

tional areas: manufacturing and engineering technology, health care, and administration and office technology. Seven high schools in the Binghamton, New York, area were involved, along with 11 firms, including hospitals, factories, and insurance companies. The project's chief lessons can be summarized in seven principles for high-quality work-based learning. Note that, although we emphasize work-based learning, the principles also address school-based learning and connections between the two. Together, work-based learning, school-based learning, and connecting activities constitute the key elements of a school-to-work opportunities system, according to the School-to-Work Opportunities Act of 1994.

The seven principles and associated recommendations identify areas in which adults teaching young people in schools and workplaces must make choices that determine the quality of work-based learning. Although we derived the principles from youth apprenticeship programs, we believe that they may be adapted to other types of work-based learning, particularly as the latter become more intensive.

Technical Competence

Principle 1. Youths gain basic and high-level technical competence through challenging work. Work-based learning beyond the exploratory level (e.g., field trips) teaches young people how to perform work tasks. Technical competence includes not only mastering procedures but also understanding the fundamental principles and concepts underlying the procedures, gaining capacity for analytical judgment, and becoming computer literate.

To foster the acquisition of technical competence, designers of work-based learning programs use the same approach used by the designers of classroom instruction: they develop a curriculum. A work-based learning curriculum identifies and sequences learning objectives and specifies the tasks, projects, and activities that enable young people to achieve them.

In addition to learning how to perform work tasks, youths learn how to learn. They acquire a firm foundation of knowledge and skills, appreciation for expertise, confidence in their own ability, and understanding that learning continues for a lifetime. They must learn specific work skills, but those skills should be understood as a foun-

ation for continuous learning, not as ultimate or sufficient in themselves. Through work-based learning, youths prepare to function in learning organizations.

Teaching young people how to perform work tasks is the essence of employment programs — and to a lesser degree of work-like experience programs. In some ways it is also the easiest objective to achieve. Young people in our demonstration project quickly learned to perform a wide range of tasks that are usually considered beyond the capacity of teenagers. They successfully ran tests in pathology labs, published corporate newsletters in human resources departments, tested photographic film quality, and performed a range of other tasks that are usually done by adults with at least two years of postsecondary education. Some filled in when their supervisors were on vacation, demonstrating their capacity to meet employers' expectations for adults.

The most challenging aspect of designing employment programs involves the identification of appropriate learning objectives and then the planning and sequencing of tasks, projects, and other activities that enable youths to achieve those objectives. Because education is fundamental to acquiring high-level technical skills, employers must collaborate with high schools and community colleges, which can provide the disciplinary base for skills and further skill learning, but only if they know what they should be teaching and set high academic standards.

Recommendations. 1) Identify work tasks that teach technical competence; 2) organize learning objectives as modules in core and elective units; and 3) design a multi-year learning plan that is increasingly challenging.

Breadth

Principle 2. Youths gain broad technical competence and understand all aspects of the industry through rotation and projects. Breadth is certainly a quality of technical learning, but it is so critical that it deserves separate treatment. Teaching young people technical competence in a single, specialized area is relatively easy compared to achieving broad technical competence. Broad training teaches young people how to continue learning and reduces the chance that their skills will become obsolete. Multiple skills enable a worker to move read-

ily from one assignment to another, to participate in flexible work teams, and to respond to rapid changes in production that result from changing markets and technology and from short production runs and customized products.

The phrase "all aspects of the industry," which is prominent in the School-to-Work Opportunities Act and in the Perkins Act supporting vocational education, denotes the goal of introducing youths to the larger context in which they do their work — the economic and organizational structures surrounding them. An old story about two stonemasons illustrates the point. When asked, "What are you doing?" one replied, "I'm squaring this stone." The second said, "I'm building a cathedral." Workers who know how their actions contribute to the whole are more motivated than those whose vision is narrow. They can answer questions and solve problems that go beyond their immediate setting. And they can aspire to a range of career possibilities. A stone finisher can do only one job. A cathedral builder might become a foreman, a contractor, or an architect.

Rotation is the most important way to ensure breadth of experience. Youths should move systematically through several different placements to acquire a variety of skills but also to learn what different units contribute and how they function. Frequent rotations are especially important in the first year or two; they may become less frequent as youths specialize in later years. Program coordinators in some of the firms in our demonstration project were very creative in finding ways to help participants become acquainted with their organizations. For example, moving patients from one part of a hospital to another via wheelchair, gurney, or walking is an excellent way for youths to learn how to deal with patients while also learning about the locations and functions of many different parts of the hospital. A brief placement in the mail room can serve the same purpose for youths in administration and office technology. The tool room can help orient youths in manufacturing and engineering technology.

Project-based learning also ensures breadth and introduces youths to all aspects of an industry. By their nature, projects cut across boundaries and engage young people in aspects of work beyond their daily assignments. Seniors in the demonstration project framed an issue related

Rotation

Over four years apprentice Brian LaPorte rotated through several departments at the Raymond Corporation, a manufacturer of electrically powered fork lift trucks, gaining skills in machining, electronics, and engineering design. During his first year he learned to calibrate the guidance system for two truck models, to check the microprocessors, and to use variable power supplies, chart recorders, and multimeters. The procedures he performed required inductive as well as deductive thinking. Through his work he discovered an aptitude for and curiosity about electronics. At the end of the first year, Brian's manager noted on his evaluation that the next step for him was to master "more hands-on troubleshooting." In an interview at the end of his second year, Brian described a complex task he learned to perform:



At first I worked with electrical boards. "Wire guidance," they called it, for the trucks. I had to put the circuit board into the fork lift. Then I had to tune it in to where they go by themselves. They'll steer themselves on this grid on the floor, and you have to tune it to stay on the grid. And, you know, it took me quite a while to get it to where I could do it by myself.

to their occupational area, planned a complex long-term project that would benefit others, researched their chosen issue using a range of resources, applied academic knowledge, and exhibited their findings.

Recommendations. 1) Inform youths about all aspects of the industry; 2) rotate youths through several departments or placements; and 3) support projects and

activities that teach multiple skills and broad knowledge.

Personal and Social Competence

Principle 3. Youths gain personal and social competence in the workplace. Bringing young people into a workplace is quite different from hiring new adult employees.

Project-Based Learning

For his senior project at Anitec and Binghamton High School, Blair Dury's coach, Robert Kage, gave him an architectural layout for a new silver analysis laboratory and challenged him to produce a functional design package for its electrical services.



Blair gathered information about power requirements for the test equipment, for the chemical exhaust fans, and for general room power and lighting by reading equipment specifications and nameplate data and interviewing lab technicians and engineers. Design steps included applying the information to size electrical circuits according to the National Electrical Code; specifying the required conduit, wire, circuit breakers, disconnect switches, and so on; and calculating lighting levels. He reviewed all work with the facilities project engineer at each stage.

The design package Blair presented at his exhibition included architectural auto-cad plan-view drawings with associated elevation views, schematics, and single-line diagrams, a bill of materials, and standard construction notes and a scope of work. Panel members who evaluated the exhibition commended the depth of his knowledge about electrical power requirements, the numerous skills acquired in executing the project, the connections to academic knowledge and skills, and the range of resources used.

Normal hiring processes are designed to ensure that new employees already have most of the knowledge, skills, and attitudes required to fill a particular position. Work-based learning programs bring young people who are unqualified for regular employment into a workplace and, over an extended time, qualify them.

Employers frequently say that the qualifications they value most in entry-level employees are not technical skills but such traits as punctuality, reliability, and diligence. They claim that people who have demonstrated personal and social competence can be trained in technical skills. In other words, it is easier to teach people how to work than how to be workers.

Before employers can teach personal and social competence, they must explicitly determine their standards, formulate appropriate learning objectives, and teach young people to achieve them. This is different from using standards to select or dismiss people or, at the opposite extreme, from misdirecting youths by excusing them from meeting standards. Employers teach youths what their standards are and how to meet them.

Meeting during the spring of our demonstration project's second year, workplace teachers concluded that personal and social competence is generic across all industries and collaborated to produce a "Guide to Evaluating Social and Personal Competence," which was used in all three of the occupational areas in which we placed apprentices: manufacturing and engineering technology, health care, and administration and office technology.

The idea of systematically teaching personal and social competence is new and challenging to many people in business. When we interviewed adults who worked with youths in the demonstration project, they said that teaching personal and social competence was more challenging than teaching technical competence. Working with youth apprentices raised new issues for managers, but we learned that many middle managers were uncertain about how to handle issues related to personal and social competence with adult employees as well. Some said they became better managers of adults after learning to deal with youths.

Personal competence encompasses self-confidence, initiative, motivation, commitment to continuous improvement, and career planning. Learning to act like an adult

was a common theme in our interviews with youth apprentices, who spoke of growing self-confidence and often noted a contrast between their behavior at work and their behavior in school.

Social competence includes learning about organizational systems — the purposes of an organization, its structure, how one department connects to another, the roles of people in the organization, obligations to clients and customers, and how to gain access to information. Work tasks and projects can provide insights into how the firm operates. When young people understand how their work contributes to the firm as a whole, they are more enthusiastic and more productive.

Some youths have difficulty meeting workplace expectations. For example, poor health care may result in frequent absences. Others may simply fail to understand what is expected and why they should comply. In such instances, convening a small case-management meeting can illuminate the problem and generate strategies to solve it. Participants in the demonstration project's case-management meetings typically included the youth, parents, a school counselor and teacher, the firm's apprenticeship coordinator, and one or more coaches or mentors.

Recommendations. 1) Recognize personal and social competencies as key learning objectives; 2) systematically teach personal and social competence in context; and 3) through case management, provide extra assistance to youths who lack personal and social competence.

Expectations and Feedback

Principle 4. Workplace teachers convey clear expectations to youths and assess progress toward achieving them. A description of the apprentice's position explains the nature and conditions of employment and outlines associated career possibilities and educational requirements. In addition, working with representatives of workplaces and schools, we developed a Mutual Expectations Agreement, which describes in detail the roles of the key players in a work-based program: employers, schools, apprentices, and parents. Ideally, all four parties sign the agreement at the beginning of the work experience, following a discussion of its contents and of other initial expectations. Work-based learning makes demands on employers that they

do not ordinarily face. The agreement helps to spell out expectations without being legalistic.

Evaluation notebooks detail employers' expectations for what youths will learn and serve as a record of their progress and a means for workplace teachers to communicate with them, with schoolteachers and parents, and with one another as the youths rotate through a variety of assignments. Another reason for documenting learning is to substantiate credentials, which are a critical component of work-based learning. Yet no institution can unilaterally issue truly portable credentials. Educational and occupational credentials open career paths for their bearers only when the

before widely accepted standards and credentials are available for more than a few occupational areas. In the meantime, local and regional standards can communicate to young people what it takes to get a job and to educators what employers expect of schools.

In the absence of standards and associated credentials, individual young people are best advised to build portfolios substantiating their work-related competencies. The use of portfolios as evidence of learning is gaining momentum in secondary education as a reaction against the limitations of conventional grades and test scores. Many colleges are willing to examine students' portfolios instead of or in ad-

Gaining Competence



As a junior, Donald Tolerson initiated conversations with his apprenticeship coordinator and managers at the IBM Corporation at Endicott about his desire to learn more and be more productive at work. Consequently, they increased the level of his work on the manufacturing line and in engineering during his senior year, and he began to see how his personal and social skills would enable him to do a good job in a high-performance workplace.

Being on a manufacturing line definitely taught me a lot of discipline, about being to work on time, about how important it is, and getting my job done. Being where I am now is teaching me to have a good outlook for quality. It's showing me how well-rounded you have to be to do a certain job sometimes and how to interact with people. I'm always calling up engineers, asking them questions about blueprints, their quality plans, and it's made my communication better. A lot of it is knowing how well I have to know my job in order to do a good job.

institutions granting them are accepted as legitimate and the criteria used in granting them are well established and widely recognized. Accreditation agencies review schools and colleges for this purpose. State and professional certification boards govern the granting of credentials in medicine, law, and other professions. Journeyworkers' papers granted to registered apprentices testify that they have met criteria established by unions or state or federal departments of labor. State licenses attest that barbers, hairdressers, plumbers, and electricians have proved their mastery of health and safety issues in those occupations.

Several industry groups are currently developing occupational skills standards, and a National Skills Standards Board has been established. These efforts are steps in the right direction, but years may pass

dition to their transcripts and SAT scores. Work-based learning should be recorded in a portfolio that will be manageable and convincing both to prospective employers and to postsecondary educational institutions. Young people could include completed evaluation notebooks, project reports, letters of recommendation, selected work samples, and a school transcript in their portfolios. A "certified résumé," listing experiences and competencies and signed by a manager, would be useful by itself or as part of a portfolio.

Recommendations. 1) State expectations for behavior and learning at the outset of the work experience; 2) regularly monitor and document the acquisition of competence; 3) provide feedback on progress to youths, school, parents, and firm; 4) encourage youths to assemble a portfolio; and 5)

eventually use industrywide standards to provide portable credentials.

Teaching Roles

Principle 5. Youths learn from adults with formally assigned teaching roles. The greatest investment that employers make in work-based learning is the time that is devoted to teaching young people. This would be a substantial investment if adults and youths were paired off one-to-one, as apprentices historically were with independent master craftsmen. Work-based learning as conducted in our demonstration project, in which youths rotate through several departments of a sizable firm, requires that many adults work with each young person. We have records of 251 different adults in 11 firms who worked extensively with the 100 youths in the project; many of them taught more than one youth. This is a low estimate of the ratio of adults to young people because we know that many other adults were also involved. All adults engaged in any type of work-based learning program need some basic information about the program and the participants, which requires communication, orientation, and continuing support.

We labeled four critical teaching roles in the workplace: coordinator, manager, coach, and mentor. Most adults we interviewed (65 of 70) described interacting with youths in more than one role, such as coaching and mentoring or managing and mentoring. More than one adult might play the same role for a single youth. The point of distinguishing the four roles is to ensure that all are attended to and to promote appropriate orientation, training, and communication. The key responsibilities associated with each role follow.

Coordinator. A coordinator designs a multi-year plan that delineates a career path with various branches, goals, and objectives for learning; core and elective competency units; a rotation plan; and desired academic degrees. The coordinator also links work-based learning to a workplace's strategic plan.¹ For example, a strategic plan might call for cross-training workers, upgrading workers' skill sets, establishing self-managed work teams, and creating a learning organization.

The coordinator is responsible for recruiting, orienting, and supporting adult participants who work with apprentices.

‡ coordinator oversees rotation, sched-

ules youths in participating departments, and meets with managers to review apprentices' learning progress at each stage.

Coordinators also facilitate communication between the workplace, youths, schools, and families. They collect and distribute young people's evaluation reports, call and facilitate case management meetings, and participate in planning, training, and program development.

Manager. The learning in a department or unit is supervised by a manager. Together with coaches, managers decide what youths will learn within a department (or comparable unit), which work tasks will enhance their learning, and in what order the tasks should be presented. They review youths' learning progress and determine whether the assigned tasks enable them to achieve learning objectives, to contribute to the team's productivity, and to experience continuous learning and challenge.

Managers also assign coaches. Coaches must be sensitive to and interested in young people. They must grasp the principles underlying the program, and they must be competent workers.

Finally, managers organize assessment. Coaches assess young people's learning, but the system of assessment and docu-

*Coaches
must be
sensitive to
and interested
in young
people.*

mentation is designed and maintained centrally by the managers to ensure consistency.

Coach. A coach demonstrates how to do a task while a youth watches.² While performing the task, the coach points out important features and checks the youth's understanding by asking questions and encouraging the youth to ask questions. (Reciprocal questioning is also part of the other functions.)

Questioning

Earl Lee, a manager at IBM Endicott, explained how he managed apprentice Donald Tolerson's work and learning. As a *manager* he designated areas in a large department where Tolerson would work. As a *coach*, he insisted on high standards in work products. The intensity of the relationship that resulted led to Tolerson's accepting Lee as a *mentor* who could teach him workplace rules, advise him about his career path, and counsel him about his social life.



On Monday mornings we had a one-on-one meeting. I told him what we should try to do with the project, and then I would give Don, say, a week or so to do some things with it, and he would walk back in with his outline — this was what he thought he wanted to do. And I basically had Don justify that outline. I could have pretty easily told Don, "This is what I want you to do." But I thought it was important that Don be able to rationalize and justify why he made the decision he made. What I was really trying to get out of him was problem solving, critical thinking. Whenever he came to me and he was at a roadblock and didn't know where to go, I would ask him, "What do you think you would do?" And what I wanted from him were two or three different alternatives because if he understood the problem and he understood the options he had, then we could go down and jointly evaluate and analyze each option. And that's the way we went through things.

A coach explains how to perform a task correctly. Coaches may explain either while demonstrating or at another time. The explanation sets out performance criteria, points out what problems are likely to occur, and indicates possible problem-solving strategies. Coaches also explain why a task is performed in a certain way. They communicate specifications, provide information about the business management or scientific principles underlying the procedure, and explain how the task relates to other tasks.

Coaches model problem solving. They are responsible for teaching youths to perform routine tasks and for fostering their understanding of what they are doing and why, as well as their capacity to cope with nonroutine events. "Thinking out loud" is the best example of modeling problem solving.

Coaches monitor and critique youths' performance. They give clear and immediate feedback. As the youth gains competence, the coach extends the interval between checks, encouraging the youth to monitor his or her own performance and to seek help when difficulties arise.

Mentor. The task of a mentor is to initiate youths into the workplace culture. When they engage in work-based learning, young people enter a new culture with its own rules, conventions, and norms. A mentor's explanations about the culture of the workplace facilitate the young person's adjustment to the work setting. Mentors advise youths on career directions and opportunities and might describe the hierarchy in an occupational area and explain the educational requirements associated with each step.

Mentors also help to resolve problems. A mentor might help a young person resolve a problem with a manager, with school, with family members, or with peers.

Coaches often become mentors, but not all adults who are effective as coaches are accepted by youths as mentors. We allowed apprentices to choose their own mentors. Other programs assign adults as mentors and train them to perform these functions. We do not insist on our terminology, but we think it is important to distinguish coaching, which entails teaching technical competence, from mentoring, which is teaching personal and social competence. The two responsibilities are quite different and need not be assumed by the same people.

Recommendations. 1) Assign clear

Academic Learning And the Real World

Joyce Golden's account of a marginal math student explaining the concept and use of standard deviation helps illustrate the rationale for work-based learning. Her opportunity to visit workplaces and meet with people from business brought a new dimension to her classroom.



When material can be made meaningful to their everyday life as it is in the workplace, it has some relevance. I had a couple of good examples this year where apprenticeships were a factor in my classroom instruction, and that would not have happened if I had not been familiar with the work environment. One was teaching standard deviation with a student who was doing very poorly in math. I was able to say, "Gee, I think we use standard deviation in the workplace. I wonder if someone could tell us what that means?" And sure enough [finger snap], it came to life, and he explained exactly what a standard deviation was, why it was important to the statistical research of the company, and how he was using it on a regular basis. No problem whatsoever because it was in a meaningful context for him. So that was application for the whole class, but he would not have volunteered if I hadn't known enough to go for it. It was my familiarity with what they were doing and what he was doing that made me able to use that kind of knowledge. Unfortunately, few teachers have had those opportunities.

teaching roles and responsibilities to coordinators, managers, coaches, and mentors; 2) authorize teaching roles in job descriptions and performance assessments; and 3) orient, train, and support adults who teach young people.

Academic Achievement

Principle 6. Youths achieve high academic standards. If the distinction between head and hand, between academic and vocational education, was ever valid, it is no longer. Jobs that pay well increasingly require a combination of knowledge, communication, problem solving, and technical skill that sounds like a classic definition of the well-educated person.

High school students hoping to have rewarding careers without graduating from four-year colleges must enroll in courses previously considered appropriate only for those bound for selective colleges. Work-based learning presents a major challenge and a tremendous opportunity for schools to connect academic learning more closely with the real world, a connection that will benefit not only the students in what have been general and vocational tracks but also college-bound students, many of whom are adept at learning abstract in-

formation for tests but unable to use what they have learned by applying it to solve real problems.

Young people should know while they are in high school what they will have to do to achieve their career goals. If their goal is first to graduate from a four-year college, then it is clear what they must do to gain admission. When employers publicly advocate higher academic standards and then use those standards to make hiring decisions, they send a very powerful message. When schools reorganize to teach all students, they will help to release human resources that are currently wasted when we define more than half of our high school students as unable to learn.

Our demonstration project showed that specific institutional practices are needed to communicate high standards and help young people meet them. Courses designed to teach high-level content in engaging ways are one such practice. Schedules must become more flexible to enable work-based learning. Another needed reform is the creation of comprehensive advising systems involving not only school counselors but also teachers, parents, and mentors at the work site. Teachers and counselors will be most effective if they are able to learn firsthand about the academ-

ic content of contemporary workplaces through visits, meetings, and internships.

Finally, curricula and instructional practices should integrate academic education with vocational education and school-based learning with work-based learning.

Recommendations. Workplaces, schools, and postsecondary institutions should work closely together to 1) set high academic standards; 2) specify courses and degrees related to the career areas; and 3) open multiple options for postsecondary education.

Career Paths

Principle 7. Youths identify and follow career paths. A career path traces a life-long occupational journey involving both education and employment — not a single job or even a single occupation. By this definition, some career paths are smooth and direct, while others are rough and full of dead ends; some lead to well-paid and prestigious employment, but others do not.

A path is not a track. It allows for changes in direction and can lead toward several destinations. A good career path provides a sense of direction and a purpose academic achievement so that a young person is well prepared even if he or she later chooses a different path. No one has ever been able to predict precisely where his or her own or someone else's career will lead, and certainty about the future is now inconceivable. But if we can give more young people a better sense of what they can do in the future and what they have to do to prepare, they will be better able to make good choices and to adapt to uncertainty.

A high school senior without a vision of a career path may see no reason to take an additional math or science course in the senior year and may therefore opt to take no more than the required courses. A student who takes an extra science course because she wants to become a physical therapy assistant not only prepares for that career goal but also preserves the option of continuing her studies to become a physical therapist or a physician, options foreclosed or at least made less attainable if she takes only the minimum requirements to graduate from high school.

Employers who invest in work-based learning to improve the quality of their future work force should take a long view of

what is needed. They cannot expect that every youth will continue in a related career path, much less that all will become their employees. Employers can increase the return on their investment by selecting young people who have already had exploratory work-based learning experience and who have learned enough about the occupational area to make a reasonable commitment to a related career path. If employers in a community join together to provide a range of work-based and school-based learning opportunities, all students will be better able to decide whether they wish to participate in work-based learning and, if so, in what occupational area.

Recommendations. 1) Provide opportunities for career exploration and information on related careers; 2) advise youths about career paths, coordinating planning with high school and college advisors and parents; and 3) pay particular attention to the postsecondary school transition.

Next Steps

The experience of operating a youth apprenticeship demonstration project has left us optimistic about the prospects for creating a more effective system to foster the transition from adolescence into adulthood in the United States, a system that uses workplaces as learning environments for youth. The experience has also revealed the magnitude of the task. Following are the steps we see as most critical to success.

1. *Restructure schools and workplaces.* Commitment is more than willingness to participate. An employer, for example, might join a school-to-work partnership primarily as a gesture of support to the community but without accepting its aims and its guiding principles. If an employer is motivated by no more than civic duty, then a downturn in earnings will quickly terminate participation. Similarly, if schools are primarily concerned about dealing with students who are not served well by current programs, they are unlikely to engage in the kind of restructuring that school-to-work requires, especially enabling all students to meet high academic standards.

The opposite of commitment is rejection, but in many ways straightforward rejection is less insidious than participation without commitment. The greatest threat to the integrity of school-to-work is its nominal adoption, perhaps simply by us-

ing the term to describe current activities without attempting the restructuring that true commitment entails.

We see a striking parallel between the kinds of commitments school-to-work requires of schools and of workplaces. Both schools and workplaces must be willing to:

- increase the breadth and depth of learning,
- ensure equal access to learning,
- assign staff to organize and monitor work-based learning, and
- maintain a learning organization.

2. *Form partnerships.* The demonstration project confirmed that partnership is essential among employers, employees, and their organizations; educators and school systems; legislators and government agencies; parents; youths; and community organizations. Once they have committed themselves to the goals of school-to-work, the partners must define their roles and responsibilities and establish a working relationship that enables each one to contribute. They succeed when the partners are able to establish a joint strategy, respect one another's needs and strengths, and negotiate to resolve their differences. The partner organizations and groups have purposes, cultures, and structures that keep them separate from one another. Changing a single institution is daunting enough; creating functional partnerships is a challenge of the first magnitude because it requires coordinating changes in several institutions. Institutional inertia and self-protective tendencies are serious barriers. But there is no alternative. None of the partners can succeed alone.

3. *Build a school-to-work system.* No single type of work-based learning is adequate by itself. Field trips, service learning, youth-run enterprises, and other approaches all increase young people's awareness of their own talents and inclinations and of the opportunities available to them. Youths who enter apprenticeship programs need to have explored careers beforehand via work-based opportunities. Employers who wish to use youth apprenticeship as a means of improving the quality of their work force will find that their investment pays off at a higher rate if they first provide young people with job shadowing and other exploratory opportunities. If the investment required by youth apprenticeship is too great, then cooperative education, internships, and other types of work-

*Nominal
adoption is
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school-to-work.*

based learning may suffice. Nearly three-quarters of high school seniors work during at least part of the school year. Augmenting standard youth jobs to make them into opportunities for work-based learning has greater potential for involving all youths than any other step. The goal should be to provide in every community a complement of work-based learning opportunities to meet a range of needs among both

young people and employers.

Moreover, in addition to work-based learning, a school-to-work opportunities system includes appropriate and effective school-based learning and multiple connections between the two. Although we have not addressed those components separately, the demonstration project confirmed that work-based learning must be supported by changes in schools and by an array of connecting activities, as the principles and choices described above make clear.

A *system* differs from a *program*. A system is:

- inclusive — it has a place for everyone who needs one;
- comprehensive — it addresses the full range of relevant issues;
- integrated internally — its components are closely linked (e.g., school-based learning and work-based learning);
- connected externally — it builds on what comes before and leads on to something else (e.g., school-to-work connects with higher education and with the labor market); and
- comprehensible — participants understand it and can navigate through it



"Welcome! You will soon be reunited with your lost files."

with the help of parents and other advisors.

4. *Continue research and development.* We do not yet know how to accomplish the goals of school-to-work. Research and development cannot answer all the questions that remain, but it would be unwise to proceed without continued monitoring and testing. Ideally this investigation will be done in a manner and on a schedule that informs practitioners who are designing and operating systems. We hope that the principles and choices proposed here will serve as a framework for some of the needed research and development.

Conclusion

The growing disparity between the well-educated affluent and the inadequately educated who struggle to maintain a decent standard of living must be reduced if the United States is to remain a prosperous and secure democracy. Education cannot reduce that disparity without complementary changes in the economy, particularly the labor market. But education — in the form of the school-to-work initiative, and especially work-based learning — is a powerful means of improving the knowledge and skills of the American work force, which is, after all, most of our citizens. Work-based learning that adheres to the principles we have stated will contribute to but also depend on never-ending progress toward the promise of freedom and opportunity that is the American dream.

1. Heidi Bowne, former vice president for human resources at the Raymond Corporation, alerted us to the importance of linking youth apprenticeship with a firm's strategic plan and demonstrated how that can be done. Bowne made sure that the program with the young people contributed to a human resource strategy that was, in turn, a part of the firm's strategic plan. The Raymond Corporation was committed to increasing the skill level and flexibility of its employees and designed its apprenticeships to produce highly skilled workers with many competencies.

2. Some programs use the German term *Meister* (master) for the person who performs this role. We have not done so for several reasons. A German *Meister* is literally a master of a craft, and only a *Meister* is formally permitted to train apprentices. In practice, however, most German apprentices spend most of their time working alongside a journeyworker; the *Meister* functions more as what we call a manager. In the United States, a coach is more like what the Swiss call a *Lehrmeister*, who is formally trained and certified as an apprentice trainer, but without the courses and examinations that would qualify him or her as master of a trade. ■