quest for Quality notebook spells out students' responsibilities and rules for their behavior during job shadows and practicums and contains a contract affirming their intention to conform to those expectations. A three-page reporting form poses questions for them to answer, which helps them frame their own questions and observations. For example, they must report on what communication skills are used and what training programs are available to employees at the site. Students often make oral reports on their work experiences as well. A key component of the notebook is the student's personal vision statement, written initially in ninth grade with the assistance of a teacher. It serves as a touchstone at the end of the four-year program and is revised as students' plans and interests evolve.

Although most students have one or two career areas in mind when they enroll at Howard, ninth grade is devoted to two-week rotations through introductory units in all fourteen career areas, along with academic courses. At the end of the year students choose a single career area to study for the next three years, but they must apply to that career area and be accepted to remain in Howard.

Seniors engage in Senior Quest, which involves developing a case study related to their career area. Dealing with realistic issues in the case study enhances their problem-solving capability. Presenting their case studies to a panel including employer representatives helps build and display their communication skills. Seniors add to their Quest notebooks a résumé, a letter of application for employment, and a business proposal.

The notebook also contains documents to help students and their parents plan and select courses. Graduation requirements are listed along with space to record their completion. The portfolio section of the notebook includes records of academic, personal, and group interaction skills along with supporting documents such as work samples and commendations and shop skill logs filled in by vocational teachers. Seniors' portfolios are presented publicly and used in scholarship application reviews, by college admissions officers, and by employers making hiring decisions.

Dominic Pedante, a counselor who coordinates work-based learning, explained that when students apply for a job they can refer to the notebook and pull from it evidence of their accomplishments such as award certificates and work samples. He recalled one student who had numerous

perfect attendance certificates in his notebook. When the student told the employer that he had missed only one day of school in four years, the employer said, "That's enough for me," and hired him on the spot. A recent graduate applying for work and facing the standard question about experience can show photos, a brief report, and an assessment from an employer she or he shadowed three years earlier, plus more detailed documentation from a practicum and a cooperative education placement in succeeding years. This is much more substantial work experience than most recent high school graduates can claim.

Communicating with Employers

Employers are partners with the school. Each career area has an advisory committee of employers; the school counts 120 different employer partners. Career programs take employers' input seriously, using their needs to establish educational objectives. Nonprofit organizations are heavily used, especially for health care careers and for unpaid practicums.

Substantial staff time is devoted to establishing and maintaining contacts with employers. All career teachers spend time communicating with employers to create and sustain student placements, particularly for seniors' cooperative education. In addition, two work-based learning coordinators facilitate placements, especially for job shadowing and practicums. Coordination and communication are critical. Because some 70 tenth and eleventh graders are out of the building each day, Dominic Pedante circulates a daily report listing which students will be out, when, and at what location. He also maintains a database of actual and potential work sites that is shared with the other two county vocational schools through a computer network, both to facilitate matching students with sites and to reduce the number of people contacting the same employers. Although academic teachers cannot know as much about the program's technical content as the career teachers, they sit on every career area advisory committee, and every year one half-day of staff development is devoted to work site visits by academic and vocational teachers together.

System Building

After guiding the implementation of the task force's recommendations, the steering committee continues to meet twice a month. Distributing its responsibilities among several subcommittees, it organizes an annual retreat to assess progress and plans all staff development. Members help collect annual performance indicators and prepare for a Middle States accreditation review. In 1996, the steering committee led the implementation of block scheduling, which facilitates intensive academic instruction and time out of school for work-based learning. Henry Stenta, who was principal at the time, described what happened when he announced a schedule change following discussions with the committee. Several members questioned the announcement, saying they did not think a final decision had been made and implying that he was acting unilaterally. He reviewed the record of the meeting, concluded that he had made a mistake, and canceled the schedule change, with an apology in writing and over the public address system. This incident convinced teachers that the committee had genuine authority.

Supporting Innovation

The state of Delaware has fewer than seven hundred thousand people, only a few large cities, and three counties. New Castle County, where Wilmington (population about 70,000) is located, has a separate countywide vocational-technical school district with independent taxing authority and a school board appointed by the governor. The district includes three vocational-technical schools: Howard, Hodgson, and Delcastle. All three are known nationally as outstanding vocational schools. The three schools cooperate in some activities, publishing a joint catalog listing all vocational programs. They also learn from each other; for example, Howard borrowed the practice of having students complete senior projects and exhibitions from Hodgson, which adopted it after joining the Coalition of Essential Schools, a school reform network. But they also compete for students and status. The school board ensures that the competition is constructive and that each school has some special features. Howard is the district's pilot site for work-based learning and technology. The other schools would love to have Howard's exemplary program in LAN management, but the board has kept it at Howard, in part to assure that Howard remains attractive and viable.

Integrating Work-Based Learning at Three High Schools

Schools have taken a rich variety of approaches to incorporating students' work-based learning. The three schools described here differ in their emphasis on career preparation and in the work-based learning opportunities they provide for their students. They are alike in designing school-based activities that complement and build on what students do in workplaces and in designing work-based learning experiences to achieve specific educational objectives.

Service Learning at Central Park East Secondary School

Anne Purdy's classroom is the hub for community service at Central Park East Secondary School (CPESS), a public school in New York City's East Harlem and a member of the Coalition of Essential Schools. Up to 80 seventh through tenth graders spend one morning each week at their placements in not-for-profit organizations such as museums, schools, hospitals, and public agencies. The school creates a context for making these placements learning experiences. "All aspects of our learning environment are framed by the 'Habits of Mind,'" according to a brochure written by Purdy. "These 'Habits' define the discussions, assignments, and activities students will participate in during their six years at CPESS, including their service learning. They are connections, perspective, evidence, speculation, and significance."

Purdy recently developed a curriculum for advisory groups that helps students state their goals and expectations about the placement, observe the organizational structure and roles of individuals, identify skills needed in the workplace, and articulate personal career directions and steps to get there. Tiffany Patterson answered phones at New York City's Public Advocate Office, a referral service. At the end of tenth grade she wrote two pieces based on her work over the past three years: a "Work Site Learning Essay" in which her reflections on critical incidents at work demonstrate development of perspective, good judgment, and empathy, and a "Work Site Paper" in which she recommends organizational changes to improve service delivery:

> When you are able to help someone or even give them a referral, they really appreciate it and it also makes you feel good, especially when people really need help in serious situations. For example, a woman called and she told me her daughter was missing for a week. I really didn't know what to tell the lady. I had to go tell my supervisor. We thought she should call the cops. When I told her that, she said she called everybody and Public Advocate was her last hope. I

just couldn't tell her that someone was going to call her back within a couple of days. Her daughter could be dead in a couple of days. So I transferred her to a public official so they could help her in her situation. I don't know what happened, but I know the Public Advocate led her in the right direction.

Learning through Internships at the Met

The Metropolitan Regional Career and Technical Center, "the Met" for short, is located in a multipurpose building in downtown Providence, Rhode Island. It is also a member of the Coalition of Essential Schools. Founded by well-known educational reformers Dennis Littky and Elliot Washor as a demonstration site, the school turns inside out the usual relationship between work-based and school-based learning. The fundamental unit of instruction is the LTI, Learning through Internships. Every student is matched with a workplace mentor to pursue a specific set of learning objectives related to the school's goals, which encompass communication, empirical reasoning, quantitative reasoning, social reasoning, and personal qualities. Learning at work is complemented by individualized and small group study in school, especially in math and science but also including other academic subjects. Teachers visit work sites and communicate with mentors frequently. Parents receive weekly reports on their children's work performance. Each student has a Learning Plan Team including the mentor, teacher, and parent(s), who meet four times a year with the student to assess progress and plan next steps. Work placements are maintained or changed depending on this group's deliberations. Each trimester concludes with a student exhibition presenting the results of a long-term project relating work experience to academic learning.

Starting an Enterprise at Southeast Raleigh High School

Southeast Raleigh High School opened in 1997 as a magnet school for mathematics, science, and technology. It has enough computers to assign one to each teacher and one to every two students. But it does not have an adequate budget for technical support to maintain this technology. Making a virtue of necessity, the school started classes to train students as managers and technical assistants for the school's network. The hope is to be able to offer these services for a fee to other organizations as a way to finance future technology needs. Jennifer Peterson, the school's program specialist for technology, talked about the personal and social skills students gained through the work experience: "They got some tremendous skills interacting with our staff. And I think they really became aware of the issues involved with being in a technical support role in terms of work-

ing with an end user that may be at a very low skill level. [One client's] typing skills were not even really there. I could see the student found it very frustrating that he had to sit patiently and wait. He always wanted to grab the computer. And I said the number one rule is you just have to put your hands behind your back and let them do it. You can talk them through it and guide them, but you never want to take control like that."

Nine of Peterson's students followed up their training by enrolling in a Certified Network Administration (CNA) course offered at Southeast Raleigh High School by Wake Technical Community College and taught by Hilmi Lahoud, the department head of Networking Technology. Six of the students earned CNA certification, an industry-recognized standard for network administrators, on their first attempt. Students receive college credit for the course.

Conclusions

Schools have many advantages over larger units in building systems. Most significantly, a small or moderate-sized school can offer all students a sequence of work-based learning experiences. All students can, for example, participate in field trips, job shadowing, unpaid internships, and cooperative education each year. All the schools described in this section are relatively small, which demonstrates that this advantage does not apply automatically to schools with a thousand or more students. In large schools, the highest rates of participation in work-based learning occur in career academies, and only a few large schools have career academies for all students. In most schools career academies enroll only a fraction of all students. When they connect school-based with work-based learning, schools move in the direction of building systems. Vocational schools and career magnet schools can readily offer classroom experiences related to students' work experiences.

Many school reformers believe that the school building is the critical unit for school reform. Although states and districts can set standards and promulgate requirements, the changes that must be accomplished in what students learn and how they learn happen in individual schools. The implication is that if school-to-work is to be linked with education reform, it is best implemented school by school.

Individual schools cannot create comprehensive systems by themselves, however. They are subject to district and state requirements that can conflict with their aspirations. Turnover among key staff can quickly destroy promising efforts. Partnerships between employers and individual schools are limited by the presence in the same labor market of many other schools from which employees are drawn and to which the employer feels obli-

gated. It is highly inefficient for both schools and workplaces when arrangements for work-based learning are negotiated one school at a time.

Engaging all students in work-based learning requires that both schools deal with transportation issues. A major limitation for Alamo is the absence of work opportunities in the vicinity, resulting in very high transportation costs and accompanying time demands. Howard is located near many employers but still commits substantial resources to transporting students. And Howard benefits from being part of a county-wide vocational school district that supports its innovations and coordinates activities with two other vocational schools.

School Districts

School districts are viable units for school reform because their boards and superintendents have considerable authority to articulate visions and then take steps to realize them. Districtwide commitment to school-to-work yields some economies of scale as large numbers of teachers and staff, students, and parents in many different schools focus on the same goals and learn from each other how to achieve them. Districts can also engage employers and employer organizations on behalf of all of their schools rather than of one school and one employer at a time. The two districts we visited differ sharply in their locations, populations, and sizes, but they both consider school-to-work as a means to enable students to attain higher academic standards.

Thompson: Planning for Success

The Thompson School District is located about an hour north of Denver, where the high plains meet the foothills of the Rockies. It includes the small cities of Loveland (population about 40,000) and Berthoud (population about 3,000) and the areas in between that are rapidly becoming suburban. The district includes three comprehensive high schools and an alternative high school, four middle schools, and eighteen elementary schools. The student population of almost 14,000 is 93 percent white; Hispanics account for less than 5 percent, with Asians, Native Americans, and African-Americans constituting the balance. Like the other communities in the corridor that extends along the Front Range between Colorado Springs and Fort Collins, the Thompson district has experienced rapid growth over the past decade.

School-Based Learning

Educators, business leaders, and other citizens concluded about ten years ago that the schools were not good enough, although Thompson students regularly exceed state and national norms on standardized tests. Employers were a critical force in stimulating school reform, expressing both a general commitment to community improvement and their own self-interest in finding qualified workers as their businesses grew.

Nancy Wear is director of secondary curriculum and career education for the district and the person in charge of school-to-career. She conveys energy, commitment, and efficiency. Wear has been a key leader of comprehensive school reform in the district for more than a decade. She explained that Thompson began by raising standards for classroom instruc-

tion content and then used school-to-career as a way to make academics relevant. (Thompson and the state of Colorado have adopted the term "school-to-career" to avoid the implication that the goal is immediate post–high school employment as some think the term "school-to-work" implies.)

At the April 1998 meeting of the School-to-Career Advisory Council, Wear described proposed new graduation requirements, saying that after two years of work, "We are finally bringing this home." The requirements apply to all students, effectively abolishing tracking. They add one more semester-long course and include a new career and academic planning seminar for eleventh and twelfth graders that requires a public presentation. Student assessments against district-wide academic standards are also part of the new requirements, along with a new high school transcript that incorporates reports on a wide range of student behaviors including teamwork, problem solving, and communication (the "SCANS skills") as a means of conveying more information to future employers.

"Connecting People to the World"

Superintendent of Schools, Donald Saul:

> I came in with a personal and philosophical belief that connecting people to the world, to applications, to relevant uses of information and knowledge and skills is a critical part of growth and the acquisition of personal confidence. Even though I also believe that academic achievement is probably the most rewarding thing for kids while they are students, it's unlikely to happen for a majority of kids unless they can connect academics to things that may count in the long term because this is a material society. Our job is to try to balance that quest for material success against the intellectual side. We need an academically challenging system that is characterized by a sense of purpose and relevance in the curriculum, and to the extent possible, a sense of integration between subject areas.
>
> I think the career and academic planning notion is the most critical part of this. All kids need to have some sense of direction within courses of study to increase the likelihood that they will have a reason to do the work and to master the skills and to understand the subject matter. The more the students know what they are doing, why they are doing it, and how it is going to be done, the more likely they will be to stay the course.
>
> Believe me, this is not a done deal. It's not a project that's completed. This is a ten-year process at minimum.

> One reason why there has been a higher level of acceptance is because while we've kept the pressure on and the expectations on in the central office, we haven't been systematically controlling about how that works in the individual buildings. I guess our philosophy in this district is that we need to create a sense of what outcomes are valuable rather than telling people how things should be achieved. There's a great deal of variability between what they do in Berthoud High School and what they do in Thompson Valley High School. Loveland High School has had the toughest time because it is our academic flagship. We have encouraged and set outcome expectations and not necessarily driven anything down their throats. I think we've had pretty good success. If district policy can't provide incentives for progress at the building level, then any elements of reform are probably doomed.

Work-Based Learning

All students in the Thompson district participate in some type of work-based learning. Job shadowing is the most widespread type. Both middle school and high school students do job shadowing and document their experience by filling out a standard form with questions that emphasize career exploration. Community service, youth entrepreneurship, internships, and cooperative education are also available, though not to as many students as job shadowing.

One group of students opened an art gallery to sell their own products. After a gala grand opening, the gallery failed because the students had not arranged for regular staffing. But they learned a great deal about business planning and operations. Students sometimes travel to sites outside the district to pursue their interests because there is a limited range of careers represented in or near Loveland and Berthoud.

Students' reports on their work-based learning include a "quality worker profile," which was developed by a committee with employer representation. Based on the "SCANS skills," it lists the generic competencies that many employers say are most critical and allows for ratings from high quality to unacceptable. The form may be completed by an instructor, employer, administrator, counselor, or another student. Its purpose is primarily diagnostic, but repeated uses of it can establish a record of continuous improvement for a student's portfolio.

Connections

The Career and Academic Plan (CAP) is a critical connection that helps make school-to-career coherent for students. Thompson has defined six career pathways: arts and communications; business operations; marketing, management, and recordkeeping; technical, mechanical, natural resources, and crafts; research, engineering, science, and medical services; and social, health, education, and personal services. Thompson administrators decided not to specify courses and work-based learning related to each pathway, however. First, they feared that such specification would be too restrictive. They wanted to avoid any possibility that they might "track" students. Second, the district does not contain a sufficient variety of work sites to afford work-based learning opportunities in all six areas. Third, the idea of organizing education around careers was not politically viable. Instead, the choice of a career path provides a point of reference for counselors, students, and parents as they review past performance and make plans. Required courses serve as a core for all students, but each student (with parents) also identifies a career path that is customized to match her or his needs, interests, and plans for the future.

The six career paths were adapted from the twelve career areas in the "World of Work" map in ACT's (American College Testing) "Discover" program, which is related to John Holland's theory of how personalities match with careers. This computerized program helps students assess their interests and connect them to future careers and then select relevant courses. In addition, it identifies jobs within each career area that require a range of education and alerts students, parents, and counselors to gaps between aspirations and achievement. For example, a counselor reviewing a student's course plans might point out that most careers in business operations require math and suggest ways the student could improve his or her performance in math classes. The counselor's role is explicitly not to tell the student he or she cannot consider a career in business operations because he or she is weak in math. The goal is to help students understand the implications for their future career prospects of current school performance.

Linking with Employment Training

Larimer County has been a leader in Colorado's transition to the "one-stop" approach, meaning the consolidation of information, training, placement, and subsidized employment services in one location. Bill Volz, an employment specialist, has been active in Thompson's school-to-career

effort from the beginning. Volz is a former teacher who moved into employment and training after earning a master's degree in counseling and career development. He recalled that when he took his position in 1991, the county had seventy-six youth employment programs, which have now been consolidated into five. Comparing Thompson with other districts he knows, he stated, "Thompson has been doing school-to-career for years now and they have really helped kids learn how to go out and sell themselves. So if I tell them about an opportunity over at Hewlett Packard or Western Power Authority, I don't have to go through the whole nine yards of explaining how to dress and what to expect when they apply. I can almost guarantee that most of them know that."

Volz had especially high praise for Ferguson, Thompson's alternative high school, which uses work-based learning extensively to hold students in school. The school-to-career coordinator at Ferguson formerly worked with him in the Employment Service, so she is knowledgeable about employment issues and remains closely connected with employers in the community.

System Building

An organizational change that has fostered school-to-career in Thompson is the identification in each high school of a work-based learning coordinator. This person, in most cases an experienced counselor, is able to facilitate work-based learning. The coordinator works with vocational teachers and other staff who supervise field placements and provides direct supervision for some unpaid work-based learning. She or he also plays a major role in maintaining the Career and Academic Planning process. In the 1997–98 school year, one person took this responsibility for the four middle schools. He was not always in the same building, accessible to teachers and students. So in 1998–99, school-to-career coordinators were identified for each middle school.

The mandate that school-to-work reach all students entails the involvement of people with specific commitments to out-of-school youth and to students with special needs. Bill Volz provides the liaison with employment training programs serving dropouts. He regards all youth programs as connected to school-to-career and directs young people who come to the office to school programs as appropriate. Although this may sound unremarkable to some, it is not common practice. Most educators feel no responsibility at all to youth who are no longer enrolled in school, and most youth workers in employment and training progams regard schools as having failed the young people they serve. Simply opening communica-

tion is a great breakthrough. Engaging in coordinated planning and mutual referral is highly laudable.

Bill Besser is responsible with his colleagues for students with special needs. He sits on the School-to-Career Advisory Council and views school-to-career as providing great opportunities for his students. Asked whether the push for higher standards posed threats to students who may have difficulty meeting academic expectations already, he and his colleagues replied that it was not threatening because exceptions are always possible and many of their students are quite able to meet the standards if their needs are met. This point was illustrated by one student who was interviewed but not identified until later as learning disabled. She expressed a preference for learning hands-on, but nothing in her oral presentation or in the work-based learning she had done indicated any serious limitations. A student with serious physical disablities was an intern at the McKee Medical Center and simply did what the other interns did.

Connections with postsecondary education have been facilitated by state legislation authorizing high school students to enroll in college courses for credit, either on the college campus or at their high school. Thompson students can earn college credit for courses taken at their high school, including calculus, composition, and computer applications. The tech prep connection between secondary vocational education and two-year colleges is made in a strikingly direct manner: the area vocational center serving the Thompson district is located on the campus of the Front Range Community College in Fort Collins. As a result, vocational students who enroll in any of the half-day programs there actually attend classes at the community college, eliminating any concerns prospective students might have about not fitting in or being overwhelmed by a campus with multiple buildings.

Having initiated many components of school-to-career before the legislation passed, Thompson is in a strong position to continue the effort after funding ends. In addition to providing access to training and some other resources, the school coordinators are a major cost borne by federal School-to-Work funds. Nancy Wear expressed confidence that the principals and school board will value this role sufficiently to continue it on local funds. One indication of the district's commitment is that it is currently planning to build a new high school designed around the principles of school-to-career. Sue Wall, currently vice principal at Thompson Valley High School, has been designated principal of the new school and leads the planning.

A school reform effort as enduring and as deep as that at Thompson requires strong leadership. Some reflections on that leadership may be informative. Wear is the most visible leader of that reform and the person

who is able to devote the most time to it day to day. She is authorized to play that role by the superintendent. Consistent support from the board of education has enabled both of these administrators to work effectively. After eight years, the board chairman recently retired and passed the torch to Frances Moore, the board vice president, who now has an equally strong commitment. With a background in the liberal arts and an interest in college preparation, Moore raised numerous questions about the school-to-career initiative, but rather than blocking the initiative, those questions helped sharpen both the substance and the description of the initiative, thus avoiding potential public opposition. Once she became convinced that school-to-career would be good for students who did not go on to college and simultaneously enhance the traditional curriculum, Moore became a supporter too.

Several people traced the origins of school reform to the contributions of a former board member, Jim Willard, who remains active in his role as public relations manager for Hewlett Packard, the largest employer in Loveland. Willard described work done by a consultant who had preceded him which helped the board build consensus and which had reduced confrontations with the teachers association. Willard also arranged a visit to the community by Bill Daggett, a nationally known advocate of school reform, who stimulated interest in raising academic standards. And Willard brought to the district a systemic perspective developed through his business training and experience.

Creating a New Role

One way in which Thompson has institutionalized school-to-career is through the role of a coordinator. The first coordinator was a VISTA (Volunteers in Service to America) volunteer assigned to Berthoud High School. When federal funds became available, they were used to support coordinators in all four high schools and one coordinator for all four middle schools. The positions are now supported on regular district funds, a remarkable development in a district whose voters are tax shy. Sue Walter is the coordinator for Loveland High School. A business teacher and department chair, she fills the school-to-career coordinator position half-time. Her duties include maintaining the Career and Academic Plan process in her building, helping departments develop and implement school-to-career activities, identifying community resources, communicating with other people in the district, and supervising unpaid work-based learning. (Most paid work-based learning opportunities are cooperative education placements supervised by the appropriate vocational teacher.)

Walter meets regularly with interdisciplinary committees of teachers, whose involvement in school-to-career helped her prove herself to the academic teachers who were hesitant because of her vocational background. Another boost to her credibilility and effectiveness was the participation of academic teachers in summer internships with employers. One teacher, in particular, came back from an internship committed to teaching students how important punctuality and diligence are to employers. He shifted from being a skeptic to being an ardent supporter of school-to-career. An English teacher returned from an internship and enhanced the technical writing course. In another year, Walter will return to her previous classroom duties and a different person will fill the position. This rotation is planned to keep the person in the job fresh and to distribute commitment to school-to-career more widely among the faculty.

Philadelphia: Achieving Standards with School-to-Career

In 1995 David Hornbeck, the new Philadelphia school superintendent, initiated a ten-point plan, "Children Achieving." The plan set high performance standards for all children enrolled in Philadelphia schools (about 214,000) as the driving force of a reform agenda. To reverse the city's long-term economic decline and worsening urban blight, the school system joined hands with families, community groups, and employers to profoundly restructure teaching and learning environments. The district's 261 schools have been grouped in twenty-two neighborhood clusters around the high schools to which the elementary and middle schools send their pupils. Cluster teams provide instructional support to all the schools in their cluster, reducing the magnitude of the district central offices. Small learning communities in each school foster a sense of belonging as well as a focus for learning. Small learning communities in high schools are often organized around career themes.

Mary Jane Clancy, executive director of the Education for Employment Office, describes how school-to-career contributes to the Children Achieving plan. "David [Hornbeck] talks all the time about how the school is not just the four walls around them, but the children's community is also where they learn. The standards are the constant: what all the kids must know and be able to do. Where they do it, when they do it, and how they do it are totally variable. We're the office that helps schools figure out how to have kids learn in the community. School-to-career is the best tool for having kids achieve standards."

The Education for Employment Office has overall responsibilities for school-to-career, vocational education, adult education, service learning, and restructuring. Clancy and others express dismay that far too many youth still fail to graduate; approximately 50 percent of the ninth graders fail to graduate in four years.

School-Based Learning

The school district adopted standards and benchmarks in the fall of 1997 for eight content areas (English, language arts, health and physical education, math, science, social studies, the arts, and world languages) as well as cross-cutting competencies (multicultural competence, communication, citizenship, technology, school-to-career, and problem-solving). Joseph Jacovino, then the director of the Office of Curriculum Support, explained that focus groups of Philadelphia employers and higher educators independently concurred that students needed both sets of standards to be ready

to enter the workforce: "They valued students' ability to apply knowledge across content areas, and they valued certain kinds of concepts, skills, and knowledge. We took it to heart. Now our job is to build the capacity of our system to have our students achieve at these levels."

To help teachers know what to do in the classroom to meet the standards, a team of 100 teachers and curriculum specialists worked intensively for five weeks in the fall of 1997 to produce three tomes entitled *Curriculum Frameworks*. The frameworks provide examples of student work, classroom-embedded assessments, instructional strategies, best practices, and resources so that teachers at each grade level may understand better the nature of the teaching and learning environment that will enable youth to meet the standards. "Real-world applications" infuse cross-cutting competencies into content areas. "A constructivist approach builds on the knowledge and skills that all students bring to the learning process and allows them to build and practice the skills demanded by colleges and the growing number of high-performance workplaces" (School District of Philadelphia, *Curriculum Frameworks*, 1998, pp. 1–2).

Jacovino reflected on the origin of *Curriculum Frameworks*: "In the thirteen years I've worked in the curriculum office, it's the first document I've worked on that teachers have asked for. In one place, we've attempted to address the idea of what constructivist teaching and learning is all about. This involves the application of knowledge. This doesn't focus on what teachers teach but what students do. So it's a performance-driven document, and it combines curriculum, instruction, and assessment."

Jacovino understands the importance of taking time to build consensus for the frameworks, recalling that the Board of Education took two and a half years to approve the standards. This process will involve introducing the frameworks in professional development for the district's 14,000 teachers to generate dialogue, debate, commentary, and new drafts.

He said, "The issue is to try to help staff, parents, and the community more clearly understand where their students need to go and where their students are. We're encouraging the Teaching and Learning Network to help us with that. When we get student work back, we'll begin to discover the kinds of things that are working well. We need to build a systemwide understanding about what we mean by proficient performance within content areas. We need to build performance standards and provide concrete performance examples. You can't do that overnight. That comes from real kids working on real stuff."

Work-Based Learning

Mary Jane Clancy first began working with the School District of Philadelphia as a consultant for high school restructuring. She joined the district in 1992 to work on vocational education reform and created manufacturing apprenticeships for twelve students who were bused to companies in the suburbs two days a week.

Clancy reported: "I watched the kids closely to learn what was happening. We thought this may be a way to restructure vocational education. The next year, we said, 'Let's restructure health.' We began with these premises: a training plan for each kid, a mentor, and pay. We went up to ninety-two kids, with great results, and a lack of dropouts. When Hornbeck came in [as superintendent], our job was to create an American version of apprenticeship. We got to work a lot with Jim Wernsing from Jobs for the Future about how to turn from a program in a comprehensive high school restructuring vocational education to a K–16 program to restructure the whole school, where every child has a mentor, work experience, and a learning plan."

Placement specialists, paid by the Private Industry Council, work with the small learning communities to create a pool of qualified students who have completed job readiness workshops, mock interviews, and résumés and whose interests and abilities are matched with the requirements of available job descriptions. A mentor trainer works with employers to develop learning plans, which outline what students are expected to learn during their employment. Once the student begins employment, the school placement specialist maintains contact between the employer and the school. Other coordinators assure that special education students have equal opportunity to participate in work-based learning. This remarkable number and variety of staff positions devoted to work-based learning demonstrates Philadelphia's commitment to school-to-career.

A Dialogue on Service Learning

In the Office of Education for Employment, Kenneth Holdsman, director of service learning, and Carolyn Wimbush, school-to-career coordinator, described challenges facing their office as they support the superintendent's ambitious goal to engage 70,000 students in service learning each year.

Holdsman: "At some point, we think in fourth, eighth, and eleventh grades, we'll look at how much service a child has. There are two real challenges in addition to the sheer numbers. One is convincing teachers that service learning is a tool and an instructional strategy and not [just] another thing

that they have to do. The second challenge is figuring out a way of organizing all of the good people and the good programs in a way that can make them grow and become bigger and better. There's great curriculum out there on service learning. There are some teachers already in the district and some outside groups who know [the curriculum] and they love it and they're empowered by it. We want to be able to turn them loose with a little bit of direction from us and let them do their thing in a bigger, broader way. We don't need to reinvent anything; we need to organize it better. We hope that one means of quality control will be developing some of these content standards. The other part of quality control is educating community partners about what their role and responsibility is with our children."

Wimbush: "It should be really student driven because the students make their community. We have to get the teachers to let the students be the driving force, and the teachers become the coaches to be there as a support."

Holdsman: "I'm beginning to view service learning as having very tangible values. One is bringing the classroom experience more to life and making it more meaningful. The second is teaching some career exposure and job readiness skills. The third is giving kids a sense of citizenship and empowerment. Maybe number four is building relationships with community groups."

Wimbush: "We have a challenge of strengthening our link with the community and getting the community to see our students not as recipients but as resources. If students can get actively involved in their community, they in turn will look at themselves and see that they are the community. This might stop the exodus. If we start from K–12, we can bring some stability back into the inner city, because now the students will actively look at the community and say, 'Hey, I worked on this. I want to be here and I want to continue to work on this.'"

Holdsman: "This is giving me a tangible opportunity to make a difference in what I think are our nation's biggest social problems: cities are crumbling and the young people within those cities are without a sense of hope and opportunity. I don't think it [service learning] is the miracle cure-all, but in terms of its ability to effect real attitudinal change in young people and in the way others view young inner-city students, this is a powerful solution."

Internships at Dave and Buster's

Dave and Buster's is a 70,000-square-foot dining and entertainment facility. The motto, "There's no place quite like it," sums up Dave and Buster's combination of a midway, virtual-reality games, a casino, several bars, a grill, and a grand dining room. Students from the food services small learning community at Bok Technical High School can apply for internships at Dave and Buster's, where they rotate through eight different areas during a twenty-week period. Their learning plan outlines what students will be doing during each of their forty shifts.

Once students have become comfortable in one area of the business, encouraging those students to rotate into a new area can be a challenge. Christopher Likely, the assistant general manager, reported, "Two of the students wanted to work just in the kitchen. They wanted to hide. That's what they knew. We wanted them to experience everything." With encouragement, they moved to the front desk. "Once they started feeling comfortable in dealing with the guests and saw that they did have communication skills, they broke out of their shells. And now we can't get them out of the front of the house."

Dave and Buster's goal, according to Likely, goes beyond training potential employees. "My main goal is for one of my students to call me ten years from now to tell me what they're doing and ask me questions about what I would do in the situations that they're in. We're not looking for Dave and Buster's managers, we're just looking to put them on the right path. Our primary goal is for these kids to get life skills and move on. I would hope that they would go on to college. I want them to consider going to school for business management."

Jamal Van, a student intern, further reflected on Likely's notion of life skills: "I always planned to go to college for a business degree, but once I came here I saw what I have to give to be successful."

Mentoring at St. Christopher's

St. Christopher's Hospital for Children offers work-based learning for 150 students annually, including twenty-six interns. The "family-centered care" philosophy for patient care at St. Christopher's permeates the environment, nurturing the youth and influencing them to make career commitments that will help their community. Douglas Allen, the vice president for

human resources, explained, "That's how we work with the students. We'll open the door and we'll help them to succeed. We find that if you raise the bar, they come to the bar."

Esdras Mangual, a radiology intern, explained that to enter the program, "I had to keep my grades and attendance up to par. Prior to participating in this program my attendance and grades weren't what they should be. I now had to be more responsible, reliable, and accountable. It was something new for me, you know, it really changed my life. It's not just you come here and you work. It's more than that. They treat you like their own, like family. My mother just passed away and the day my mentor found out, she came to my home, sat down, and talked to me. Also the coordinator of the program, Barbara Liccio, came over and talked to me, and it really helped me a lot. She also obtained counseling services for me. I see that they're here to support you." Mangual plans to enter college and major in physical therapy. "After I finish and get my master's, I will give back to the community. I'd like to come back to St. Chris, probably become a mentor to young students. Before the program I was involved in gang activity. And when I joined the program, my whole life changed. I started seeing the point of my education."

Integral to St. Christopher's philosophy is that everyone should give back to the community. The interns developed and made career awareness presentations about their departments for eighth and ninth graders visiting the hospital. Eventually they hope to put these on the Web for other children to browse. Allen explained, "Not only are the students learning, but they are sharing what they learned with other students to get them focused."

Connections

All comprehensive high schools in Philadelphia have been reorganized into small learning communities (SLCs). These smaller schools within a school are often organized around a theme or career area with a team of teachers who stay with the same students for three or four years. The SLC structure makes it possible to design a curriculum that is more relevant to individuals, more open to real-life applications, and more continuous over time. At many high schools, such as Bartram, Kensington, and Olney, ninth graders explore career areas in a Career Awareness community and choose an SLC in a career area that interests them for grades ten, eleven, and twelve. Some SLCs operate with support from outside organizations, such as Communities in Schools and Philadelphia High School Academies,

the latter having created career academies, the earliest forms of SLCs in Philadelphia. Other SLCs are homegrown.

A Community Garden Project

Charlotte Buonassisi, a twenty-one-year veteran teacher at Penn Treaty Middle School, explained how a community service garden project of the Passports small learning community enhanced academic learning:

> We got involved with the New Kensington Development, which also has ties to the Pennsylvania Horticultural Society, and they just hired a teacher/landscape artist. We have one class that's going to do our plot of ground for the school garden, and they're going to help us with the community garden across the street. The landscape artist just brought us some dynamite lesson plans to measure plots of land and to plan it in the classroom. The science teacher is going to test the soil. Then the class is going to record the sunlight—where is the sun, where is the shade—[decide] what kind of plants we want, and take before and after and panoramic photos. The art teacher is going to help us with color, texture, what goes here, what goes there—so we'll actually plan it on the paper. Our music teacher happens to be a carpenter on the side, so he did the lattice around the garden and had the kids put it up and paint it, and they're measuring [and using] their math skills. They see the landscape artist and what skills you need to go into a related field. So that's working out really well and the school is going to get a garden. I've been here twenty-one years and [until this] we've never had anything.

Connecting School and Work at St. Christopher's

As a senior at Olney High School, Carlos Carre was part of the Medical and Health small learning community. He took advanced placement physics and English, a social studies class, and a math elective. He also worked on a proposal for a medical, legal, and business charter school. As a senior intern at St. Christopher's Hospital for Children, Carre worked sixteen hours a week in the microbiology lab doing "streaking and culturing, performing work side by side with my mentor." The previous year he rotated through multiple departments in the clinical lab, such as micro, chemistry and urinalysis, blood bank, virology, pathology, and central processing. In the spring of his senior year, Carre took Biology 210 with a lab and a philosophy class at LaSalle College.

Louis Lessick, the coordinator of Olney's Medical and Health small learning community, familiarized himself with Carre's work in the clinical lab by having an occasional lunch with Carre at the hospital on Fridays, by reviewing the learning plans of Carre and other interns once a week, and by reading through the journals of younger students who shadow the interns once a month. This gave him the idea to recruit Carre to assist in a class at Olney.

Carre reported: "He allows me to instruct the class in what I learn at St. Christopher's, such as the methods followed when culturing viruses and bacteria. I was the professor these times. Mr. Lessick and I had a very good friendship; he was like my guardian. Whenever he reads of a breakthrough in science in the newspaper, he brings the article to me and asks me for my input after I read it. He normally asks me to share it with the class. We always question what we read in the paper. A few of my favorite questions are 'Is it really possible?' 'Why are they doing it?' 'Have the scientists thought of the major consequences?' Going to school is something that I look forward to because of Louis Lessick."

System Building

Through school-to-career, education reform, economic development, and community development are treated as interdependent in Philadelphia. According to Mary Jane Clancy, "The mayor says that school-to-career is one of the best economic development tools that exists in our city." Pursuing these agendas simultaneously requires a partnership of all the players within the educational system, community organizations, and businesses. Cassandra Jones, the director of school-to-career for the school district, grapples daily with the tactical issues of turf, focus, and problem solving to move the Children Achieving agenda forward through school-to-career: "We put together a work team and a leadership council where all of the partners sit and everybody has to learn to take off their individual hats and put on the hat for children. There is tension every now and then because you have to do what is best for children, and that means changing, leveraging resources, and giving up control. That's tough!"

The work team includes all the educational and community organizations that work with youth. The School-to-Career Leadership Council is located in Greater Philadelphia First (GPF). Vicki Phillips, then the executive director of two GPF initiatives, explained the connection of GPF to school reform: "The thirty-five CEOs formed an association several years ago to improve the quality of life in Philadelphia and the region. They have three strands of work: public policy, economic development, and

education. The education arm is technically called the Partnership for Reform. Underneath that is a small suborganization [Children Achieving Challenge] that was the result of the fifty-million-dollar Annenberg contribution to the city. One of the Challenge's missions over five years is to help the school district get the foundation pieces of this reform in place with enough depth and richness that when the Challenge goes away, the district can sustain the momentum. For us that means not just helping get the foundation blocks in place, but building the capacity among the leaders in the city, both inside the district and among outside partners, to continue that work. School-to-career fits neatly in both. It's a primary tool for moving the agenda forward inside the district and getting some of those foundation pieces in place, and showing people how they can use school-to-career to do that."

Vicki Phillips believes it is critical for an organization supporting school reform to define its role clearly at the outset. "We've chosen to see ourselves as conveners, catalysts, coordinators, and capacity builders to bring the best practices to the table. After the Challenge goes away in five years, it's their job to keep this in place. We need to give good leadership but it has to be joint leadership, with us a step behind and the district always the front leader if this is going to survive in the long run."

In addition to Greater Philadelphia First, supports for work-based learning and school-to-career in general come from other organizations, such as the Education for Employment Office (including cluster-based postsecondary readiness coordinators), Community in Schools, employer groups for each career area (the industry-based stakeholder partnerships), community groups located in cluster-based multistakeholder partnerships (resource boards), and the Private Industry Council. The Education for Employment Office has experimented with different support structures. In the 1997–98 school year, six business relationship managers employed by the office each worked in an occupational area to develop relationships with businesses to create opportunities for work-based learning and to market and support it. In 1998–99 these functions were shifted primarily to the stakeholder partnerships and the cluster resource boards, with support from school district postsecondary readiness coordinators located in the clusters.

GPF has had a major role in recruiting businesses to participate, communicating between organizations, shaping state policy, and providing technical assistance and resource materials such as a monthly newsletter for teachers and a manual on forming clusters. While GPF provided initial impetus for education reform and for school-to-career, it represents only the thirty-five largest employers; the movement could not continue to grow without support from hundreds of smaller employers. The Chamber

of Commerce and the Private Industry Council included a wider range of employers, but no single organization provided a contact point for school-to-career issues. The advent of welfare-to-work, which also seeks work placements, further complicated the picture. In response, the Education for Employment Office has generated a plan to create an intermediary organization to link educators and employers citywide.

Next Step Centers

The Next Step Center, housed in the West Philadelphia Partnership, provides education and employment referrals for young adults through the age of twenty-two. The center focuses on high school dropouts. Vernon Deane, coordinator and director, sees the center operating as a catalyst for transitioning its clients to diploma-granting programs and to work.

Larry Aniloff, director of community partnerships for the Office of Education for Employment, and Harvey Chism, staff member at the time in that office, work at the district level to support model development and proposals so that the center collaborates with the schools to provide an educational lifeline to the disturbingly large dropout population within the city.

Chism: "Another way that it fits with the school-to-career program is by bringing our dropouts on board and working with them. With the Children Achieving agenda, we are of the mind that virtually all children can achieve, including our dropouts. The Next Step Center uses the workplace or a job placement as an incentive to get some of the students reenrolled or reattached to the educational programs."

Aniloff: "Harvey and I have been working on the second chance system for the last year. The eight 'Twilight Schools' start at three in the afternoon and use an accelerated-credit graduation system and give credit for school-related activities that take place during the day. Where are you going to a put an eighteen-year-old who's in the tenth grade?"

Aniloff argued that simply finishing high school and qualifying for a minimum-wage job is not enough. He pointed out that a relatively small investment in scholarship support could boost a young person's earnings from $5.50 per hour to $9.00 per hour. By paying $1,300 more per year in Social Security and city and state income taxes, recipients would more than pay back society's investment in their educations.

Conclusions

The school districts we visited have adopted school-to-work as a means of helping all students achieve higher academic standards. School-to-work, in other words, is intimately related to school reform. Thompson has many advantages in building a school-to-work system. Its population is relatively privileged, though by no means uniformly affluent. Leadership in both the district administration and the board has been remarkably stable. Local businesses have been supportive. Hard work and tactical judgment have generated progress toward realizing an audacious vision.

Philadelphia faces an even more daunting challenge, being very large and serving a predominantly poor and minority population. Philadelphia has used a promising strategy of forming clusters as the primary units within which reform occurs. Student performance will certainly not be elevated in a year or two. Too many changes must occur first, in the way schools are organized and teachers teach. But the foundations for enhanced effectiveness are under construction.

Districts have the capacity to adopt a comprehensive reform plan and allocate resources for its implementation. For example, Thompson and Philadelphia have both formally assigned staff to do some of the coordinating needed between employers and schools to support work-based learning. Districts can align curricula with requirements and adopt districtwide policies that move the plan forward. They can realize economies of scale by arranging work-based learning opportunities with multiple employers simultaneously. Philadelphia's use of school-to-career as an umbrella for economic development, community development, and education reform also is an efficient strategy.

Regions

Regions are natural units for school-to-work programs because they can be defined to coincide approximately with labor markets, uniting employers with the schools from which a fair proportion of their employees and applicants are drawn. The School-to-Work Opportunities Act encouraged the formation of regional partnerships by allocating the largest proportion of funds to partnerships via states. Although regions have no formal authority over schools, consortia of employers can jointly communicate to educators their standards and expectations for employees, which can help raise academic standards.

Sacramento: An Employer-Initiated Partnership

In the fall of 1991 the Sacramento Metropolitan Chamber of Commerce convened representatives of more than 500 large employers to discuss common concerns. They agreed quickly that the major concern is educating the workforce. Managed care was forcing rapid change in health care and insurance, while an influx of firms from Silicon Valley—such as Apple, HP, NEC, and Packard Bell—accelerated the demand for workers in high technology. Drawing on the business-education partnership experience of IBM and other employers, the chamber established Linking Education and Economic Development (LEED), a not-for-profit organization. From a long list of specific issues and recommendations, LEED narrowed its focus to three core initiatives: workforce development, technology in the classroom, and advocacy for improved education. When the School-to-Work Opportunities Act passed in 1994, those involved in LEED saw it as confirmation of what they were doing. They applied for and received a direct grant for a Sacramento Regional School-to-Career Alliance, which brought new resources to the workforce development initiative.

As LEED fostered communication between employers and educators, the question, "What does business want from schools?" was asked repeatedly. Many employers were dissatisfied but had divergent concerns. Some identified specific work skills they wanted applicants to have. Others said, "You just need to teach the basics and then we'll do the rest." Still others wanted young people to learn the work ethic and to be able to adapt to the corporate culture and dress code. As a result, educators did not find their dialogue with employers helpful in designing programs to develop their workforce. The promulgation of banking industry skill standards by the California Business Roundtable broke this impasse. At a summer institute for teachers in 1995 banking standards were used as a basis for integrating

a career orientation into academic classes. Superintendents were willing to be held accountable for enabling their students to meet industry standards. Industry standards then became a focus for school reform in the region.

LEED identified twelve key industries on the basis of national and regional growth projections. The first four are banking and financial services, health, telecommunications, and high technology. Next LEED will add retail and public safety. The list is revised annually and has already been updated, notably by broadening the categories and adding a new one, bioscience, which has rapidly gained momentum and visibility in the region.

School-Based Learning

Brenda Gray, executive director of LEED, calls career academies "the delivery methodology of choice" for school-based learning in the Sacramento region. Career academies are "schools within schools," smaller units in comprehensive high schools that are organized around a broad career area such as health, business and finance, engineering, or aviation. They typically enroll about thirty students per class and have a core group of teachers who relate academic instruction to the career area. Career academies derive their power not only from their career focus but also from their small size; together these elements help students identify strongly with the school and foster close relationships among students and between students and teachers.

Eight school districts, which include about thirty-five academies, participate in the alliance, which LEED formed and coordinates. Career magnet schools and career paths in comprehensive high schools are the other methodologies used for school-based learning.

The state of California provides special funding for California Partnership Academies. Academies also receive support from the Regional Occupational Program (ROP), through which counties pay for vocational programs in comprehensive high schools that include paid and unpaid work experience. Career academies also draw on federal vocational education funds (Carl Perkins Act), which, among other things, support tech prep activities and structures. For academies focusing on one of the key industries LEED has identified, School-to-Work funds are also available. These funds are devoted primarily to professional development and to paying teachers to develop curricula that relate academic subjects to careers. LEED helps career academy teachers align their curricula with industry standards and finds employers who are willing to provide work-based learning opportunities and otherwise support the academy such as by sending speakers.

River City High School, in West Sacramento, has an engineering academy and plans to open two more academies. The principal at the time of our visit, Donna White, said that the academy evolved from a structure in which all students in the school chose one of five career paths as a focus for their elective courses and planning for the future. (All students take the same core courses.) White believes the academy has helped the school raise its academic standards: "We've put in more advanced placement classes. When I came there were only two and now we have seven. In 1993, before I came, nineteen students completed the A through F requirements [for entrance into the University of California system]. Now we have fifty-four. So it's been a progression of challenging them and not allowing teachers to say, 'We do as well as we can with the students we have.'" At the same time, grade point averages have increased and absences have decreased.

Ron Piña, who directs River City's career academy, explained that they succeeded in convincing the University of California system to count applied courses as college preparatory by changing the name of the course, not the course of study. Not only can students in career academies go on to college, but some of them take community college courses for credit while still in high school. A community college professor teaches a course on electrical circuitry in the engineering academy and assists the other teachers in planning integrative projects. The state grants "credit" (average daily attendance) to both institutions for the students. Students earn college credits at no charge before graduating from high school. When the engineering academy's current juniors graduate, they can already have twelve college credits or more.

The San Juan Unified School District has twenty-two career academies in its nine high schools. Encina High School has "wall-to-wall academies," meaning that every student is in one of its four career academies. The school board has allocated money to pay for field trips and to employ "youth employment technicians," or job developers who find related work-based learning opportunities for all seniors in career academies.

Merle Padilla, San Juan's school-to-career director (now retired), talked about how participation in a career academy affects teachers and students: "The teachers really like it. It's such a support for them. They have other teachers to depend on and they'll do anything for each other. We try to help them figure out ways they can get together, but nothing quite does it like the common prep [preparation period]. Most of the teachers and students now eat lunch together in the academy rooms, so they truly do become a school within a school. Students know the teachers are there and they know they can get in touch with them during lunch. It's great for the students to know that those teachers care a lot about them."

When asked about the range of students who enroll in academies, Padilla noted a tension between the ideal of including all students in career academies and system constraints: "Non-college-bound students are easier to schedule because there are fewer required classes. Carl Perkins money has placed an emphasis on disadvantaged students. The California Partnership Academies also are funded primarily to serve disadvantaged students. We're saying school-to-work is for all kids, but the funding is still focused on kids that have a disadvantage."

Work-Based Learning

Job shadowing was the type of work-based learning mentioned most frequently by LEED partners, who also described field trips and internships. School-to-Work funds have fostered the growth of career academies and have augmented many programs with work-based learning. Work-based learning varies enormously among schools and school districts. Some students who are not enrolled in career academies have work-based learning opportunities, but most of these are traditional work release and cooperative education, which predated School-to-Work.

At its most sophisticated, work-based learning is tightly linked to school-based learning. The latter, which is related to a career path, meets employers' needs for well-educated, highly skilled workers who understand all aspects of the industry. Michael Phillips described such an approach at Sutter Health, a large not-for-profit health care provider:

> I looked at the components of partnership academies and decided they could be tweaked to a higher level. For example, the partnership academy called for mentoring, job shadowing, and hands-on experience as three key components of connecting activities between the classroom and the workplace. So we took a look at where we had highest demand for workers and said, "Let's recruit our mentors out of those same fields where we have high demand and let's job shadow in those same departments to try to show the students that you don't have to be a physician or a nurse to be a success in health care." We put into effect an actual job shadowing curriculum and started holding students responsible for getting that curriculum done while they're out shadowing. We also started grading them for their performance during shadowing. Then we started grading them for their projects with their mentors. We started holding them accountable for producing, with their mentor, as a team. Then we started nudging the bar up. The first step was just holding them accountable for anything, then we started holding them accountable for quality.

Well, it worked. Our first data started coming back and they showed that the students were responding. Even their parents were responding to the accountability piece. That's about the time the federal site grant RFP process hit and the School-to-Work Office was formed. So, we said, "Hey, we've got something that works here. We ought to apply for a grant and see if we can take it across Sacramento rather than just one site."

Connections

When people in the Sacramento region talk about "connecting activities," they are referring primarily to links between educators and employers (rather than between school-based and work-based learning). LEED was created specifically as a brokering agency between educators and employers. Although it performs this function in many ways, industry standards are the essential connection.

Brenda Gray described what happened after the first summer institute when teachers used banking standards as the basis for curriculum development: "Other teachers began to ask the teachers at the banking academy, 'Do you think there is something similar to this in our industry?' So we began to do research and found that the Department of Labor and the Department of Education had funded twenty-two original industry skills standards projects. And we learned that skills standards documents were available. Our local public safety organizations—firefighters and the police organization—came together to look for common skills in those two departments so they could define a core set of skills to use specifically in one of the police academies at one of the high schools here. And so this became a very exciting notion to us and we began to see the systems piece."

Working with business and education partners, LEED established a sequence it continues to use. In each of the key industries LEED identified, it begins by looking for standards that have already been developed. Employers in the region then review these standards. Usually they adopt them as is, but they may decide to adapt them; for example, employers deemed health care standards too narrow in a managed care environment, which requires workers to have multiple skills.

Once employers agree on standards, LEED conveys them to educators, notably through summer institutes for teachers. The educators, including those from community-based organizations as well as from schools, use the standards as the basis for their curricula. Eventually they hope to develop assessments that both employers and colleges will accept as certification that students have achieved the standards.

Theresa Trujillo, the LEED industry education coordinator responsible for high-tech employers, talked about the challenge of defining appropriate standards: "Really this isn't about a training program for them to be prepared to do just one job. But you're also not doing a too-broad career path that really doesn't prepare them for anything. We have found that if we keep going back to those skills standards documents and using those as our point of departure every time, both on the education side and the employer side, we're not going wrong. Because we keep coming back to what employers are looking for and what will assist students to be successful once they exit their education, at whatever level that is. And those things tend to be the common denominator. It's fascinating—every new document I find tends to be very similar in what we can actually do at the high school level. We could probably be more job specific, but then I think we're getting away from what we want to do in school-to-work."

Integrative Projects in a Career Academy

Interdisciplinary projects integrate vocational and academic education. They can also connect school-based learning with work-based learning. Many career academies rely heavily on such projects. Karen Shores, coordinator of the Oakmont Health Careers Academy, described the sequence of projects their students complete:

> In tenth grade we focus on health care of the aging and elderly. Our project is called "the Journey." In the English classes the students learn about the relationships between the elderly and different age groups. In social science they study how different cultures around the world treat their elderly. In Spanish they do a diet and exercise plan for an aging relative or friend. Then they create a poem through the eyes of the elderly, put it to music, and present it to an audience. They bring in their grandparents and interview them in front of the class in Spanish. This is all done in Spanish. In science, the biology/health tech combination, they're looking at the difference between the biology of the young and the biology of the aging, the difference in cells, the difference in muscular and skeletal development. Math's not in there yet; we'll start with that next year. Putting all of this information together is the culminating project: they do community service for an aging or elderly citizen in their community. They write it up in the WestEd project format. And then they present it to a group of teachers and other students so that they get their public speaking skills in there, too. This term's class went to Grammercy Court Nursing Home. They went over

there and did a day's worth of entertainment for the residents. They did Bingo, skits, music, arts and crafts, and reading little stories. They had a good time. I think the residents even danced in their wheelchairs.

In junior year our project revolves around the English class. They do a junior research paper on controversial issues in health care. And in all of their classes we deal with different controversial issues. The students do intensive research on their own issue, prepare a formal research paper, and then they present this to representatives of various community organizations. The students dress up in their blue suits; they all have blue business suits.

Senior year is a combination of English, American government, and Health Tech 3. The focus is on world responsibility, and how governments work, and how governments and economies work together. So we've got American government, economics, and English 12 working together. The English 12 curriculum meets the university requirements, but we use a multitasking format. The English teacher jobshadowed in health care last summer and discovered that you're not given one thing at a time to do out there. In the real world you're not allowed to finish one thing at a time either. You're given a whole lot of stuff, and you have to manage your time. Students don't write flowery in this class; creative writing is not really appreciated in most industries, so they have to write concisely and to the point. They have to create six perfect papers to graduate. The things the teacher has them write about revolve around what we're doing in Health Tech 3 and what they're learning about economics and world governments, and American government and economics. English class pulls it together.

Projects are a big part of our senior portfolio presentation. That shows all of the soft skills, EKSs, as our district calls them—Essential Knowledges and Skills. Then it shows the industry soft skills—knowledge and ethics and all that—and then our industry skill standards. So the portfolio presentation shows all of these skills through the students' choice of ten pieces of documentation; and it has to be big pieces demonstrating knowledge and skills. One of these is always the sophomore Journey project, because that just about meets every single soft skill that they need to have accomplished. That plus the nine additional projects show how they have mastered all of these different skills and knowledges.

Another connecting activity is work-based learning for teachers, usually in the form of job shadowing. Employer partners and LEED staff expressed frustration that not enough teachers take advantage of the opportunities they offer. Teachers and school administrators spoke favorably of job shadowing for teachers in interviews.

Transferability of Core Skills

When explaining school-to-career and LEED, Brenda Gray uses a spiral diagram depicting the "career journey" with several entry and exit points. Asked where this concept originated, she replied:

> You might be surprised to hear that it actually came from our employers. Our high-tech consortium hates the term "school-to-career." Whenever they have to use the term, they often refer to "school-to-career," "school-to-school-to-career," or "school-to-school-to-school-to-career." The consortium represents the entire gamut: employers who hire right out of high school for assembly line work, employers who hire only people with at least an A.A. degree minimum, and employers who hire only bachelor's-degreed individuals, minimum. And so that became the basis for that graphic in that we have to think about career pathways that are broader than just simply getting kids jobs right out of high school or right out of community college or even right out of the university system. Many of our employers also were telling us that they were using the industry skills standards documents internally as a way to measure their incumbent workers. So it was not just about that entry-level job. It was also about helping people begin to understand what skills they would need to move on to the next level within their organization or within the industry for that matter.
>
> We don't talk about career pathways. That's an education term. We talk about our industries and we talk about economic sectors. Part of the reason we went through the discussion that is reflected in the definition of all the standards was to deal with parents' concerns about tracking. If they're faced with a parent who says, "I don't want Susie to be a part of this health academy because what if she wants to be a lawyer?" just about everybody in our community, whether they're educators or business partners, would respond that the work we're doing is truly focusing on core skills that cut across all industries. We spent time early on taking the skills standards documents that we knew we were going to be working with most immediately—banking, telecom, high-tech, and health—and we hired a consultant to do a cross walk among those

> four standards documents to define for us the core skills. And those core skills were shared with all of our teaching teams across our region.
>
> Our teachers integrate the core. Examples that they use in their teaching as well as in the assessment process are contextualized within their industry emphasis. But the skill is a core skill that's going to cut across the health industry and the remaining three. And so, when we work with parents we make it very clear that this is not about job training. We don't get down to that level of specificity. It's not about giving a young person the right skills to be a sonogram technician or a pharmacy tech. It's about giving them the skills essential to succeed across industries. And in that health academy they will have an opportunity to gain those core skills. Yes, it will be within the context of a health workplace. But they ought to be able to transfer those skills into any other industry.

System Building

LEED has developed an organizational structure that supports its goals. It is a not-for-profit (501(c)(3)) corporation that has a small professional staff, all of whom have business experience. They are housed in office space donated by IBM, which also provides phones, office machines, and support services. Top-level leaders from the partner organizations constitute the board of directors: CEOs, general managers, and presidents of companies; superintendents of schools, the chancellors of the regional community college system and the University of California at Davis, and the president of California State University at Sacramento; and congressional representatives, the mayor of Sacramento, city council members, and county supervisors. The board meets every other month to make policy decisions. Each member assigns a person in his or her organization—for businesses it is usually the human resources director—to work with LEED staff on day-to-day operations. Those representatives meet monthly with their counterparts from the same industry. One or two representatives from each industry group attend monthly meetings on a rotating basis. This structure recognizes that top-level authorization and involvement are essential but also that the top leaders have limited time to devote to the partnership.

An industry "champion," which is an organization, forms a consortium in each of the identified sectors. In each case the champion is represented on the board of directors: HP for high tech, Bank of America for banking and financial services, Pacific Bell for communications, Sutter Health for health care, and Nordstrom for retail. LEED recruits champions with the advance approval of the board. Acceptance of the role en-

tails specific obligations, which are assumed by a human resources director or equivalent person but with the explicit authorization of the top leader. People in business rather than education are responsible for urging other employers to join the consortium.

One of LEED's strengths it that it was founded by business leaders, but, according to LEED's operations manager, Lisa Bartoe, they do not describe themselves as "employer-driven" because that would imply that employer partners have more influence than others.

Employers participate in LEED not only out of a sense of corporate citizenship, but more compellingly, because it helps them meet their need for well-educated employees. High-tech employers are especially vocal about their need for technicians with associate's degrees. They are leading a campaign to produce "1,000 technicians by the year 2000." When she speaks to parents, Sue Gamage, who represents NEC in education partnerships, refers to a survey of twenty companies that found a combined need for 3,500 engineers and 2,500 technicians. Yet four community colleges together award associate's degrees to only 100 technicians per year. She wants parents to understand that two-year degrees are valuable too, not just four-year degrees.

Defining Partnership

Michael Phillips of Sutter Health:

> The traditional coupling of industry and education has been patronage. Education comes to industry and says, "We've got this great plan. Underwrite it for us, would you?" And industry takes a look at it and says, "Okay, yes, I think that's got a shot at succeeding. Here's your check." That's patronage. Partnership means that we come together as equals, and not only do we share truths, but we share risk. It's not until you start looking at what that risk-sharing side looks like that you really finally become partners. What is it that each of us is willing to put on the line to make this happen, both politically and economically? Are we willing to stand up together and take the heat in communities for the change that we want to implement, and are we willing to back each other to the hilt to make this happen? Then we've got a partnership.

Meeting Employers and Schools Where They Are

Theresa Trujillo described how she and her LEED colleagues work with business and industry:

> We use this menu[1] as a way to engage employers. Most employers really do want to do something, but they don't respond well when schools come in and basically tell them, "You should be doing this for us," and then define exactly what the company should be doing. If they do respond, they're only going to do it for a while and it's probably not in a meaningful way. It's just giving them a computer or some money to get them to go away. The approach we take is to say, "We know you're concerned about this because it's going to affect your bottom line. You need qualified employees. We know it's a concern of yours. In what ways can you assist this whole system that we're building?" It could be that they send a speaker to a school twice a year and that's it. That is great. So we allow the employers to meet us when they can. And this gives plenty of room for large or small employers to participate in some way in this whole system-building process. I found that very few have said, "No," outright. They just don't. They will do something. And we also approach them with something very specific in mind, usually around a project we're doing. For instance, when we participated in the national Groundhog Day event in February, it was extremely easy to get employers to participate in that. It was something so specific. But again, give them a range of specific things. It's been very easy, I think, because our employers want to be engaged.
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> And then on the education side, I go out and meet with the schools and try and figure out, "What's your curriculum for this year? Where will it make sense to bring employers into your classroom for speakers? Where does it make sense for you to go out on a tour that will really enhance what they're learning in the classroom?" At times, if they ask for it, I give assistance on their action-based projects, how they might be more relevant to industry or how their action-based projects, tours, or job shadows or what have you would be relevant to them.

The need for technicians highlights the importance of building postsecondary education into a school-to-work system. Several links have already been mentioned, notably dual credit for college courses taken during high school and acceptance by the University of California system of

[1] The "menu" is the Employer Participation Model developed by the National Employer Leadership Council (NELC). LEED contributed to the model, working with Pat Stone, who later directed NELC.

applied courses and work-based learning as appropriate preparation for students. California's system of higher education has three levels. Units of the University of California are the most selective, followed by California State University units. The community colleges are the third tier. They enroll students who plan to complete associate's degrees and others who transfer to four-year institutions.

Although schools and businesses are the most numerous LEED partners, community-based organizations (CBOs) are also involved. The Sacramento Employment and Training Agency (SETA) administers state and federal job training programs. It works closely with CBOs, which operate programs. SETA's employment and training analysis supervisor explained that the state education department holds SETA accountable for using Job Training Partnership Act (JTPA) funds to support the School-to-Work Program. Because they work extensively with low-income youth and dropouts, they are instrumental in opening school-to-work to all youth. Their programs are primarily subsidized work experience but include academic enrichment for those who are functioning at or below the eighth-grade level. They also support "one-stop" centers that offer a range of services in one location, including assessment, counseling, job search assistance, access to programs, and placement. Some one-stop centers are located in high schools, which promotes collaboration between the school and the job training programs. Another example of such collaboration is the Urban League's adoption of the same industry skill standards used in schools as the learning objectives and assessment criteria for its job training programs. SETA hopes to continue fostering this collaboration and views it as a major requirement and benefit of school-to-work.

Brenda Gray is confident that LEED and its activities will continue to flourish after federal funding has terminated. LEED was created before the School-to-Work Opportunities Act was passed, and it continues to meet a pressing employer need. Gray says this is different from communities that "come together around a pot of money." LEED has support from the highest levels of corporate leadership and from the leaders of the partner educational institutions. They have worked hard to remain a lean organization with a small staff. She envisions the organization continuing with support from private and corporate foundations and by charging employers and schools for service. She believes the brokering function, with one point of contact between educators and employers, has demonstrated its value sufficiently that the partners will maintain it in the future.

North Metropolitan Atlanta: Designing a New Consortium

High-tech industries joined with educational institutions in Atlanta and its northern metropolitan region beginning in 1996 and subsequently formed a not-for-profit corporation called the Local Industry–Education Consortium. Its purposes include promoting a manufacturing technology major and program of study in high schools and postsecondary institutions that is linked to industry skill standards, structured work-based learning, and improved school-based learning. CIBA Vision requested that the Southern Regional Education Board (SREB) prepare a plan for a model regional consortium that could be replicated elsewhere. SREB, an education reform network based in Atlanta, promotes school improvement through its High Schools That Work program. The Novartis U.S. Foundation (then Ciba Educational Foundation) funded SREB as an intermediary with business and educational institutions. Siemens joined CIBA Vision as the key business partners in establishing the consortium. Thirty businesses, including local, national, and international firms, are currently members, along with eight school systems and four technical institutes. The Georgia Department of Education is also represented. Jim Clark is an SREB staff member whose salary is paid by Novartis U.S. Foundation to serve as managing director. Travis Hembree, apprenticeship coordinator at Siemens, assisted in the consortium's creation and development and was assigned 80 percent to the consortium during the first eight months of 1999.

At the time of our visit (spring 1999), Hembree and Sonny Williams, who was then responsible for youth apprenticeships at ZF Industries and one of the consortium members, discussed employers' motivation for helping to initiate the consortium and some of the challenges they have encountered in their first year of operation. Following is a transcript of that discussion, edited for continuity. Note that this case study is based primarily on this interview, rather than on an extended visit and interviews with diverse participants.

Williams: "Because unemployment in our area is very, very low, 2.4 to 2.5 percent, there is no pool of skilled labor to draw from, so we will need to develop such a pool. And we don't want to try to steal from other industries. They have the same needs we do. We are actually preparing them for everybody. And if one leaves here and goes up the street and works for Siemens, or if one comes down here from Siemens, we've still got the same skill standard and everybody is equal. And since we don't compete product-wise it's been a very good effort."

Hembree: "When one company takes on an apprenticeship program, it's never going to do enough to fill its workforce needs. So the only way to address workforce needs is to systemically address the suppliers that are providing it. Because the thing that's going to drive manufacturers to get aboard is exactly the kind of situation that we're in here: the inability to hire people. It's going to take time. It's going to be a slow process, but as we sit down and go through this packet [of materials about the consortium] with potential partners, I've yet to have one turn me away."

School-Based Learning

Williams: "All parents expect their children to go to college, and if you start talking about technical careers, it's kind of a turnoff for them. We're not saying 'don't do that,' we're just saying maybe you're going down a different avenue to do that. What you want to do is give them a career path where they can actually get an associate's degree, a four-year degree, or higher and at the same time develop skills and work ethics.

"And it's pushing education a little bit, too. I think it gets them outside the paradigm they have, which is that everybody should be prepared to go to college. Those students who feel like they're not going to college really don't know what they're going to do. Once they get into an apprenticeship they say, 'Wait a minute. I hated math but now that I see the application, it's easy.' But that's our problem in the education system. We don't show the application of things. The only thing we say a lot of times is, 'OK, do the odd problems and turn them in tomorrow.' Then you ask an instructor, 'Why do we do this?' 'We did it because you want to pass this course,' or, 'I don't know why you did it because I don't know the application. I can tell you how to solve the equation.' We use trig at ZF. We use tangent and cosine all the time out here because if you drill into our housing, and if that angle's not correct it's not going to fit into the bolt pattern of the transmission."

Hembree: "And I think it's important, too, to recognize that even the students going on for the four-year degree, the engineers—mechanical, electrical, manufacturing—if they don't have that connection to the products they are going to design and build before they get out, their curve for productivity is going to be a lot longer than that of the student who's coming from a structured work-based learning program. Plus if you co-op you can take your professional engineering exam after you graduate; you don't have to wait and get your experience. You've got the experience and you hit the ground running, where otherwise, you know, all you have is theory.

"What you should do is have one diploma that prepares every student in the United States to either go to work when they finish or go to school, or do both, work and go to school."

Williams: "Now the core is always going to be the same, I think. The math, the science, the social studies. They're going to be the same, but when you get to the technical, that's where it can be different. The vocational or technical schools always had the stereotyped image of a lesser education. It's easier. What we're trying to say is if you take math in technical school or the two-year college across the street, they're the same. You're expected to perform the same because we're going to give you an associate's degree and you need to be at this level.

"Right now anybody we have in our plant can go back to the technical school and it's all paid for. We're probably the only state in the United States that has set it up this way, thanks to Governor Miller."

Hembree: "To make a difference in these kinds of things you've got to have a lot of people behind you."

Williams: "You've got to have a lot of leverage. And business can provide that leverage."

Work-Based Learning

Williams: "We understand the barriers in getting an education, and you've got to work around some of those. That's what we're trying to do by partnering with some of these schools and just basically taking a prototype of schools. Once we get this established with the schools that we picked, then it's a template to go out there and say, 'This is what we can offer you.'

"We get together on a quarterly basis and then have work teams that get together and try to do recruitment and identify through the Southern Regional Education Board the schools and industries that want to participate. We do internships in the summer for instructors and counselors and for students. It's also meshed with our Youth Apprenticeship Program. We are trying to provide through this consortium about 250 jobs each summer for students after their sophomore or junior years to intern so they can decide whether they want to go into a manufacturing career. The consortium has a set of national skills standards that we wanted to incorporate into the school system and provide career paths for people who are interested in technical manufacturing careers."

Hembree: "At Siemens we use those skills standards as a system for the entire workforce. We've got it done and in place for all the hourly people and we are starting it now for all the salaried people. There's an A, B, and

C to each level. So in, say, Production Specialist 1A, there are certain skills that a person should know and for that number of skills there's a pay scale attached to that. Now that person also knows by looking at Production Specialist 2 what skills are required for that and where he or she can go get the skills, whether it's training within the facilities or a course at Lanier Tech or whatever it might be. We're using this with the consortium as a starting point for companies to get involved. We asked them to complete a validation survey, which basically tells us whether the skill is needed within the facility. And the hope is to work with the schools to get them actually teaching those skills."

Williams: "We have now decided that we need to start bringing in job shadowing and tours at a younger age, so we are looking at the middle school—sixth, seventh, and eighth graders—because the consortium is laying out career paths and skills standards. If we can get the schools to adopt the skills standards, then we can put in place the training that we'd like to see them pursue in high school and postsecondary school. If they wait until they are juniors and seniors they may not have taken the correct curriculum to prepare themselves for these technical careers, such as geometry or calculus."

System Building

Hembree and Williams discussed the need to improve articulation between technical institutes and four-year colleges. Some technical institutes are not accredited to award associate's degrees, and their credit cannot be transferred to a four-year college.

Williams: "The next step we're headed toward is saying we want a two-year associate's degree when you come out of these [technical] programs. The biggest challenge for the consortium is marketing. We want to show other companies that it does work and get them on board and then we want to leverage the business side of it with the educational side. So it's marketing. We sell those people and we sell other industries."

Hembree: "Marketing not only to the manufacturers but to students. There's been a big focus on, 'Will there be enough manufacturers to provide jobs for these kinds of efforts?' when I think the real problem is, 'Will there be enough students to accept these jobs?'"

Williams: "We're coming up with a plan to better market it to parents, not just to students. The parents are very influential but on the other side their peers are sometimes more influential than their parents. So if you can, you get a successful candidate from an apprenticeship to talk. Travis

and I can present all day long and it's two adults presenting. If you get a peer who's successful and can show what's happening and how they've changed their life, that's the key to it."

Hembree: "Some of it is lack of understanding of the opportunity. Some of it is just the word 'apprenticeship,' I believe. When a student hands a parent a letter that has 'apprenticeship' on it, if that parent thinks he knows what apprenticeship is, he will say, 'No, that's not for you. You're going to college.' The labels are a problem. Whether the label's manufacturing or whatever."

Williams: "Because you know you've got either college prep or tech prep and that's where you lose them right there. Because the parents say, 'You aren't going to be tech prep. You're going to be college prep.' Even if they know in their mind probably you're not going to be a college graduate, you're still going to be college prep. We've got to make sure that somehow we can pull that together and sell the parent on the idea that this is a career path, a lifelong learning path."

Hembree: "The real key is that the kinds of skills that the people on the tech prep track are able to access are just as relevant to the people on the college prep track. I mean, their need is just as great, especially when you think of the different computer courses they can take."

In the fall of 1999 Jim Clark updated and clarified some of the information on the North Metropolitan Atlanta Local Industry–Education Consortium. Sonny Williams was relocated by ZF Industries and another employee is now involved. Travis Hembree was given additional assignments by Siemens and currently devotes 15 percent time to the consortium. Most significant is that the state of Georgia has decided to allocate its School-to-Work funds through the technical institutes in each of thirty-seven service areas. The state's charge to the technical institutes is to form a committee and identify gaps in the workforce development system and then come up with plans to fill those gaps. Recognizing the overlap between this mission and its own, the consortium leadership met with the presidents of two of the four technical institutes whose service areas are in North Metropolitan Atlanta and offered either to work with them or to disband. The presidents, who had previously supported the formation of the consortium, urged the board to keep it going and agreed to continue working with it.

Clark explained that the consortium has grown in each of the last three years and succeeded in placing 184 students in internships during the summer of 1999. It also has expanded the range of careers beyond

manufacturing to include other high-tech occupations—health and medical services, finance, agribusiness, and arts and humanities. Clark also pointed out that High Schools That Work regularly advocates an academic core at the college-prep level so that all students may be able to go on to four-year colleges, consistent with the position taken by Hembree and Williams.

Conclusions

Regional consortia can bring together natural groups of employers to act on mutual concerns about workforce quality. They can also establish and promulgate skill standards and related academic standards.

LEED is an exemplary regional consortium whose employer members have a strong commitment. It has succeeded in linking school systems with employers, postsecondary institutions, and community-based organizations. The consortium has enabled educators to learn about and make use of industry skills standards and to take advantage of such resources as classroom speakers and work-based learning opportunities. In schools that have multiple career academies or that use career paths as an organizational structure, school-to-work affects all or most of the students. In other schools, however, the impact is limited. Brenda Gray estimates that 5 percent of the students in the Sacramento region's eight school districts are directly involved in school-to-work activities. This estimate does not include indirect effects such as the influence of a teacher who has done an internship at a high-tech firm. Nor does it include students who are involved in activities that are consistent with school-to-work but predated the legislation, such as work-based learning through cooperative education or career academies in industrial sectors that are not among LEED's priorities.

Travis Hembree and Sonny Williams have a deep understanding of the need for and challenges of school-to-work partnerships. Although they represent the employers' perspective, they also understand the perspectives of educators, parents, and youth. In his position with the North Atlanta consortium, Williams drew on his previous experience as a teacher. Both Hembree and Williams are aware of the need to accommodate competing interests and preferences that arise when institutions that have different missions, governance, and audiences try to work together.

The North Atlanta partnership is committed to building a school-to-work partnership system. This commitment is shown by Hembree's and Williams's concern for improving the academic attainment of all students, which requires extending the age range downward to assure that students

are prepared to take demanding courses in high school and improving the link between secondary and postsecondary institutions and from two-year to four-year institutions. They also note that for recruitment of youth apprentices to succeed, young people and their parents must understand that becoming an apprentice does not rule out going to college; in fact, it may make it more likely for some students.

The Local Industry-Education Consortium in North Atlanta has a narrower membership than many partnerships, being made up of high-tech firms, but the problem that member firms hope to overcome is one familiar to employers even in areas that have higher levels of unemployment: the scarcity (and concomitant expense) of well-qualified employees. Siemens, CIBA Vision, ZF Industries, and the other consortium members are exceptional in their willingness to make a long-term investment to alleviate this problem. They see the value of partnership with other firms that, though not their market competitors, compete with them for the best workers.

Corporations

We added corporate initiatives to our schema after realizing that they represent a way of building systems that does not match a level of school governance. Including school-to-work systems being developed with corporate leadership vividly highlights the ideal of mutual partnership. If school-to-work is viewed as being under the control of educators and predominantly a matter of changing schools, it will never attain the status of a system. When both the school side and the work side can take leadership, stronger systems arise.

The two corporate systems that we have chosen have demonstrated a firm commitment to high quality and wide dissemination as well as a willingness to allocate the resources required to achieve both. Other examples of corporations building systems include McDonalds, BellSouth, Ford, Autodesk, and American Express.

Automotive Youth Educational Systems: Competitors Uniting

Automobiles have changed dramatically over the past decade, as have their sales and service. American auto manufacturers rose to the challenge posed by imported automobiles by substantially improving quality. But by selling a more durable product, dealers have fewer customers who reliably buy a new car every year or two. Astute dealers emphasize high-quality service, which simultaneously provides an earnings stream to complement sales and cultivates customers, who when they buy a new car are more likely to buy from the dealer they trust to maintain it.

These changes have increased the demand for competent and committed workers. Instead of automobile mechanics, the industry now needs technicians. The difference is more than semantic. A contemporary automobile is loaded with microprocessors and other electronic equipment programmed to adjust the engine for maximum efficiency, to deploy air bags, to prevent brakes from locking, and to perform myriad other tasks that orchestrate the vehicle's performance. The mechanical parts are the simplest and most reliable. Therefore, instead of listening to an engine and "tinkering" with various adjustments as mechanics have traditionally done, a contemporary auto repair technician performs routine scheduled maintenance and diagnoses a vehicle's functions by attaching it to a specialized computer, which analyzes data from all of its microprocessors to identify problems that require service.

General Motors began Automotive Youth Educational Systems (AYES) as a school-to-work initiative in auto repair technology. Daimler Chrysler, Toyota, and Volkswagen subsequently joined in sponsoring AYES as an independent, not-for-profit corporation. Independent local dealers decide whether to participate in AYES. Participation entails establishing a partnership with other dealers and with one or more schools that offer vocational education in auto repair. Dealers agree to provide paid internships under the guidance of a mentor. The initial internship is in the summer before grade twelve. Some internships continue through the school year. As of summer 1999, 110 schools in twenty states were participating in AYES.

When he announced the formation of what was then GMYES, Jack Smith, GM's chief executive officer, explained that "the education system in this country is not turning out people for the jobs of the future." The problem, he said, comes from separating students into college-bound and non-college-bound tracks. Instead, he argued, "What we need today, what we will especially need for the future, are people with both head and hand skills." Drawing on his experience running GM's European operations, he called for an American version of European apprenticeship and emphasized the key role of workplace mentors.

School-Based Learning

Oklahoma City was the first pilot site for GMYES. The GM dealers there were enthusiastic in their support, and the city boasts an exceptionally strong vocational school, the Francis Tuttle Area Vocational Technical School. Students take academic courses at their home schools for half of every day. They do internships three half days per week and are in classes at Tuttle the other two half days. Their curriculum is structured by performance. They can gain the specified competence either in school or at work and demonstrate mastery any time by passing a self-administered computerized assessment examination.

In Delaware, students attending Delcastle Technical High School take both academic and vocational courses rather than shuttle between an academic high school and a part-time vocational center. AYES interns alternate two weeks in school with two weeks of full-time internship. Classes are divided into two groups; one group attends school while the other is at work. Academic classes are scheduled to accommodate this arrangement.

The automotive technology instructor at Delcastle, Jim King, said, "Diagnosis is the big thing. That's what takes the brains and the work, not the physical aspect of working on a car. The people who are capable of doing that are going to make the big money, dictate to the nondiagnostic

technicians what to do. They are going to be the liaison between management and the hands-on workers. My theory is that the people who are capable of doing that are going to naturally go to the top."

As in other domains, computerization simultaneously simplifies auto repair and makes it more complex. The computer assesses the vehicle's basic functions more quickly and accurately than traditional methods. But the technician must be able to interpret the data and determine the steps required to correct a problem. Simplification of routine procedures places a greater premium on understanding the entire system, including the automobile, the computer, and the diagnostic program, because such understanding is required for coping with nonroutine events. The diagnostician must be able to spot an implausible result immediately and know how to solve problems when things go wrong. Solving problems often requires the use of repair manuals that amount to a dozen or more volumes for a single model. These manuals have grown so large that manufacturers publish them both on paper and electronically.

Work-Based Learning

The service manager at Bob Howard Auto Mall, an AYES partner in Oklahoma City, reinforced the value of educational credentials in the field. He said he would prefer that all technicians have an associate's degree. He organizes his technicians in teams, which are each led by a master technician with an associate's degree plus five years of experience and include two technicians with associate's degrees, one technician with a high school diploma, and one AYES intern.

This hierarchy based on educational level illustrates several key points about AYES and about auto repair technology as a career. One is that teamwork is important in this field, as it is in so many others. Teamwork requires communication, group problem solving, flexibility, and division of labor in addition to technical mastery. Adding customer relations to the mix heightens the importance of "soft skills" in a field that many associate solely with mechanical aptitude. Another implication of the hierarchy is that, although jobs are available for technicians with no more than a high school diploma, advancement and increased earnings clearly depend on further education and thereby provide visible incentives for continued schooling.

All this points to the fact that preparing young people as auto repair technicians is more than narrow training. They need a sound education to succeed. Having acquired that education to become auto repair technicians, they are then prepared to succeed in other careers as well.

Felix Leiter, a student of Jim King's at Delcastle, explained what he liked about his AYES placement: "It's a really good job. It's good experience. You're in an actual dealership. We do real work on cars, not just oil changes and services. We get to see everything and see how everything works, so it's a good opportunity. When it's busy, I'll do the things that I can do, the things that I have learned so far. Then when we slow down, my mentor will teach me something, and then I will be able to do that by myself. And it keeps going until you learn more and more. When you're in the school shop, you can mess up more; it's just the place to learn and make mistakes. At the dealership, it's the car of someone who is actually paying for it. You can learn, but you try not to make mistakes. You know it's a little more important."

Leiter plans to enroll in college after graduating from Delcastle, and King is encouraging him to do so. King points out that Leiter can work while taking classes and his employer will pay his tuition. "It used to be that if you found a technician with an associate's degree, he was probably one in a thousand. I would say that now probably 25 percent have associate's degrees and 10 percent have bachelor's degrees. Ironically, you find that most of the ones with degrees are technicians, not management. Automotive managers have gone from people who have worked their way up and know how to fix cars to business managers. The dealers would like to see people like Felix go get the training and degrees to do that, but a lot of them are saying, 'Well gee whiz, if I can make $60,000 to $100,000 as a technician and not have to worry about any of that, why would I want to go get a four-year degree to make $50,000 a year and be responsible for everything?'"

Connections

Although all participating schools are free to use their own automotive curricula, AYES is now in the process of producing a common curriculum that schools may choose. AYES also provides a well-designed mentor training program, which incorporates an orientation for youth and the first meeting of interns with their mentors.

AYES students take certification tests in four areas: suspension/steering; brakes; electrical/electronics system; and engine performance. The tests, which are administered by American College Testing (ACT), assess the attainment of national skill standards established by Automotive Service Excellence (ASE) using realistic diagnostic and repair problems. They are demanding; about one-third of all those taking the test fail, including adults. Passing the four tests is the minimum ASE qualification for technicians. To become an ASE-certified master technician, a person must pass

eight tests. Maintaining ASE certification requires taking additional tests every five years.

System Building

AYES enjoys several advantages as an approach to school-to-work. The CEOs of four major corporations have committed time, money, and other resources to it. The National Automobile Dealers Association and the School-to-Work Office have joined the manufacturers in contributing substantial financial resources to designing, implementing, and maintaining the program. It has a sharp focus on an occupational area that needs more people with higher levels of education and in which talented and diligent workers can earn $50,000 per year or more. Increasing emphasis on the associate's degree provides an incentive for enrollment in higher education, which in turn creates opportunities for further education and career mobility.

AYES has made good use of existing skill standards in the field. Through the National Automotive Technicians Educational Foundation (NATEF), ASE establishes and assesses what auto repair technicians should know and be able to do. These standards provide a target for students and teachers, a means of monitoring the achievements of students and of programs, and a universally recognized credential for those completing the program successfully. Insistence that all participating schools meet the standards has had a cost. Many communities that are eager to participate in AYES have not yet qualified. Program staff members have resisted entreaties to bend this requirement, urging those who would like to join the program to upgrade their schools instead.

Siemens: A World-Class Apprenticeship

Siemens is an international manufacturer based in Germany and specializing in electrical and electronic devices. It has 400,000 employees worldwide and six major product lines: energy, industrial applications, transportation, health care, lighting, and information and communications. When the company first expanded into the United States, it purchased established firms and acquired their skilled workers. For example, Siemens bought Stromberg-Carlson, a manufacturer of telephone switching systems in Lake Mary, Florida. As technology evolved and older skilled workers retired, Siemens faced the same challenge other high-technology manufacturers face: finding well-educated, well-trained workers who can keep up with complex and rapidly changing products, machinery, and production methods. But Siemens was able to go back to its roots to solve this problem and draw on the highly developed apprenticeship system it uses to train workers in Germany and in nineteen other countries.

North American CEO Albert Hoser, himself a former Siemens apprentice, made a strong commitment to importing their apprenticeship system to the United States and hired a canny educator to guide the process: John Tobin is a former high school teacher, coach, and principal, who has served as deputy to three New York City chancellors of education. His deep knowledge of education and educational politics combined with a straight-talking style and a clear vision enabled him to connect the firm's rich resources with the fledgling school-to-work movement. The result is the country's most ambitious effort to adapt German apprenticeship, both to prepare young people for employment and to upgrade the skills of the existing workforce.

School-Based Learning

A key experience of the Siemens apprenticeship could be described as corporate-sponsored vocational education. Rather than learn informally on the job, high school juniors and seniors are taught primarily in classrooms the knowledge and skills specified by the apprenticeship curriculum. Siemens transferred instructors from Germany to plants in the United States and translated into English the curricula and the examinations that assess apprentices' progress. In Lake Mary, Florida, apprentices initially received daily instruction for two years in a special classroom at the Siemens plant; after three years, this corporate classroom was relocated to the local high school. Siemens also influenced the hiring of faculty who taught the electronics course at Seminole Community College, where apprentices could continue their education after high school. Benefiting from the experiences of the pioneering efforts in Lake Mary and Franklin, Ken-

tucky, a third Siemens pilot site in Wendell, North Carolina, located its classroom in East Wake High School. They invested over $400,000 in curriculum, staff development, and equipment to teach apprentices for two hours a day five days a week during their junior and senior years.

This reliance on classroom-based learning is common for apprenticeships in large German firms. The traditional image of an apprentice helping an experienced worker and learning new skills on the side is more accurate for small- and medium-sized firms with less formal organizational structures, more flexible work assignments, and less rigid production schedules. The arrangement in North Carolina is different from what Siemens and many other large firms do in Germany, where apprentices attend a state-supported vocational school part-time and while at the workplace learn in an instructional shop and classrooms in the plant. The double provision of instructional facilities and classroom time is inherently inefficient. While upgrading the school so that they can teach the curriculum effectively in classrooms and instructional shops, as is now done in North Carolina, seems more sensible, it raises issues related to efficiency as well as private influence over what happens in a public school.

Providing training to adults as well as youth led Siemens to emphasize multiple entry and exit points. Participants can begin their training while in high school, in college, or in the workforce. High school apprentices can be employed in the company immediately after graduation, but their prospects improve if they continue in postsecondary education for an associate's or bachelor's degree. This concept of opportunities that vary in duration for people with different backgrounds makes Siemens apprenticeships very flexible.

At Siemens Energy and Automation, Inc., in Alpharetta, Georgia, apprentices earn seven hours of college credit for an eighty-hour training course at Lanier Technical Institute that is for youth apprentices as well as adult employees. High school juniors must first achieve a grade of 80 percent or higher on the summer course before continuing their apprenticeship. The instructor is a Siemens employee. They may also earn eight hours' credit for a health and safety course; all fifteen credits are transferable to a college degree program.

In 1992 Siemens Power Transmission and Distribution, Inc., in Wendell, North Carolina, was a financially struggling plant. Barry Blystone, the training and development manager, described an experiment in which they piloted modules of apprenticeship training at Wake Technical Community College for incumbent workers who had not previously had access to electromechanical training of this quality. He explained that they taught adult employees theory and skills to create a more flexible workforce,to be

able to move quickly from one product line to another. They created paths into low engineering jobs, pre-engineering jobs, customer service, and field services. Participants earned thirty to forty semester credits, one-third of the credits needed toward a degree, and some continued on for associate's degrees in engineering technology.

Blystone added that providing this opportunity deflected criticism that might otherwise have come from experienced workers envious of young people gaining training that they could not have and avoided creating replacement workers. The successful experiment resulted in the upgrade of employee training, a 48 percent increase in productivity, a $458,000 return on the investment in training, and a North Carolina Department of Labor–registered apprenticeship program for high school students.

Work-Based Learning

Siemens' investment in apprenticeship extends to research and development activities conducted jointly with the German Federal Institute for Vocational Education. A product of this effort is Project- and Transfer-Oriented Training (PETRA), a well-developed approach to teaching and learning in the workplace that emphasizes "key qualifications" (similar to the "SCANS skills") and makes heavy use of group work and "self-motivated individual work" as opposed to traditional didactic approaches.

Siemens has authorized its plants to adapt the apprenticeship program to suit local conditions, which has led to considerable diversity in the design of the apprenticeship program and in the proportion of adults and youth enrolled. The apprenticeship program at Siemens in Alpharetta, Georgia, uses the workplace as a learning environment for juniors and seniors, who work 1,000 to 1,200 hours both years, including summers. Students engage in projects at the plant and rotate through assigned work areas according to the design of the program that hired them. For example, manufacturing apprentices stay in the same area for the first year and then rotate through nine different support functions the second year. In contrast, engineering apprentices stay in a manufacturing area for six months and then rotate; business apprentices may rotate every three months during the first year.

Connections

The Siemens apprenticeship structure responds to the desires that youth, parents, and educators have expressed at multiple locations that youth be able to attain a rigorous academic education and build their individual career path from a broad base of generic skills. Mastery of broad generic skills opens doors to higher education and multiple career opportunities.

Jan van Dokkum, the president and CEO of Siemens in Wendell, North Carolina, emphasized the importance of a strong academic background for successful workplace employees:

> There's a disconnect between high school and what the workplace requires. And the disconnect will get bigger and bigger the more and more technology is in the workplace. The entry requirement for students to become productive employees in any operation is much higher than in the past. We want to assume that they have computer skills, that they know arithmetic, that they have some algebra, that they do logical thinking, that they have language skills, and that they understand how those basic skills apply in the workplace. But there is no relationship between basic education and what can be applied in the future workplace. What motivates us to be involved in the apprentice program and the transitional workplace programs is to have some influence in the curriculum.
>
> Siemens has an apprenticeship program because we believe that we need a continuous stream of educated employees within our organization. We want to grow high school students to become productive business people and tradespeople in our organization. We want to continue to grow for another 150 years in our organization with innovation, with new ideas, and bring the products to the marketplace that are accepted and in demand. So we cannot lose our connection with the new generation. That's why we have apprenticeship programs. To change and improve things.

Blystone at Siemens in Wendell, North Carolina, is increasing the program's flexibility still more by incorporating a wider range of occupations. Under the Applied Business Leadership Education (ABLE) initiative, Siemens prepares learners for four career paths: information technology, engineering, manufacturing, and business/finance. These areas are aligned to make it possible for apprentices to switch from one to another. Consistent with the need for advanced education, both the youth program and the upgrade program for adult workers lead to associate's degrees as well as Siemens certification.

Blystone described the evolution of Siemens' approach to working with students, contrasting traditional cooperative education for college-level engineering students with their current approach: "It wasn't a controlled learning situation where they had expected outcomes. And it certainly wasn't a line to a future business need, which is what the co-op program we've designed now is. Managers have to forecast their needs in

advance and sponsor those students, not for a semester, but until they graduate. It helps us fill a recruiting gap two to four years out, as these people graduate."

He explained that this approach to co-ops for college students is the same approach they are taking to high school apprentices through the ABLE concept. The key point is that Siemens teaches youth apprentices as a means of solving a business problem. Although Siemens leaders are happy about the public relations benefits they accrue, their efforts are sustained by their need for competent employees.

System Building

As a global corporation with a long history of apprenticeship, Siemens provides a rich infrastructure, unmatched in any other U.S. youth apprenticeships. German experts and German educational materials are skillfully deployed, currently in twenty-four apprenticeship and school-to-work training sites. To date, more than 400 apprentices have completed two-year programs, with one-half later enrolling in college or technical institutes. They also have the capacity to implement the system in multiple sites, allowing for variation from one to another and for mutual learning. The German examinations provide a challenging benchmark for their apprentices' performance. It is interesting and encouraging to note that when a group of U.S. apprentices in Siemens Stromberg-Carlson, Lake Mary, Florida, scored higher on the intermediate examination than their counterparts in Germany, those responsible for Siemens apprenticeships in Germany were anxious to learn what had been done in the United States to achieve those results, indicating that the learning process can go both ways.

Conclusions

Corporate school-to-work initiatives have some of the same virtues as other corporate enterprises. Successful corporations have the money to commit to achieving their goals and they know how to identify and deploy talented people to get the job done right. Their impatience can be refreshing and stimulating to educators who are accustomed to snail's-pace change.

General Motors founded AYES but quickly transformed it into an autonomous organization co-sponsored by Daimler-Chrysler, Toyota, and Volkswagen. One of its great strengths is that auto dealerships and auto repair technicians are nearly ubiquitous. Most communities have them, giving AYES the potential to operate all across the country. Another strength is that technicians are in demand and well paid. Furthermore,

postsecondary education is increasingly part of their background, and many dealers will pay their employees' tuition, thereby providing good prospects for career advancement. AYES has laid out an attractive career path that specifies academic and skill requirements and provides appropriate school-based and work-based learning opportunities that motivate students to perform well.

Siemens has been able to act quickly by borrowing elements of apprenticeship from its German headquarters. It has enrolled incumbent adult workers as well as potential future workers in high school. After starting with the preparation of workers for manufacturing, Siemens has broadened its approach to provide multiple career paths, both to attract young people with a range of career interests and to provide greater flexibility to participants.

Corporations have no formal power to change what schools do, yet both AYES and Siemens have motivated schools to improve by contributing resources and by providing an attractive postgraduation destination for their students. Though both programs were initiated by corporations, they have grown through partnerships.

States

States receive School-to-Work funds after filing plans laying out how they will create systems. Yet states vary enormously in their authority over local school districts and their willingness to exert that authority in relation to school-to-work. West Virginia is an example of a state with highly centralized control over education. Washington State falls between the centralized structure of West Virginia and the almost laissez-faire structure of some others, such as Colorado, where the state contribution to school-to-work is facilitative, not directive. Like districts but on a larger scale, states can set policies and direct resources toward building systems.

West Virginia: Statewide School Reform with School-to-Work

The Appalachians are at once the source of West Virginia's rugged beauty, its mineral wealth, and its poverty. Though interstate highways have reduced the isolation imposed by terrain, the state ranks last in median family income and last in the percentage of the population employed. Coal mining and the related chemical and steel industries pay high wages but employ fewer and fewer people; they cannot carry the economy. Education is clearly critical to the development of the state's human resources. And education is taken seriously in West Virginia, constituting the largest category in the state budget: 70 percent of general revenue dollars goes to education, and state funding accounts for more than 60 percent of expenditures on K–12 education. As a result, the state has a strong voice in education policy.

Senate Bill 300, passed in March 1996, prescribed statewide comprehensive school reform consistent with the School-to-Work Opportunities Act. The reform effort was inspired in part by the state's participation in High Schools That Work, beginning in 1988. Tech prep was added to the mix in 1990. A School-to-Work implementation grant, received in October 1995, broadened the effort beyond its initial vocational focus to include all students and accelerated the change process.

Educational improvement appealed to business and political leaders as a means of ensuring that West Virginia could attract and sustain the new service and high-tech industries that the state needs to replace declining employment in mining, chemicals, and steel. Foreign-owned international companies are increasingly prominent in West Virginia, and the state's leaders believe such companies will only come and stay if the workforce is well educated and productive.

Education Reform and Economic Vitality: A Senator's Perspective

Senator Lloyd Jackson, sponsor of Senate Bill 300:

> There are a number of levels of motivation for education reform in West Virginia. It is clear that the number one issue facing people in our state is the creation of good-paying jobs. The day is over when you can have a high school diploma, and sometimes less than a high school diploma, and be guaranteed $50,000, $60,000, or $70,000 a year in the mines, mills, or factories of West Virginia.
>
> West Virginia ranges in the top five states in the nation in the percentage of per capita income spent on education.
>
> We make a very heavy effort for education. But the public needs to see results for that effort. School-to-work and the whole reform initiative that we have developed help us address the need to use the 70 percent of our general revenue dollars that we spend on education in a way that the public can understand and in a way that addresses the needs of the people of West Virginia to create good-paying jobs. The bottom line is creating the type of workforce businesses want to see.
>
> The second motivation is that it is right. School-to-work helps our students understand why it is they need to get a good education—why reading and writing and math and computer skills are critical. I am one of those people who believe that our education system has done a very fine job over the last hundred years. It has done exactly what it was designed to do for the economy it was designed to service, basically a manufacturing economy. Our education system was not designed very well to deal with the economy we have today. West Virginia, because of the reforms we have, including school-to-work, is certainly redesigning its education system to meet the demands of the jobs that are available today. That is what many people don't understand. They view school-to-work and other initiatives as a type of training. They don't understand that at the lower grades school-to-work helps students understand the importance of their course work, and as they enter the upper grades, school-to-work exposes students to what is out there in the world of work. It will help them understand how important it is to pursue higher education and to do some postsecondary work. We do not view school-to-work as something that only leads to a job when you graduate from high school. For us, it is the education of people in skills that they will need, whether they obtain a job right out of high school or go on to college.

School-Based Learning

Senate Bill 300, the Jobs through Education Act, eliminates the general track in high schools and puts in place career clusters and majors requiring higher academic achievement by all students. The bill spells out the following steps:

1. By the end of fourth grade, all children should have reached grade level in reading, writing, math, and computer skills.

2. Career exploration occurs in grades five to eight.

3. Individual student transition plans are developed by the end of grade eight, including the choice of one of six career clusters.

4. Each student selects a career major by the end of grade ten, and the transition plan is adjusted if needed.

5. Students demonstrate proficiencies by the end of grade ten at the latest.

6. Students participate in work-based learning related to their career majors in grades eleven and twelve.

7. Students complete their transition plans in the first year after graduation and report back to their school district.

Based on the legislation, the state board of education adopted new graduation requirements to take effect for students entering grade nine in the 1999–2000 school year. These requirements include three year-long courses of science; three courses of mathematics, including at least two at the level of Algebra I or above; four courses in a career major; and some type of work-based learning, to be determined by the county school board (counties and school districts in West Virginia are the same).

Although county school boards have many options, and they can petition to adopt different standards so long as they meet or exceed those set by the state, Senate Bill 300 provides for rigorous accountability and accreditation. All schools and all districts are required to maintain records and report on such measures as student achievement (according to specific standardized tests), attendance, dropouts, and postgraduation enrollment or employment. In addition, the legislation provides for extensive professional development for both teachers and administrators to support them in meeting the standards.

Although it is not required, most counties that have begun to implement the legislation have adopted block scheduling, meaning that schools have converted from a six- or seven-period day to a day with four ninety-minute periods. Typically, this means that a course that would otherwise extend over the entire school year is completed in one semester, so that, for example, a student might take tenth grade English in the first semester

and social studies in the second semester. Block scheduling allows for greater focus and concentration and less time moving from one class to another and getting resettled each time. It also provides longer periods of time for work-based learning and other out-of-school activities.

Work-Based Learning

State policy adopted in connection with Senate Bill 300 requires that all students engage in work-based learning before graduation. In the counties that are already implementing the new plan, this includes field trips for elementary and middle school pupils and job shadowing in ninth grade, followed by internships, cooperative education, or another type of intensive experience during high school. The sequential implementation of the new approach, beginning in ninth grade and progressing through high school, means that attention to work-based learning will grow and more intensive types of work-based learning will be emphasized as the initial class moves up. However, interpretation and application of the work-based learning requirement are the responsibility of the county school board.

The rural location of many West Virginia communities impedes the provision of work-based learning. Employers are few or far away. Community service and school-based enterprises are part of the response to such conditions. Classroom simulations are another approach used either to complement or substitute for work-based learning. Thus far, job shadowing has been the most prominent type of work-based learning, in part because of the sequential implementation plan that begins with ninth graders.

Clay County

Clay County is at the geographic center of the state and is the state's most rural county. Other than Interstate 79 from Charleston, the roads are two-lane and wind through narrow valleys past mobile homes and neat houses, many perched on the steep hillside, some set between the road and the river on plots of level land no larger than a turnoff.

The high school, located on the riverbank, houses a vibrant array of people and activities. Jerry Stover, an art teacher, directs a center for the study of local history, which houses an archive of documents, and engages students in researching and writing a series of annual volumes on local history called *Hickory and Ladyslippers.* The masonry and carpentry classes are constructing a two-story fitness center on the school grounds that will be run by business students as a profit-making enterprise. And Bob Morris, the vocational agriculture teacher, is guiding students in establishing

an aquaculture facility that will produce fresh fish for sale in Charleston and use the effluent to fertilize greenhouse plants and flowers. All students spend half an hour every week with a teacher-adviser in an advisory group of fifteen to seventeen students. The groups all discuss the topic of the week, such as decision making, diversity, career choices, and conflict resolution. Teacher-advisers also supervise the students' community service, for which students receive course credit if they satisfactorily document it in their portfolio.

School-to-work activities are also visible at the elementary level. Ivydale Elementary School is located in a hamlet on the Elk River. The old brick building is worn but warm. Ninety percent of the school's pupils qualify for free or reduced-price lunches. The school serves three meals a day and remains open year-round.

In the hall the principal, Nancy Updegrade, asks a third-grade girl with long black hair whether she is talking about "after school" or "after-after school." Updegrade explains later that the buses don't arrive until forty-five minutes after school ends because they are also used for other schools. An after-school program uses that forty-five minutes constructively. "After-after school" begins when the buses leave. It is for children whose parents are not at home at the end of the school day.

The primary school-to-work activity is career development, with an emphasis on "people skills." The after-school time is used for exploratory activities with career components; for example, each class takes responsibility on a rotating basis for producing a weekly video "news" program about the school.

School administrators in Clay County have learned how to garner the extra resources available to their community because of its poverty by writing proposals for special grants. This ability, along with the creativity and entrepreneurship evident in so many of the district's activities, is another dimension of the resourcefulness people need to thrive in such circumstances.

Connections

Career majors and programs of study are the primary devices employed in West Virginia to connect school-based learning with work-based learning. The state board of education identified six career clusters: health, human services, business/marketing, science/natural resources, engineering/technical, and fine arts/humanities.

A career major is related to a narrower occupational area within a

cluster; for example, therapeutic services is a career major related to the health cluster, public safety is a career major related to the human services cluster, and the career major in hospitality is related to the business/marketing cluster. School boards may choose which career majors to offer and they may choose to cluster careers differently, but they must offer career-related majors.

In addition to deciding which career clusters and career majors to offer, each county board also adopts programs of study for each career major. A program of study is the set of courses taken by students who choose a specific career major. For example, a student choosing the therapeutic services major would take, in addition to courses required of all students, advanced biology, chemistry, and anatomy/physiology to meet the science requirement and also choose electives related to the field. And the student would participate in work-based learning related to the field.

Career majors are internally differentiated according to three career levels, designated "entry," "technical," and "professional," which correspond, respectively, to jobs requiring a high school diploma, an associate's degree, and a bachelor's degree. This means that students in a single career major may be planning either to seek employment immediately after high school graduation, to enroll in a two-year technical program, or to enroll in a four-year college and perhaps continue on to postgraduate education.

David Ice, the state secretary of education and the arts, stated the philosophy underlying connecting activities:

> I don't want to portray all of this as just being driven by economic development. Ultimately our goal is to provide students with an education for lifelong satisfaction, for their own personal development. Education opens up our eyes, our minds, our hearts to what life can be and ought to be about. A significant piece of that is gainful employment, but there's more to life than just economic development and employment.
>
> Maybe we've misnamed school-to-work. What it really means is trying to make education more relevant to students so they see some reason to pursue that course of study and can apply it to something—their personal life and their own enjoyment and to a career.
>
> I was a public school teacher for twenty-one years and I taught primarily high school senior social studies courses; I saw firsthand a tremendous number of students just going through the school system because that's what you had to do, not with any real purpose. There were always 10 to 15 percent of the top students who had a real mission, but the bulk of those students just went through the process. School was the place where you went to do what you had to do and have some fun with your classmates. They were always asking, "Why

do I need to know this algebra stuff?" or "Why do I need to know this government stuff?" The real value of school-to-work is to make education more relevant for the students in their lives.

System Building

Senate Bill 300 is being implemented sequentially both within and among county school districts. Six counties began implementing the plan with all their ninth graders in 1994 before passage of the bill or receipt of the federal implementation grant. They are serving as pilot districts for the state and are already developing advanced work-based learning opportunities (e.g., internships, cooperative education, apprenticeships) for their eleventh and twelfth graders. Another eighteen counties began with ninth graders in 1995. Forty-nine of fifty-five counties had begun the change process by the spring of 1996; all were expected to be operating according to the legislation by 1999. The legislation also demands strict accountability from districts, requiring them to submit annual report cards on their progress toward putting the legislation into effect and on the achievement of their students.

School-to-work is attempting to link what had been separate initiatives to make all of them more effective. According to Ron Grimes, state school-to-work director, the linkages are what make school-to-work distinctive and set it apart from previous efforts: "School-to-work allows you to start linking some of those things together and get people looking at it as a system rather than just a bunch of separate programs funded through separate streams, headed by separate offices that happen to be at the same school. You see a lot of those things working together better at the local level than at the state education department. School-to-work brings some of that together in a system. You get the same people around the table to do some joint collaborative planning."

Experience with tech prep gave West Virginia a head start in forming links with community colleges. Initially, articulation agreements were in specific, narrowly defined areas and served small numbers of students, but partnerships have worked in recent years to develop broader agreements that are more inclusive. A more serious barrier to continuity between secondary and postsecondary education is the paucity of technical associate's degree programs. All but two of the state's two-year colleges are components of four-year colleges, where technical education has often not been highly valued. David Ice anticipates that the coming graduation of a large number of students with career majors who want to earn associate's degrees will create pressure to strengthen community colleges and their links with secondary schools.

School-to-Work, High Schools That Work, and Tech Prep

Adam Sponaugle (assistant state superintendent of schools): "I think having High Schools That Work and tech prep in place have made the implementation of school-to-work a lot easier because people had a mind set, or philosophy, that kids can learn more, but they need focus in their study. We would have been hard pressed to make the progress that we have made in the last two or three years with school-to-work had we not had that base already in place."

Stanley Hopkins (assistant division chief, Technical and Adult Education): "But then, school-to-work, when it came along, really helped move it along faster."

Sponaugle: "Yes it did. It gave it the fuel to really make it happen. High Schools That Work focuses primarily on secondary schools, and in our model, school-to-work goes all the way from kindergarten through postsecondary and then out of school and puts it all under one umbrella."

Ron Grimes (director, state office of School-to-Work): "When we look at the components of school-to-work, we've incorporated both. Whether a local system has a High Schools That Work plan or is an official member with the SREB, we don't care. They must address the ten key practices and the six conditions that have been identified in the legislation to bring about educational reform."

Hopkins: "The legislation includes those ten key practices. It doesn't say High Schools That Work, but it has the ten key practices in high schools."

Grimes: "Yes, and that is no longer voluntary."

Washington: Bringing Partners to the Table

The state of Washington is divided geographically and economically. Eighty-three percent of its 5.6 million people live in metropolitan areas, predominantly Seattle. Aerospace is the state's largest employer. In the rural areas, lumber, wood products, and food processing are the major economic activities. Urban prosperity keeps the overall unemployment rate for the state low at 6.4 percent, but almost two-thirds of the counties, all of them rural, are classified as distressed areas.

The concept of school-to-work transition is an integral part of Washington's educational reform agenda. House Bill 1209, passed in 1993, raises academic standards for students and preserves school districts' free choice in how to design programs to meet those standards. The law has four goals:

1. Students will read, write, and communicate effectively in a variety of settings.

2. Students will know and apply core concepts and principles in the disciplines.

3. Students will think and integrate experience and knowledge to make judgments and solve problems.

4. Students will understand the importance of work and how performance, effort, and decisions directly affect career and educational opportunities.

House Bill 1209, together with related laws passed between 1990 and 1993 that also contain provisions supportive of school-to-work transition, set the stage for Washington State to receive a five-year $27 million federal grant in 1995. Education, labor, and business groups execute the plan under the direction of the governor's School-to-Work Transition Task Force. The task force advises the governor and decides policies and program funding for system building.

State legislation gave Washington an early start on school-to-work, but also generated some opposition. The state budget removed $2.7 million of state funds for school-to-work in 1997 because of fears that school-to-work would narrow children's choices and focus their education too sharply on careers. The state's Workforce Training and Education Coordinating Board, responsible for school-to-work transition communication, found that recasting the ideas in layman's terms boosted the public approval rating to 97 percent from 30 percent for "school-to-career" and from 20 percent for "school-to-work." Kyra Kester, the state school-to-work director, explained that the board has responded by translating its goals into everyday language: "We talk about applied learning. We talk

about partnerships with the community. We talk about finding mentors and internships."

School-Based Learning

Washington State's education reform includes a Certificate of Mastery attesting to a student's attainment of basic academic competence, normally by grade ten. Part of the rationale for this structure is the belief that students will be more highly motivated during grades eleven and twelve if they have mastered basic academics and can focus on gaining competence related to a career area.

Terry Bergeson, Washington State's superintendent of public instruction, explained how school-to-work affected staffing within her agency as well as policies and programs flowing from her agency to the districts and schools:

> School-to-work is making us rethink vocational education. In this agency we have had a person in charge of vocational education and another person in charge of school-to-work. [After this interview took place, these two positions were combined as director of secondary education and career preparation, and Kyra Kester was named director while continuing to direct school-to-work.] I just received the work of a futuring task force in vocational education that looks at two questions: What does vocational education mean in a school-to-work education reform environment? What do you want to keep that is the essence of vocational education in the high school, and what changes? Everybody is thinking about how to get a strong track for kids who want to go on to further education and a strong track for kids who want either immediate work experience or a technical experience, not about some general land in the middle that anybody could do anything with. That dialogue is strong across the whole state.

The Certificate of Mastery will be one admission requirement to gain access to the public baccalaureate institutions. Doug Scrima, a policy associate at Washington State's Higher Education Coordinating Board (HECD), works on articulation between secondary and postsecondary education. He is currently working with high schools and admissions officers of colleges to ensure that requirements beyond the Certificate of Mastery directly incorporate standards recently established by the Commission on Student Learning. Determining the equivalency between courses required for college admission and the standards attested to by the Certificate of Mastery entails shifting attention away from course titles to the competencies identified by the HECD in English, math, and world languages and pending in science, social studies, and the arts.

In four pilot high schools, teachers have developed assignments that enable students to meet Certificate of Mastery standards. Subject area portfolios of student work will be compiled as teacher resources. Scrima gave as an example the "Mole Team" course in a rural public school, where students conducted a comprehensive study of moles; the course taught them all the principles and techniques of a standard biology course, along with some mathematical concepts, and how to find information when they need it.

This effort to develop student competencies through such courses has been aided by a statement of support from the presidents of public baccalaureate-granting institutions saying students who have taken such courses will not be disadvantaged in college admission. They also obtained statements from higher education officials in Oregon and California, including Stanford.

Work-Based Learning

State Superintendent Terry Bergeson described school-to-work as being about rigor and relevance: "If it's relevant to them, kids will do rigorous work." As an exemplar of high-quality work-based learning, she described a visit to a project in Pasco, where she observed the work of youth and their vocational education teacher:

> They have started a nonprofit organization in the high school. They bought a piece of property and they are building a house. They're financing the building of the house and then they're going to sell the house and they're going to take the money that they make, pay their debts, and put the earnings aside, some of which will go for scholarships and some of which will be seed money for the next house. Young men and women are doing the carpentry, the electrical work, and the accounting on this entire endeavor, from start to finish. Some young women from a design class showed me the choices they'd made on carpeting and materials, telling me why they had made the decisions on colors. They used very market-oriented criteria.
>
> They have a boat class where they're building power speed boats, incredible crafts that will go in the Columbia River, and they're selling them. Having state academic standards, which we call essential academic learning requirements, now further encourages talking in that boat-building class and in the home-building class about the math that is involved. Having to talk about the geometry they're using has made the kids be much more rigorous, and the teachers have to think, "I've got to do the essential learnings as well as build this boat. So how do I blend these two, how do I fit them together?"

Some of these kids were migrant kids. They never had the concept of owning a home. Now they've built a home and now they have a concept of owning a home and building their own home.

In my role as state superintendent, I've got to pull this together. How do we get what's happening at Pasco to be commonplace? The biggest challenge is to get people to see a new vision of high school, a high school that is performance oriented, where kids are expected to do meaningful work and be accountable for the work, not the days and the time that they put in.

The biggest questions are, Can these kids think? Can they write clearly? Can they do mathematics? I don't care whether they apply it to a house or a science project, but is it rigorous? Is it clear thinking? Is it applying the principles of science or social studies or whatever field of knowledge that they dipped into to do this work? Do they do it well? Do they know how they did it and why they did it? Can they talk to somebody about it clearly? It doesn't have to be perfect, but have they engaged in their work at a high level? That's the challenge.

Work-Based Learning at Boeing

The Boeing Company is the largest employer in Washington State and a leader in providing work-based learning. About 10,000 students over age twelve participated in a career day in the 1997–98 school year across the state. The company placed about 300 interns in three locations around the Puget Sound area during the summer of 1999 and approximately 400 the previous summer. The manufacturing internships began in 1993, and engineering internships were added in 1998. The manufacturing and engineering internships are known as the Boeing Tech Prep Program. Boeing selects for these six-week summer internships high school students who have finished their junior year and who have enrolled in applied academics (tech prep) at schools that have adopted the procedures and competencies generated by the Manufacturing Technology Advisory Group (MTAG). During the first two summers students typically learn MTAG competencies through classes in the factory as well as through interactions with engineers and technicians on the floor. During the third summer students begin a job shadowing experience. By their third year of the program, students will have completed one year of community or technical college education.

Connections

Industry skill standards connect work-based learning with school-based learning by conveying to educators what employers require and by stating learning goals in a way that enables students to achieve them either in school or in the workplace. The key is not taking a specific course or spending a set amount of time in class, but demonstrating competence.

Dan McConnon, the director of workforce education at the State Board for Community and Technical Colleges (SBCTC), explained how his group contributes to developing industry skill standards: "We've been involved in several activities with business, including a more meaningful conversation between colleges and businesses about the skill needs of workers, more responsiveness, and a more flexible system. Our notion was if you created a standardized process for defining the skills that industry needs, those conversations would become more meaningful."

The state board helps community colleges, through funding and training, to convene consortia with business, labor, and education to develop standards. McConnon reported that the Manufacturing Technology Advisory Group (MTAG), which provided their very first prototype for skill standards and interested Boeing in the concept, was recently updated by the original consortium. The information technology standards, currently their most popular, were adapted by Microsoft to create a "self-assessment tool for people who might be interested in going into that industry that will walk them to resources, potential jobs, or potential training."

To create standards, a community college convenes consortium members, including frontline workers from the industry for which standards are being developed. The process begins with reviewing existing standards and convening focus groups of employees, then lists the standards, and finally surveys the industry to validate the standards. College staff then propose how to deliver an educational program to teach to the standards.

Alan Hardcastle, a policy associate for workforce education at the SBCTC, pointed out the need to keep skill standards current and useful to the industry while maintaining momentum in educational institutions: "In the last year or two, we have been trying to encourage innovation with skill standards, so we've not placed a lot of restrictions because we wanted creativity to come out, and we wanted to develop a model that would help us implement the standards in our college programs."

Now they are ready to be more directive about standards. Hardcastle went on to say that Washington State has worked in parallel with the National Skill Standards Board (NSSB). NSSB asked to incorporate some of Washington State's process into their model.

Involving teachers in workplace learning is another way to build connections between school and work. Since 1991, Boeing has sponsored for educators from the MTAG schools a summer intern program that integrates manufacturing skills into their curriculum. Teams of three to five educators propose five-week projects for summer work in a Boeing factory. This past summer Boeing selected six teams totalling twenty-eight educators to do special projects ranging from "gender equity in non-traditional careers" to "why do I have to learn this anyway?"

Learning from Projects

A partnership between the Port of Seattle and metropolitan King County, called the Magnuson Partnership, developed a project-based curriculum to help students in grades six through twelve see the connections between school, work, and international trade. The core of the curriculum is a case study featuring an employee's challenge, issue, or problem that needs immediate action. Initially, cases were developed from an interview by a team of students and a teacher with an employee at a work site. However, this proved too costly in employee time, so Magnuson staff now initiate most cases. These cases, now placed on their Web site (http://www.portseattle.org/portandyou/educ/02teach.htm) with recommended videos, portray real-life situations that can be downloaded by teachers anywhere to open project-based learning activities to more students.

One scenario engages students in a worker's challenge during her first day on the job. Her supervisor set the scene: "Apples are one of Washington State's biggest crops, and I want APL to ship more apples to other countries. I want you to focus on Taiwan. One week from today, I want you to give me a marketing plan about what you are going to do to help APL carry more apples to Taiwan. If you have a good plan, you will receive a $10,000 bonus."

Collaborating with teachers, the writers suggest student activities, such as getting needed information and identifying research tools, and they outline different forms of reports. The activities are designed to help students attain state academic benchmarks. Opportunities exist for some students to meet employees and present their solutions to the problems. Molly Tennis, a former manager of education programs at the Port of Seattle, explained that the projects can be expanded, for example, to include the history of trade between the state of Washington and Taiwan. She reflected, "The test for us now is how much will teachers pull it from the Web and use it, or expand it."

Eighteen school districts in the Puget Sound Educational Service District have formed a regional consortium that contains 152 high schools and junior high schools and 25 percent of the state's students. In the spring of 1998 Brian Jeffries, director of King County Kids-to-Careers, described an electronic database program being tried in King County that builds a portfolio for a student relating previous work-based learning experiences to academic knowledge and skills. The program also can search for related career information for a student and prepare background material for the student's meetings with a counselor. Jeffries noted: "The software has been installed at eleven pilot sites, and we have the software and hardware at the hub. We plan on piloting through March, hoping then to scale up to all school districts in King County. Our biggest obstacle at this point is sustainability. We are currently looking for resources to carry us through the next two years. We are hoping to tap into what little School-to-Work dollars are available in our state."

Jeffries hopes that this system will eventually connect with the adult system and be used for posting jobs, internships, and information about the skills of people looking for jobs. "My committee was adamant that it be Web based, that it connect with the adult system, that they have the opportunity to search the labor market information, and that it be expandable."

System Building

Legislation and other state support for practices related to school-to-work is Washington State's strongest system component. The effort has never been entirely dependent upon federal funding and will not end when the funding terminates. State Superintendent Terry Bergeson explained that some state School-to-Work funds were essentially lost in districts where they were allocated as part of a block grant and school-to-work was not a high priority. On the other hand, this funding mechanism identified those districts that were committed to school-to-work because the districts made sure the money was used for that purpose.

Another strength of Washington's system building is the partnerships that have been created. Mic Dinsmore, chair of the Governor's Task Force on School-to-Work and executive director of the Port of Seattle, reflected on this achievement in the spring of 1998, at the end of three years' funding: "What gives me the greatest level of comfort today is we've had dedicated, passionate, knowledgeable people who put together this partnership that includes education, labor, and business. I'd say what brought that about was Governor Lowery's passion for pulling together some pretty disparate groups and making us all feel that we are part of this same initiative."

Yet the state clearly has a distance to travel before a statewide system is in place. Hardcastle noted that even though the workforce development group is currently working on skill standards in more than twenty areas, "twenty skill standards do not a system make." He added:

> We're talking very seriously now about how as a state we get to scale. How do we get more projects that reflect our labor market demands, that reflect and build upon the programs that we already have in our high schools and colleges and that provide a stronger connection between these two systems?

Earl Hale, executive director of the State Board for Community and Technical Colleges and Workforce Education, discussed the role of community colleges in relation to standards and the creation of a system. He explained that there are now several projects in which colleges are redesigning the curriculum around standards. Because control of curriculum and program development "is a cherished local function" in Washington, local institutions need to be able to create their own curriculum consistent with the standards.

The same barrier exists to making standards mandatory. Hale said, "My instincts are still to create incentives to encourage colleges to do it rather than make it mandatory." The principal incentive for colleges to participate, in Hardcastle's view, is that, "your graduates are going to get priority in these industries if they meet these standards."

Hale observed that community colleges are not yet systematically linked either with high schools or with four-year colleges. Community colleges, he said, can train people in skill areas that industry needs, and those who take the programs are hired, but recent high school graduates are not coming into those programs. The average age of technical students is twenty-eight, and the average age of students planning to transfer to four-year colleges is twenty-one. He attributes the problem to societal values and social status.

The Labor Partner

The School-to-Work Opportunities Act of 1994 specifies that employees are included in partnerships. This wording includes but is not limited to organized labor. Organized labor is strong in Washington State, counting 23 percent of the workforce among its members. More than in any other place we visited, organized labor is a central partner in Washington State.

Steve Ignac is the labor liaison for school-to-work. He began his career as a lather journeyman, worked as a carpenter, and spent volunteer time

recruiting youth from the high schools in Pierce County to join registered apprenticeships after graduation. In 1994 the Washington State Labor Council got a grant as a labor partner to expand its work with the school districts. Ignac then represented not just the carpenters union but more than fifty unions in the area. In his current position with the Washington State Labor Council he is responsible for creating a range of programs that introduce union opportunities, from job shadows to speakers, as well as apprenticeship recruiting, in which he works with high schools, community colleges, skill centers, and vocational education facilities. "We wanted to help the state build a system in the schools, because we realized that 75 percent of the kids are not going to college, so let's put them into some jobs that are going to pay them a livable wage. It would be nice if they had benefits to go along with that livable wage."

Ignac has expanded from the nineteen construction trades to manufacturing, food processing, paper making, lumber, and retail, and has gone beyond unionized occupations. "Often times those opportunities are not union opportunities, but my concept now is, let's find something that they like, that pays them a decent wage, and that is going to help them further their career. Technology is changing so fast that if we don't keep up with it, we are going to be stone age. If you don't stay current with today's technology, you are not going to move up."

Ignac's current priority is to help link the regional consortia to labor, making them true business-education-labor partnerships. He works closely with his counterparts in business and education as "a technical advisory" to monitor the grants to the consortia. Together they link the consortia to local representatives who are qualified to serve on their steering committees, review reports on meeting goals, attend meetings, visit labor representatives to see if they are full partners on the steering committee, and visit schools to talk with students, counselors, and superintendents. "If we go to an area and we find that they are not fully integrated, we want to bring technical assistance, or whatever we can to help bring them up."

Ignac explained that each consortium draws up its own plan, and the advisory's task is to see if they are abiding by it. Although new pre-apprenticeship programs have been created for high school students, now if a student becomes an apprentice after high school, their high school credit and work hours in an internship do not count toward the hours required in an apprenticeship.

Rick S. Bender, president of the State Labor Council, commented that "some see school-to-work as some type of a conspiracy or some type of channeling of their young people into careers by the big companies around this country and in the state of Washington. Many of the career paths that we've talked about have included a lot of flexibility for the student. If they decide they want to change, they have that right. Seventy-five percent of

our young people are not going to get a degree. Yet they are going to need the vocational and technical skills to be able to support themselves and their families."

Conclusions

States are capable of mounting large-scale school reforms. They can mobilize governors' offices, legislatures, state agencies, large employers, and employers' organizations, and they can coordinate school-to-work with economic development and workforce development. Both West Virginia and Washington State have enacted legislation that guides the implementation of school-to-work and ties it tightly to school reform. However, states vary in the amount of control they exert over local school districts. Some treat K–12 education as primarily a state matter, while others are constitutionally constrained from influencing K–12 education very strongly. Some have chosen not to exert control over school-to-work.

West Virginia has strong state control over local districts, and the state pays well over half the costs for K–12 schooling. It has established more rigorous graduation requirements and, drawing on experience with High Schools That Work and tech prep, has set out a sequence of work-based learning opportunities tied to students' career majors. The implementation process is staged: a few pioneering districts are leading the way for the others, and within each district the new approach is put in place one grade level each year.

Washington State is less centralized but has still acted on a statewide basis to shape school-to-work. Its emphasis has been on forming partnerships to develop academic and skill standards that meet employers' needs and to set the stage for large-scale work-based learning. It also supports regional partnerships to link schools with employers. A Certificate of Mastery is used to motivate and assess student achievement and to structure their secondary education.

Conclusion

A school-to-work system must contain the three key components identified in the legislation: school-based learning organized around high academic standards, work-based learning organized around industry skill standards, and "connecting activities." We have used the term "connections" to include structures as well as activities. Strong connections help establish a system by contributing to both internal coherence and links with other organizations and systems. Creating connections goes a long way toward building systems, but systems also need scale and sustainability. Providing opportunities for all youth makes systems large and inclusive. And sustainability ensures that systems will endure despite the vagaries of funding. This section summarizes what we found in the case study sites in relation to the three key components of systems and the additional demands of building enduring systems.

Attending to schools, districts, regional consortia, corporations, and states clearly demonstrates that system building ideally occurs simultaneously and coherently across all five of these levels. A comprehensive system relies on mutually reinforcing components put in place at each level.

School-Based Learning

Our selection criteria led us to sites engaged in raising academic standards, so it is no surprise that a common feature of school-based learning in our cases is setting and then striving to meet higher standards. Only two sites, Howard High School of Technology and the Thompson School District, have been engaged in raising standards long enough to have accumulated data indicating progress, but their results are encouraging to those beginning to make the effort. Although Howard is a city school with a diverse population, its challenge was not of the same magnitude as that faced by the Alamo Navajo Community School and the Philadelphia School District, where achieving high standards often means that students must overcome poverty, transcend the limited educational achievement of parents and neighbors, and learn English as a second language.

All sites share in the growing national consensus that every student should attain the level of academic preparation previously expected only of those hoping to enter selective colleges. Washington State has adopted the Certificate of Mastery as a means of operationalizing academic standards. Thompson, West Virginia, and other sites have placed more emphasis on graduation requirements, meaning that the critical time for attaining standards comes later.

Setting higher standards does not by itself improve student performance. After setting more ambitious goals, educators must find ways to achieve those goals. Professional development for teachers allows them to develop new skills and master new methods. In many sites, school-to-work brings a new emphasis on applied learning, which changes both the content of courses and the nature of classroom activities. Philadelphia has incorporated into its curriculum frameworks a "constructivist" approach to teaching and learning in which teachers spend less time giving didactic instruction and more time designing and supporting student activities that engage them in a process of discovery. Washington State has worked hard to assure that students who have taken applied-learning courses are fairly evaluated when they apply for college.

School reform proceeds one building at a time. Secondary school reform networks such as High Schools That Work and the Coalition of Essential Schools have recognized this reality by enrolling individual schools as members. (Several sites we visited grafted school-to-work onto education reforms following the principles and practices promoted by these networks.) District school boards and state policies also influence schools. Comprehensive education reform ideally involves the state as a source of standards for achievement and a source of supports to districts and schools whose students are striving to meet those standards. West Virginia's school reform plan is driving much of what is happening now at the district and school levels. In contrast, Alamo, Howard, Philadelphia, and Thompson have set standards that are leading their respective states.

Our investigation suggests that regions are not viable units for guiding school-based learning because they have no authority over what happens in schools. That authority resides in district and state policymaking bodies and their executive officers. As a result, a regional consortium can facilitate school change but cannot direct it. Corporate initiatives, similarly, cannot drive school reform. But, as illustrated by the Automotive Youth Educational Systems (AYES) requirement that participating schools meet National Automotive Technicians Educational Foundation standards, corporations can hold out their partnership as an incentive for schools and districts to meet their standards.

From Alamo to West Virginia, schools are adopting block scheduling to provide substantial amounts of time for more elaborate classroom activities and for work-based learning during the school day. Blocks are typically ninety minutes, double the standard class period. Courses that would last all year with a shorter period are completed in one semester with block scheduling. Concentrating courses into one semester adds intensity and focus, but it can also impede continuity, especially in math. Students may

take math in the fall, go a semester and a summer with no math instruction or practice, and then find they have to spend several weeks reviewing the next fall before they can go on. As a result, some schools use a modified block plan with a combination of ninety-minute and forty-five-minute periods.

Work-Based Learning

Howard High School of Technology has the most highly developed work-based learning system that we observed. It is universal, sequential, and includes relatively formal monitoring and evaluation. As a vocational high school with clearly defined occupational specialties, Howard can provide specific preparation and reach out to relevant employers. Students follow an exemplary progression from job shadowing into voluntary internships and finally to paid cooperative education placements. The Alamo Navajo Community School is also noteworthy in its involvement of nearly all students in substantial work-based learning; its students' needs and its location warrant an emphasis on exploration and the acquisition of generic work-related skills and attitudes.

Larger units that have made a commitment to universal work-based learning understandably emphasize job shadowing. Enabling several thousand students to accompany adults to work for a few hours or a day is daunting enough. We have not yet seen intensive work-based learning—such as internships, cooperative education, and apprenticeship—on that scale. West Virginia intends to achieve universal participation in work-based learning, but school districts have not yet come to grips with the implications of that aspiration. They clearly need even stronger employer support plus substantial infrastructure to achieve their aims. Philadelphia and the Thompson School District have invested in creating such an infrastructure. Both of those districts have defined and funded the role of a work-based learning coordinator and funded new positions dedicated to finding places for students and then supervising their work experiences. In principle, if more students are learning at work under the tutelage of unpaid mentors, school districts should be able to reallocate staff resources to perform this coordinating role. In practice, it may prove difficult for districts to deploy the level of staffing required to support high-quality work-based learning on a large scale.

Transportation is another barrier to large-scale work-based learning. Alamo represents one version of the challenge, being located an hour away from most work sites. But even Howard, located in a city and within easy walking distance of some work sites, has had to cobble together an array of transportation options, including vans and private cars driven by properly

licensed teachers and staff. For students engaged in work-based learning for substantial amounts of time, the alternating schedule used by Delcastle, a vocational/technical school in Delaware, is a way to reduce travel time. Instead of sending students from the school building to work sites daily, Delcastle has one group of students in full-time work for two weeks while another is in full-time school; then the two groups switch. (The British refer to this as sandwich scheduling.)

Alamo, Clay County in West Virginia, and Southeast Raleigh High School have developed school-based enterprises as another response to geographical isolation from work sites. When students run their own businesses, they need not leave the school building to gain work experience. In addition, they are able to perform leadership and decision-making roles in those businesses that no established business would pay them to perform. This can be an especially significant experience for disadvantaged youth, who learn to see themselves not just as workers but as leaders and managers. Students who run their own businesses also learn how demanding it is to meet a payroll, which will make them better employees in the future, especially in small businesses. Alamo's reliance on 4-H to guide its agricultural enterprises is an excellent example of using community resources to strengthen school-to-work.

Educators in the sites we visited have gone well beyond the simplistic assumption that students will learn something of value if they are placed in some workplace to do whatever must be done. They are developing work-based curricula that parallel the more familiar school-based curricula, spelling out what students are to do and what they are expected to learn. Washington State and North Atlanta are engaged in serious efforts to develop and use industry skill standards as the basis for those curricula and for related school-based learning. Thompson, with a less vocational emphasis, uses the SCANS skills in a template for assessing and documenting work-based learning.

Regions are more natural units than schools or school systems for organizing work-based learning because regions can be defined in relation to labor markets (though labor markets are overlapping and ill defined and vary across the occupational hierarchy). Regional partnerships facilitate employer involvement because each employer need not deal separately with multitudes of individual schools. In some locations—not those described here—the introduction of school-to-work has been accompanied by floods of calls to employers requesting partnerships with individual schools. One valuable function of a regional consortium is coordinating employer–school communication, especially information about placements.

Connections

Career majors connect school-based learning to work-based learning. The places we visited define career majors very differently—from Thompson, where they are general orientations with merely advisory implications, to Howard, where students select a specific occupational area and specific courses beginning in grade ten and proceed through a sequence of related work-based learning experiences. West Virginia has the most elaborate structure, in which six career majors are further subdivided into multiple career clusters, and each career cluster is associated with a prescribed course of study. The challenge for West Virginia high schools, as for all others that adopt career majors, is to accommodate the range of student interests within a manageable set of career areas without defining them so loosely that they become meaningless. This challenge is especially serious in a small school like Alamo.

Career academies are a step beyond career majors. In effect they bring together all students who share a career major with a small number of teachers in a semiautonomous unit organized around a common career interest that, because of its small size, offers a more personal and more supportive environment. Although career academies emerged well before school-to-work, they are in many ways an optimal school structure for school-to-work, not only because of their career focus but also because they are flexible enough to fit work-based learning and other nonclassroom activities into their schedules. The Sacramento region, like the rest of California, has many career academies, though only a small minority of students enroll in them, except in schools like Encina High School, where every student is in an academy. Philadelphia, where career academies were born, has made the strongest commitment to the form, planning to divide all its large high schools into "small learning communities," which are patterned on career academies even when their themes are not specifically career related.

Career majors are a device to encourage student planning, and well-developed planning processes constitute the strongest connections at Howard and Thompson. Howard's Quest for Quality brings together career planning, course planning, and portfolio development in a consistent series of activities that also includes a culminating project and exhibition. The Career and Academic Plan is the comparable device in Thompson. It is a highly individualized approach that substitutes for prescribed career majors, thereby avoiding the danger of prematurely narrowing students' options. Both these processes appear to provide an unusual amount of career and course information, interaction between each student and various advisors, and parent involvement.

Advising is central to planning. It involves students, parents, teachers, workplace mentors, and advisers in community-based organizations along with school staff members formally designated as counselors. Surrounding every student with this rich array of information and support is far more important than the specific structures in which they are placed. Some students at the Metropolitan Regional Career and Technical Center (the Met) have well-defined career aspirations, but others are still exploring a range of interests that may not be related to careers, demonstrating that this web of support need not be organized around specific career paths. Siemens's plan for career pathways is another approach to fostering planning. It has added flexibility by emphasizing the common foundations for diverse careers through the Applied Business Leadership Education (ABLE) program.

Strong connections are forged between school and work when industry-generated skill standards help shape curricula. This has been an emphasis in Sacramento and Washington State. It is built into vocational high schools like Howard. AYES has used standards in several ways, including offering a curriculum designed to meet their standards, requiring that participating schools demonstrate the capacity to teach to national standards and orienting their program to professional examinations. Such examinations are also used in other sites, including Siemens, which has translated German apprenticeship completion examinations, and in information technology courses at several schools we visited. These latter are especially interesting in the case of software firms that have promulgated certification courses and examinations, because passing these examinations opens doors to very well-paid jobs and also prepares students for higher education. Note that the same is true of auto technicians in AYES. It is probably easier to convince parents that a new career area like information technology can lead their daughters and sons into college as well as employment, but many less fashionable career areas also offer this possibility.

Students in several sites we visited are required to complete projects that link school with work. Typically these are related to an issue or problem in the workplace and involve extensive research and writing and an oral presentation. The Met has taken this approach furthest, organizing its entire curriculum around a sequence of "Learning through Internship" experiences that entail regular exhibitions. Keys to making projects successful include clear guidelines on what constitutes a project, along with critical assessment and feedback on performance; joint, coordinated support by a teacher or adviser in school and a mentor or coach at work; and a commitment to engaging students in significant issues and treating their work seriously. The Met and Central Park East (both members of the Coa-

lition of Essential Schools) demonstrate that projects may be rooted in unpaid service experience as well as career-related internships.

One of the most important connections between school and work is communication among youth, teachers, parents, and employers. Communicaton with parents and parent involvement are critical. Parents need to know that career majors and work-based learning are equally appropriate for students who plan to go to college and for those who expect to work full-time after high school graduation. Parents also need to be fully involved as students choose career majors and plan their courses of study. Internships and job shadowing for teachers are especially potent means of communicating to teachers how to bring work-related problems and standards into their classrooms. Communication is also the central element to the connecting function served by Linking Education and Economic Development (LEED) in Sacramento. An intermediary organization such as LEED can reduce the transaction costs of partnerships and greatly expand the network of employers involved with any single school.

System Building

We have defined systems as incorporating the three key components specified by the School-to-Work Opportunities Act—school-based learning, work-based learning, and connecting activities—and as being inclusive, internally coherent, externally connected, and enduring. Having drawn summary conclusions about the three key components, we turn now to the additional criteria for systems, mindful of the overlap, especially with connections.

Inclusiveness

Since its inception, school-to-work has confronted the need to combine large scale with high quality. The sites we visited exemplify quality—that is why we selected them—but they do not allay concerns about scale. Our case studies reveal an inverse relationship between size of unit (magnitude) and both intensity and inclusiveness. Smaller units, namely schools and districts, have been able to involve nearly all young people in school-to-work activities, including intensive work-based learning. Large units can count substantial numbers of students involved in intensive work-based learning, which is what is hardest about achieving scale, but those students still constitute only a small proportion of all students, though some sites are taking serious steps to boost the proportion involved. This observation parallels the finding of the national evaluation of school-to-work that participation is widespread but shallow, with only a small mi-

nority of students involved in intensive work-based learning and/or in several distinct school-to-work activities.[1] Maintaining quality while enlarging scale will take broader and deeper partnerships and a judicious redistribution of human resources to provide the required level of student advising and coordination with work sites.

One of the most challenging provisions of the School-to-Work Opportunities Act is that systems serve all youth. It is challenging because of the sheer numbers of youth but also because of the diversity among youth needs. All youth includes honors students, whose parents may view a career focus as premature and work-based learning as a distraction from academics. All youth includes students with learning disabilities and physical disabilities who may need support to function in classrooms and even more to function in workplaces. All youth includes dropouts, who are defined as part of the target population even though they have severed their connections with the school.

The Thompson School District involves students who plan to apply to selective colleges by defining career paths very broadly and not specifying courses related to careers. This defuses concern about overspecialization or vocationalization. Other sites that use school-to-work as a means of comprehensive school reform have tied it so tightly to higher academic standards that this concern has not arisen.

Closely associated with raising academic standards is the system-building goal of linking secondary and postsecondary education more closely. This entails overcoming the traditional distinction made in high school between college prep students and others (usually classified as vocational and general). It also entails closer connections with two-year colleges. Two-year colleges (community colleges and technical colleges) provide for some students the first two years of a four-year degree and for others a "terminal" degree with an occupational specialty. Their low cost and openness to people of all ages and abilities is one of their great strengths, but too many high school students use the openness of the community college as a reason not to take rigorous courses and make specific plans. They tell themselves they can enroll in the local community college at some indefinite time in the future but need not worry about it now. Connecting high school programs more directly with two-year college programs helps some of those students continue their education uninterrupted and alerts them to quite stringent entry requirements that, although they do not apply to the institution as a whole, apply to the most prestigious and rewarding programs,

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[1] Hershey, A. M., Silverberg, M. K., Haimson, J., Hudis, P., and Jackson, R. (1998). E*xpanding Options for Students: Report to Congress on the National Evaluation of School-to-Work Implementation*. Princeton, N.J.: Mathematica Policy Research, Inc.

such as nursing and engineering technology. Well-prepared graduates need not waste time and money taking remedial courses.

The strongest two-year college links are arrangements that enable simultaneous enrollment in high school and community college. Front Range Community College in Fort Collins, Colorado, just north of the Thompson district, houses the area vocational center, so high school vocational students actually attend classes on campus. Students at River City High School in West Sacramento and Southeast Raleigh High School took a course taught by a community college instructor in their building. This easy, and tuition-free, introduction to community college allays any concerns young people might have about their ability to do college-level work and gives them advanced standing, which makes the time to degree completion seem less daunting. Several sites encourage high school students to enroll in college courses. In West Virginia all but two two-year colleges are units within four-year colleges and offer only a limited choice of technical associate's degree programs.

Involving students with disabilities and dropouts requires partnerships with organizations devoted to those populations. Philadelphia's Office of Education for Employment has a director of community partnerships who is responsible for fostering collaboration between schools and Next Step Centers that help dropouts improve their qualifications for employment. Thompson works closely with the county employment and training office. Sacramento encourages employment and training programs to use the same industry-generated standards that guide school curricula. Thompson gets from specialists both advice on how to integrate students with disabilities into school-to-work activities and support to meet students' individual needs. Note that the goal of involving all students in school-to-work often conflicts with provisions attached to programs for targeted populations that separate them from other students.

Coherence, Connectedness, and Standards

Coherence and connectedness are closely related qualities of systems. Coherence refers to internal structure, connectedness to external links. Both also have been addressed in some depth in relation to connections. Standards have emerged in the case studies as central to coherence and connectedness.

Three kinds of standards have been described in the cases: academic standards, industry skill standards, and generic employability standards.

Academic standards refer to knowledge in the basic school subjects, especially English, math, science, and social studies. Skill standards or industry skill standards are more directly work-related and refer to the ca-

pacity to perform specified work tasks. Generic employability standards refer to a broad class of attitudes and behaviors that employers look for in applicants, such as punctuality, diligence, reliability, and commitment to quality. They are generic, in contrast to the skills needed in a specific occupation, because they are applicable in any workplace; indeed, they are also desirable qualities in citizens and family members. They are sometimes called "soft skills" because they are less precise and more difficult to assess than specific technical skills. They are also called "SCANS skills" because the Secretary's Commission on Achieving Necessary Skills stressed their importance. We have defined them elsewhere as personal and social competence.

As with many distinctions, the distinctions among these three types of standards blur at the boundaries. Geometry is an academic subject. Machinists have to calculate angles and the linear distances that a tool will travel in shaping a part, which is a specific technical skill related to geometry and trigonometry but not fully contained within the subject. Students who do well at geometry might still be unable to solve the machinist's problem. Some machinists who can set up and run a lathe expertly have little or no facility with geometry as a school subject. Similarly, students who write good essays in English class may not be good at writing business letters.

The distinctions among academic, skill, and employability standards are useful in general terms, in part because assessment methods tend to vary among them. The attainment of academic standards is typically assessed by performance on standardized tests, which give students a limited amount of time to answer a set of multiple-choice questions. Work skills may in some cases be assessed by paper-and-pencil tests, but they are more frequently assessed by performance tests that require people to perform the target task or something like it under controlled conditions. Completed products may then be evaluated for quality. Work skills are also often assessed with varying degrees of formality by supervisors who look primarily at the quality and quantity of work performed. Generic employability is usually attested to by letters of reference and then, after an applicant has been selected, assessed by supervisors based on specific incidents.

One problem with assessing generic employability is that an appropriate scale is lacking. A person can be said to have demonstrated good teamwork, or improved teamwork, or better teamwork than peers, but how much teamwork is enough? At what point does good teamwork become mindless conformity? No one can ever be so good at teamwork that he or she has nothing more to learn. This makes it all but impossible to set measurable standards for such qualities. Assessments are often based on lists of desirable characteristics without clear criteria or valid rating methods.

To have their intended effect, standards must be stated well and assessed appropriately. If standards are unrelated to actual performance, they become unnecessary gates that keep people out arbitrarily. If they are stated too narrowly, they become trivial; if too broadly, useless. If standards are set too high, they will be ignored; if too low, they will serve no purpose.

If individuals' attainment of standards is assessed poorly, the results will be poor regardless of how well conceived the standard. On the other hand, if tests are well designed, then "teaching to the test" will be very constructive, contributing directly and strongly to the attainment of desirable objectives, and those who perform well on the test will also perform well on the job or at the next level of education.

Conventional standardized multiple-choice tests have a place, but they are not sufficient. They reflect in broad terms whether people who take them know and are able to use some academic knowledge and skills believed to be important, including recall of information, the ability to solve math problems that are already formulated, and the ability to extract information from brief reading passages. They are ill suited, however, to measuring progress toward more complex educational objectives, such as finding information and using it to solve real-world problems. For such purposes, evaluations of individual and group projects are more valid, but they are much harder to standardize.

Standards have the potential to shape the architecture of a system. They can connect work-based learning with school-based learning. When standards are defined in terms of demonstrated mastery, in contrast to "seat time" or course credits earned, then they can be achieved and demonstrated in either school or workplace or both. Standards can connect school with employment. When graduates have attained standards that employers respect, then employers are confident about hiring them. Standards can connect secondary with postsecondary education. Graduates who have met standards are able to move on to next level of education, including from two-year to four-year colleges.

Standards can be conceived metaphorically as gates across career paths. Gates have two seemingly contradictory functions. They block progress along the career path by those who do not know how to open them, but for those who have the key, they mark the path and show the way. If there are no gates, it is easy to move about but just as easy to get lost. Gates prevent automatic access but inform people how to get where they want to go.

Standards should be "standardized," meaning they should be uniform statewide or nationwide. Individual schools can set their own standards, but they become more powerful when adopted by the district and even more powerful when established at the state level. When skill standards

are set locally, they are not transferable and deprive young people of the benefit of taking their occupational certification to another geographical location or another employer. Replication of standards development is also inefficient. The United States does not lack standards; we lack widely recognized and accepted standards. Standards have proliferated independently and, as a result, they do not function as they might.

Widely recognized standards communicate. They transmit information among people and institutions. Employers' standards tell educators what employers think they should teach. Graduation and certification standards tell employers which applicants are qualified. As gates marking career paths, standards communicate to young people and their parents what they need to do to prepare for the future they envision.

Endurance

Systems are more likely to endure when they are supported by strong partnerships, when they are part of larger school reform and economic development efforts, and when they are manifested in restructured staff roles and responsibilities.

All the partnerships we saw include employers and educators. Organized labor has an unusually prominent role in Washington State's partnership. Philadelphia First and LEED in Sacramento are notable because employers there took the initiative to form partnerships among themselves and then reached out to involve educators and others. Employer initiative is strongest in the corporate systems developed by Automotive Youth Educational Systems (AYES) and Siemens.

Whenever a partnership is seen as belonging primarily to either employers or educators, there is a danger that the other partner will feel less involved and therefore less committed. A vigorous intermediary organization can reduce that danger by serving as a broker between those two key partners and among other partners as well. A regional consortium with an executive capacity, such as those in North Metropolitan Atlanta and in Greater Sacramento, also provides economies of scale, relieving employers of the burden of maintaining partnerships with dozens of high schools and providing professional development and technical assistance to multiple school districts. As members of a consortium, employers who compete with each other for qualified workers can act together to influence the schools to help improve workforce quality.

In Alamo, Philadelphia, and West Virginia, school-to-work is part of a larger economic development strategy. Alamo and West Virginia folded existing tech prep initiatives into their school-to-work plan, and West Virginia drew heavily on its experience with High Schools That Work.

The legislation passed in Washington State and West Virginia counts as the most comprehensive effort to draw different programs and systems together into a unified whole.

Legislation is also the strongest commitment by a state to maintain school-to-work after federal funding terminates. Sites like Philadelphia and Thompson that treat school-to-work as part of a larger and longer-term reform movement will also maintain their effort in the absence of federal funding. Most of the case study sites began their initiatives before the School-to-Work Opportunities Act was passed, which certainly augers well for continuation after it terminates. Another good omen for continuation is a leadership and administrative structure that is built in rather than added on. In Philadelphia and Thompson especially, responsibility for school-to-work is so widely dispersed and so well integrated with established functions that the practices seem likely to persist. Corporations that have committed their own resources to school-to-work to meet their own needs will surely not be deterred by the act's sunset provision.

Philadelphia and Thompson, as noted above, have restructured staff assignments most dramatically in support of school-to-work. In Philadelphia, staff in the Education for Employment Office support school-to-work activities, including service learning, project-based learning, and internships. At the same time, the Office of Curriculum Support produces curriculum frameworks that incorporate school-to-career to guide teacher practice at all levels. In the small learning communities that high school students belong to, teachers' roles have been broadened to make them responsible for advising and for facilitating students' work-based learning. Teachers also interact with partners from firms and community-based organizations. Washington State's unification of secondary education, vocational education, and school-to-work in one office is also notable.

One of the most striking findings from our case studies was that nearly all the sites we identified as having made good progress toward building systems had started before receiving School-to-Work funds. This does not mean the funding and the other resources that became available after 1994 were irrelevant. Widespread attention to the relation between education and employment and the transition from school-to-work gave greater credibility and urgency to these efforts. In addition, ideas and practices embodied in the legislation helped sharpen and direct their progress. However, the relative maturity of these sites implies that creating a large-scale high-quality system takes far more time than the five years allowed by the School-to-Work Opportunities Act.

A critical policy question is how to foster this continued commitment and progress after the act sunsets, when funding and the other forms of

support provided from Washington disappear. The cases we have described illustrate how other resources can be redirected and focused on school-to-work. But there is no substitute for the national functions including advocacy, direction, research and development, training and technical assistance, and a resource bank that have been created with federal funds. Maintaining this support in some form will help states, regions, corporations, districts, and schools pursue the ambitious goal of creating high-quality school-to-work systems.

We conclude by noting that our treatment of systems has emphasized, as we warned it would, organizational or structural features. We would like to have portrayed young people moving through school-to-work systems. This was not possible because no systems have been in place for very long and because we did not spend enough time anywhere to gather the information needed to produce such portraits. We return to the idea because we believe it offers a complement to what we have described. In addition to examining the structural features of systems, system builders should look carefully at what happens to young people now and contrast that with what they would like young people to experience in an optimal system. The gap can tell them what needs to be done. The ideal stands as a goal against which they can measure progress.