

# Work-Based Learning Models and Evidence of Effectiveness

## 5

**A**lthough work-based learning for students is not widespread in this country, a number of different models are in use. The youth apprenticeship model encouraged by STWOA is the newest and most comprehensive model, and currently the least used. The clinical training model and the cooperative education model are similar to youth apprenticeships, but somewhat less comprehensive. Each of these three models is described here in relation to the structuring of work-based learning that was discussed in chapter 4. Evaluations of each model’s effectiveness are summarized and the likely advantages and disadvantages of the models are described. Three other models are discussed briefly. They are school-to-apprenticeship programs (distinct from “youth apprenticeships”), school-based enterprises, and career academies.

It should be noted that there are no established definitions of these models—instead, they have evolved informally and even experts disagree some on the important characteristics of each. In addition, some work-based learning programs have intentionally modified a model or developed their own. Finally, actual practice seldom coincides exactly with the original intentions. The descriptions provided below are of ideal models, as they are commonly conceived. Key features of these models are summarized in table 5-1.

The effectiveness of school-to-work transition programs with work-based learning can be judged by several indicators. Early indicators include the impressions and reactions of students, teachers, employers, and parents, but these subjective measures sometimes do not coincide with more objective ones. Interim objective measures include the students’ rate of participation in various work-based learning activities, school attendance and

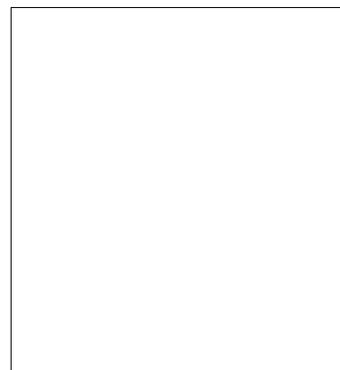


TABLE 5-1: Several Models of Work-Based Learning<sup>a</sup>

Model	Students to be served	Objectives of the work-based learning	Means of coordinating the work-based learning with schooling	Grades and hours per week of the work-based learning	Setting of the work-based learning	Payment for work
<p><b>Youth apprenticeship:</b> The students participate in a coordinated program of school-based and work-based learning that provides career counseling, integrated academic and occupational instruction, training and mentoring in a workplace, progressively higher levels of work experience, and the opportunity to earn an industry-recognized skill credential. The programs extend from high school through at least one year of postsecondary education.</p>	Interested students meeting selection criteria	Academic reinforcement, Career exploration, Occupational development, Productive activity	Joint school and employer planning, Training agreements, Class schedule flexibility, Worksite visitation by school coordinator, Integrative seminars, Skill credentialing	Grades: 11-14 Hours/week: 4-20	Workplaces	Usually
<p><b>Clinical training:</b> The students undertake a course of occupational study and assume a series of coordinated worksite positions that provide training and unpaid work experience. The course of study, the work experience, and adequate scores on an external examination are required for licensure and subsequent employment in the field.</p>	All students admitted into program of study (mostly medically related occupations)	Occupational development, Productive activity	Joint school and employer planning, Training agreements, Class schedule flexibility, Worksite visitation by school coordinator, Skill credentialing	Grades: 13-16 Hours/week: 10-30	Workplaces	Seldom

<p><b>Cooperative education:</b> The students engage in a coordinated program of school-based learning and career-related work experience during the later year(s) of high school or college. This is the oldest and most widely used model of work-based learning in the U. S., and actual implementation varies considerably, especially in respect to the objectives and extent of coordination.</p>	Interested students meeting selection criteria	Career exploration, Occupational development, Productive activity	Training agreements, Worksite visitation by school coordinator, <sup>b</sup> Integrative seminars	Grades: 11-12, 14-16 Hours/week: 6-40 <sup>c</sup>	Workplaces	Usually
<p><b>School-to-apprenticeship programs:</b> In the senior year, the students begin part-time participation in union and employer apprenticeship programs registered with the U.S. Department of Labor.</p>	Interested vocational students meeting selection criteria (mostly skilled trades)	Occupational development, Productive activity	Training agreements	Grade: 12 Hours: 20-30	Workplaces	Usually
<p><b>School-based enterprises:</b> The students work part-time in a school-owned business and take elective classes that develop the required occupational and entrepreneurial skills.</p>	Interested students meeting selection criteria	Career exploration, Occupational development	Teacher supervision of the enterprises	Grades: 9-12, 13-16 Hours/week: 5-20	Schools <sup>d</sup>	Seldom
<p><b>Career academies:</b> The high school students attend a small career-oriented “school within a school” focused on one cluster of occupations. It integrates academic learning, career exploration, occupational preparation, and sometimes part-time or summer jobs.</p>	Interested students in the career academy meeting selection criteria <sup>e</sup>	Academic reinforcement, Career exploration, Occupational development	Joint school and employer planning	Grades: 11-12 Hours/week: 4-15	Workplaces	Sometimes

<sup>a</sup>There are varying definitions of these models. In addition, programs sometimes make intentional modifications to the models, and implementation often is not fully consistent with the retentions

<sup>b</sup>Seldom used for liberal arts students at postsecondary level

<sup>c</sup>Some co-op programs have students alternate between full-time schooling and full-time workplace assignments

<sup>d</sup>Also school-managed facilities outside of school sites

<sup>e</sup>Career academies have been established primarily for socioeconomically disadvantaged youth

SOURCE: Office of Technology Assessment analyses, 1995

conduct, course taking, grades, scores on academic tests and occupational performance assessments, graduation rates from high school, adolescent pregnancy rates, crime rates, enrollment in postsecondary education or training, completion of postsecondary education or training, and proportions earning the applicable skill certificates. Employer satisfaction and the extent to which employers expand or contract their participation also are important interim measures. Longer-term student outcomes include employment history, career progression, earnings and benefits, and career satisfaction. Longer-term labor force outcomes include worker productivity and production quality indicators.

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*“When asked about what happens to students who excel in their [work-based learning] jobs, one supervisor replied, ‘We hire them’.” (20).*

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Measures of these characteristics for program participants alone would be inadequate to determine the effects of the programs on students. For that purpose it is necessary to have a comparison group of similar students who are not exposed to the program. Otherwise, there is no way of knowing whether the observed changes in students would have occurred because of natural maturation and other elements of their education.

Ideally, for purposes of assessing the effects of a program, eligible applicants are assigned randomly to the program or to a control group receiving traditional instruction directed at the same objectives, and then the success of the two groups is compared over subsequent years. Although random assignment is desirable from an assessment standpoint, it is unpopular with educators who seek to serve all students with what they consider to be the best available educational opportunities. If, however, the growth in work-based learning positions is slower than the growth in parent and student interest, educators might be persuaded to allocate program admission by lottery.

Randomization has rarely been used in past evaluations of work-based learning. Rather, par-

ticipating students have been compared with non-participants matched on the basis of family background, ability, past performance in school, and other characteristics that are commonly associated with future school performance, postsecondary educational achievement, and early occupational success. These matching procedures can control only for measured characteristics; there are many others, such as initiative, ambition, and foresight, that can affect the outcomes. Such lack of initial comparability between matched groups is particularly likely when the program group is composed of volunteers and the comparison group is composed of those who did not volunteer. Evaluations using such matched comparison groups will often overestimate the positive effects of the studied programs.

For rigorous evaluations, the researchers must have access to large percentages of the students in the programs and in the comparison groups. If several of the programs refuse to participate or if many students in the program group or in the comparison group refuse to participate, the validity of the results can be seriously undermined. In past evaluations of work-based learning, gaining access to programs has sometimes been a problem, gaining access to a large portion of the students has commonly been a problem, and following students for five or 10 years has rarely been accomplished.

These evaluation difficulties are not unique to work-based learning. They are common in the assessment of all types of education and training programs. Occasionally, most of the problems have been overcome, particularly in some evaluations sponsored by the Department of Labor during the past two decades (19), but such success has taken considerable leadership and resources, and often a mandate from the funding source.

Numerous evaluations and their findings are discussed in this chapter. Very few of the evaluations randomly assigned students, many were not able to include large proportions of the students, and none followed students well into their adult employment. Taking into account these limitations, a prudent interpretation of the evidence ac-

cumulated from the cited studies suggests the following findings about past work-based learning:

- School-to-work programs have arranged work-based learning that generally offers more learning opportunities than do the jobs that students find on their own.
- Most students have been excited and motivated by their work-based learning, feeling that it has helped them make better use of their schooling and become better prepared for employment.
- Most employers have been quite satisfied with the students who participate in work-based learning.
- Work-based learning has generally had small positive effects on students' attendance, grades, graduation rates, and participation in postsecondary education, but some of the new youth apprenticeship programs appear to have dramatically increased postsecondary enrollments.
- The effects of work-based learning on employment, career progression, and earnings during the first few years after graduation have been a mix of modest positive ones, no differences, and a few small negative findings. The results for college-level programs have been more positive than those for high school programs, and employment results from the youth apprenticeship programs are not yet available.
- Well-planned and supervised work-based learning requires considerable effort to arrange, coordinate, monitor, and sustain.
- Intermediary groups, especially employer organizations, have often been important in establishing work-based learning programs.
- Programs that have earned a reputation of excellence have done so only after several years of adjustments and fine-tuning.

Each of these findings is supported by two or more studies of several programs. Only the findings in respect to employment outcomes varied substantially among the studies.

## YOUTH APPRENTICESHIPS

Students in youth apprenticeships participate in a coordinated learning program with the following key elements:

- school-based learning that provides career counseling, integrates academic and occupational instruction, and extends from the later years of high school through some postsecondary education;
- progressively higher levels of paid work experience, accompanied by training and mentoring; and
- the opportunity to earn an industry-recognized skill certificate.

Youth apprenticeship is the newest model of work-based learning. It is the model that STWOA encourages, although the legislation never uses the term “youth apprenticeship” (Public Law 103-239, Title I, Secs. 101-104). Before passage of STWOA, there probably were only a few dozen programs in the country using this model. Most of those had been established in the early 1990s and had not fully implemented the model by the time the legislation was being considered.

Youth apprenticeship is the most ambitious, coordinated, and sustained model of work-based learning in the United States. It is directed at serving the widest spectrum of students—in terms of academic performance and career interests. The objectives are broader than those of other models, encompassing the reinforcement of academics, exploration of careers, occupational skill development, and productive activities. Youth apprenticeship involves extensive coordination between academic and occupational instruction in school, school-based instruction and work-based instruction, and high school and postsecondary education and training. In fact, youth apprenticeship is the only model that spans the high school and postsecondary levels, providing students with the most extensive progression of learning opportunities. Some other models are used at both levels, but not by a single program.

Youth apprenticeships differ from the apprenticeship programs operated by unions and em-

ployers in several ways. Youth apprenticeships begin serving students in high school and continue to serve them for at least one year of postsecondary education, whereas union and employer apprenticeships are targeted at young adults several years out of high school (the average age of participants is about 25). In youth apprenticeships, the students work part time or rotate between full-time work and full-time schooling, whereas in union and employer apprenticeships the participants generally work full time and take two or three hours of classes each week. In addition, youth apprenticeships use high school and college teachers to provide the formal instruction, whereas the unions and employers often use their own personnel for that purpose.

### ■ Evaluation Results

Youth apprenticeships are of such recent vintage that there is little evaluation information available on them. Most of the programs are still in the start-up phase. Only a few have graduated cohorts from high school, and none has operated long enough for those cohorts to progress well into their careers. For those reasons, all the findings in this section should be considered quite tentative and subject to change as the programs refine their operations and become established in their communities.

The U.S. Department of Labor commissioned a preliminary assessment of 15 youth apprenticeships that were begun with its support between 1990 and 1993 (4). At the time of the assessment, a few of the programs were still in the planning stage and had not yet accepted students. It was found that the work-based learning usually began in the junior or senior year and varied considerably in intensity from program to program. In a few of the programs the employers offered a carefully structured sequence of training opportunities but no real work experience. Conversely, when students were given real work experience, they usually received only informal training from their supervisor and only as much as they needed for the work (4).

The biggest difficulty that most of these youth apprenticeship programs faced was arranging enough work-based learning opportunities. Employer associations helped with that task, but individual employers ultimately based their decisions to participate on their perceptions of the costs and benefits.

Coordinating the work-based learning opportunities with schooling proved to be a challenge. The school staff and employers' representatives usually met to discuss expectations at the start of the school year. Continuing communications, either by scheduled meetings or informal communications, were spottier. Only a few schools tried to link their class activities to the work-based learning, and none of the employers made substantial efforts to link the worksite experiences with the students' academic or vocational curriculum. One program twice attempted to develop a detailed training plan to be used by its large employers, but the plans required more staff time, space, and equipment than the employers were willing to commit (4).

In focus groups, sometimes selected randomly and sometimes not, students from these youth apprenticeship programs generally said that the programs encouraged them to study harder in school and to improve their attendance and grades. Many found their schoolwork more interesting because of team project assignments. Some were motivated to study harder in school to assure their eligibility for work-based learning assignments. Students sometimes complained, however, of experiencing delays in the implementation of certain program components, being isolated with the same students for most of their schoolwork, receiving promises about pay rates that were subsequently broken, having to do mostly menial jobs, being paid less than regular employees doing the same work, having to constantly "act like adults," missing after-school social and extracurricular activities, and misunderstanding the postsecondary tuition reimbursement offers of some employers (4).

Jobs for the Future, a nonprofit organization with foundation funding, is supporting 10 innovative school-to-work transition programs with work-based learning. Only two of the 10 had been in operation prior to 1991. Six are youth apprenticeships and the other four include several elements of that model. A self-administered survey, handed in by 226 seniors, about half of those at 8 of the 10 sites, found that 92 percent thought the work-based learning was encouraging good work habits, 83 percent thought it was providing at least some chance to explore career options, 62 percent said they spent one-third or more of their time in the workplace learning new skills, 57 percent reported the assignments to be interesting and challenging most of the time, and 79 percent said they would participate in the program again (6).

A subsample survey of 113 seniors at four of the programs found that they most liked the career exploration aspects of the program and least liked, or found hardest to achieve, the level of skills required for tasks performed at the worksite. More than half of the subsample thought that the program had improved their feelings toward school, and less than 2 percent felt the opposite. The most common suggestion for improvement, offered by 16 percent of the students, was for “better planned activities at worksite that require more involvement by students” (6).

In three of the programs where actual postsecondary enrollments had been tracked, it was found that between 69 and 84 percent of the students had enrolled in some form of postsecondary education or training soon after graduation from high school—rates well above the national average. The program with the highest rate serves an inner-city population where postsecondary enrollments are normally low. In three other programs, between 85 and 92 percent of the seniors in the programs reported they had plans for continuing their education after graduation (6).

Jobs for the Future staff observed that programs that began primarily as workforce improvement efforts have since become “more committed to significant school reform as a precondition for being able to deliver improved career preparation.” Similarly, programs that began primarily as

school reform efforts have developed a “much more serious commitment to structured, planned learning experiences at the worksite and creative approaches to linking school and work experiences”.

The major problems that have been encountered are rigid school schedules using 50-minute periods, entrance requirements of four-year colleges that do not recognize credits for integrated academic and occupational courses or work-based learning, and the high costs of small programs that result from the limited ability or willingness of business to provide work placements and to hire students who have completed the program. Incremental costs are estimated to range from minimal to \$2,000 per student, although there may be reductions after the implementation phase is completed and the operations have been scaled up (6).

Case studies of 14 innovative school-to-work transition programs were recently completed by the Academy for Educational Development (10). Nine of the programs were youth apprenticeships or had many of the components of that model. Most of the 14 programs appear to have benefited from strong leadership by a state or local school administrator who provided vision, fostered collaborations, and set high standards while also expecting some mistakes to be made. Similarly, most programs appear to have benefited from the impassioned leadership of a teacher or coordinator who knew curriculum, pedagogy, and the targeted industry; was willing to take risks; and communicated well. Collaborations with business appear essential for expanding the programs. The collaborations took different forms and required substantial investment by both the schools and the industry.

The nature of the work-based learning in these programs varied considerably. Important elements for success appear to be building on local labor market needs, coordinating the school-based learning and work-based learning, allowing students to assume new roles and shoulder responsibility, permitting students to do real work and receive feedback, and encouraging students to reflect on their experiences and engage in self-assessment. Participating businesses apparently

needed and welcomed some orientation and support, particularly for their mentoring roles. Difficulties that were commonly encountered include limited resources for the substantial start-up efforts, limited business participation, the unwillingness of four-year colleges to recognize some of the high school credits earned in the programs, and transportation difficulties in countywide systems and in inner cities that had lost most of their jobs to the suburbs (10).

Another recent study of 16 school-to-work transition programs in high schools, including five youth apprenticeships and nine others with similar components, concluded that most of the programs appear to have induced the students to take more advanced courses. Some of the programs were providing high-quality work-based learning and some were not (9). Economically disadvantaged and low-achieving students were found to be participating with few complaints from employers, teachers, or the students themselves. Most program directors thought that these students would be best served if the work-based learning experiences began in the 9th or 10th grade, rather than in the 11th or 12th grade, because by those later grades sizable portions of the students have become disengaged from school or dropped out. Parents were initially skeptical of the programs, fearing that they would preclude a college education, but many parents whose children participated have been pleased. Students appreciated the work-based learning mostly for the career exploration opportunities.

Planning and development of the programs were very time-consuming, often requiring two years. There were substantial costs for a coordinator, staff planning, curriculum development, staff training, and equipment (sums up to \$200,000 are reported, but it is unclear whether those included all, or only part of, the expenses actually incurred). Considerable time was also required to recruit employers and to help them plan high-quality work-based learning activities. For three to five years after implementation, extensive revisions and fine-tuning were required. Operating costs for the school were usually estimated to be somewhat higher than regular schooling because

of the time needed to secure the work-based learning positions, to prepare the students for them, and to monitor their progress. These costs do not include the costs that employers incurred.

Intermediary groups such as the chamber of commerce, business and professional groups, and trade associations apparently provided crucial support for many of the programs. Even with their contributions, there appears to have been a tradeoff between the number and the quality of work-based learning positions that have been arranged. Providing a broad introduction to the organization and industry, planning a progression of training and work experience, coordinating both with the school-based instruction, and providing supervision and mentoring are time-consuming. Often the staff time devoted to these activities costs employers more than the wages paid to the students (9).

Jobs for the Future, drawing on the study just described and on its experience in providing support to several youth apprenticeship programs, inferred 10 guidelines for high-quality work-based learning:

1. The partners should agree on the goals and the means of achieving them.
2. There should be a structured plan for the students' learning in the workplace.
3. The work-based learning should focus on developing broad and transferable skills.
4. The school and workplace staffs should receive orientation and ongoing support as needed.
5. The students should be oriented and prepared for their workplace assignments.
6. The students should receive the support and guidance of a caring adult in the workplace.
7. The school-based activities should help students distill and extend lessons from the workplace.
8. Students learning in the workplace should be documented and assessed.
9. There should be ongoing coordination between the schools and workplaces.
10. Quality control mechanisms should be used (5).

## CLINICAL TRAINING

Students in clinical training programs take academic and occupational courses and assume a series of positions that provide work experience and training. The course of study, the work experience, and a passing score on an examination administered by a professional body are usually required for licensure and subsequent employment in the field. Clinical training is used primarily in medical occupations, including several fields of medical technology, in both two-year and four-year colleges.

The clinical training model is moderately selective. It focuses on occupational skill development and production activities in the workplace. There is tight coordination between the occupational course work in school and the training and work assignments in the workplace, and both are partly guided by the licensure requirements. Most programs begin at the postsecondary level. Work assignments involve large numbers of hours—often thousands of hours before one is eligible for licensure. Most of the work is undertaken in hospitals, medical centers, and medical laboratories. Every student in the program must participate in the work-based learning, although the assignments may depend on satisfactory progress in one's class work. The students are seldom paid for their time in the workplace (1,2).

The clinical training model is similar to the youth apprenticeship model but less comprehensive. The main differences are that the objectives of clinical training are more narrowly focused on occupational development and productive activities, the programs do not span the high school and postsecondary levels, and the work experiences are usually unpaid. In addition, youth apprenticeship is a generic model applicable to any occupation, whereas clinical internships have been used almost exclusively in medical fields.

The clinical training model has become the norm for preparation in all the medical occupations—ranging from nurse's aide through medical technologist to brain surgeon. OTA calculations based on data from a recent survey suggest that about 50 to 65 percent of all two-year colleges

have at least one program that uses this model, and virtually all the programs are in the medical fields (2). The model is used almost universally in nursing programs in four-year colleges and in medical schools.

The clinical training model appears to be expensive, having much lower students-to-teacher ratios than cooperative education programs in the same institutions. It is common, however, for the industry to partially subsidize the expenses and to provide political support for the programs (1).

## ■ Evaluation Results

A major study recently asked two-year college administrators to report on their best health-related program with work-based learning and their best non-health-related program with work-based learning. They were asked to judge "best" on the basis of being in full operation, having a formal structure for linking the work-based learning with the college courses, using innovative approaches, and having a proven track record of preparing students for their career goals (2). The study did not attempt to further assess the nature and extent of the effects on the students, but rather sought to identify common characteristics of the nominated programs.

The most common characteristics of the programs designated as "best" were that they had been in operation for more than 10 years, used the clinical training model for health-related programs, and used the cooperative education model for non-health-related programs (2). More than 80 percent of the clinical training programs used a governing or advisory board with employers on it, had formal agreements with employers, provided career orientation for students, offered remedial and other services to prepare students for work-based learning, coordinated school-based and work-based learning, had regular consultation between college faculty and workplace mentors, engaged in periodic evaluation of student progress, and prepared students for a skills certification process (2).

The college administrators indicated that the highest levels of support for work-based learning

came from local boards and advisory committees, college administrators, business representatives, students, college trustees, and state licensing agencies (2). The lowest levels of support came from four-year colleges, labor unions, and parents. The most serious barriers to the expansion of work-based learning were perceived to be the colleges' lack of staff, time, and funds for arranging and supporting work-based learning; the demands of classroom instruction, which left students little time for work-based learning; and the students' lack of career orientation when entering college (2).

The data from the survey described immediately above were supplemented with expert rankings and a telephone survey of promising candidates to identify eight exemplary work-based learning programs in two-year colleges. The programs selected used the clinical training, youth apprenticeship, cooperative education, or union and employer adult apprenticeship models. These programs were studied further (1). All of the programs had coordinators who had prior experience working in industry and were widely acknowledged as strong leaders. They were known for their political savvy, long work hours, attention to details, setting of high standards, and effective promotion of the program. All of the programs were well funded, often with the assistance of the industry and participating employers. Most of the programs had direct links to an industry group that was important to the local economy. The programs were usually the only source of training in the area for the given occupation, or were overwhelmingly the largest source of that training. The links with employers were both direct and close; communication among program staff and industry personnel was frequent, and the staff (usually the program coordinator) circulated among the workplaces almost daily. These ties often resulted in work-based learning slots for students; donations of supplies, equipment, and expertise; and political advocacy and protection for the program. Most of the exemplary programs:

- used two or more kinds of work-based learning—most commonly, a school-based enter-

prise for the earlier stages of training and then work-based learning assignments with local employers;

- included mentoring for the students;
- had the students document their own progress with diaries or portfolios;
- had agreements with four-year colleges for transfer of a considerable portion of the credits that students earned in the program; and
- went through five or more years of adjustment before achieving excellence (1).

## COOPERATIVE EDUCATION

Students in cooperative education engage in school-based learning that is coordinated with career-related work experience during the later years of high school or college. Participating high school students usually work part time in their senior year (and sometimes in their junior year), often with a shortened school day. In college the students usually alternate between a semester of classes and a semester of work experience, a schedule that accommodates working at sites beyond commuting distance. Co-op students are usually paid for their time in the workplace.

Cooperative education varies considerably in terms of the students who are served, the objectives, and the degree of coordination between the school-based learning and the work-based learning. In some schools participation in the co-op program is offered only to vocational education students, whereas in other schools it is also available to students in the general track and the college preparatory track (16). The formal model is targeted mainly at occupational skill development and production activities, but in practice the objectives can sometimes also target academic enhancement and career exploration. The formal model includes considerable coordination between schooling and the work-based learning, usually by means of written agreements, worksite training plans, and periodic visits to the worksites by the school's co-op coordinator. Because these means of coordination require considerable staff time, some schools forgo one or more of them.

At the college level, the co-op programs are usually moderately selective, requiring a minimum grade point average. In engineering and business departments, co-op tends to be focused on occupational skill development and production activities. For liberal arts majors, the focus is more often on career exploration and production activities. The engineering and business departments tend to coordinate the courses and work-based learning experiences more than do the liberal arts departments. Colleges often make co-op work experiences available from the sophomore year through the senior year. Many award limited credit toward graduation for the co-op work assignments, requiring students to enroll year-round or to complete an extra year of schooling before graduation. Students may apply for jobs with different employers each semester, or remain with one employer who is to provide a progression of training and work responsibilities.

Although the cooperative education model is similar to the youth apprenticeship model in several respects, co-op programs often focus more narrowly on the objectives of occupational development and work experience, academic and occupational courses in school are seldom integrated, skill certification is not common, and individual co-op programs rarely span the high school and postsecondary levels.

Several recent studies suggest that although about half of all high schools offer co-op programs, only about 8 percent of graduates have participated in them (15,16,17). It appears that one-third to two-thirds of the two-year colleges have co-op programs, but only about 2 percent of the students participate (2,17). A recent survey indicates that about half of the engineering technology departments in two-year colleges and two-thirds of the science technology departments offer cooperative programs or other work-based learning, but the survey did not ask about the percent of students participating (3). Co-op programs are generally voluntary, but a few colleges require all students, or all those in certain programs of study, to participate.

## ■ Evaluation Results

Cooperative education is the oldest and most widely used model of work-based learning, and the most extensively researched. The results of evaluations at the high school and college level are discussed separately in this section.

### *The High School Level*

A recent review of the research and evaluations of high school cooperative education found that former co-op students report favorable opinions of the experience, believing that the programs helped them to apply themselves in school, remain enrolled until graduation, quickly secure full-time jobs after graduation, and find jobs consistent with their career interests (13). One study compared the quality of co-op work assignments with part-time jobs that students arrange on their own and found that the co-op students considerably more often reported having jobs that required the application of academic skills, offered opportunities to learn new things, involved contact with adults, and provided good supervision. The studies that examined the subsequent employment and earnings of co-op students relative to similar non-co-op students have found a mix of positive, null, and small negative results. The largest earnings benefits accrued to students who were employed by their former co-op employer.

The review by Stern and associates concludes with their inferences about how to maximize the positive effects of high school co-op. These include having written agreements between the school and the employers that specify the responsibilities of each; using a written training plan for each student specifying the progression of activities and objectives to be achieved; and having a co-op coordinator in each school with responsibility for finding suitable job assignments, orienting students, negotiating training plans, and monitoring the students' workplace activities (13).

The U.S. General Accounting Office examined high school and two-year-college cooperative education programs nominated as being of "high

quality” by researchers and practitioners (16). GAO identified several program characteristics that were common in the programs and appear to have been important for success. The characteristics are participation by employers who are willing to providing training in occupations with promising career paths, screening of applicants to assure that they are prepared to meet employers’ expectations, training plans with ambitious and specific learning objectives, and, for high school students, close monitoring of the worksite activities by school representatives. GAO also speculated that skill standards and certification, which are not common in cooperative education, would provide useful targets for the training plans and assessment of student progress.

Barriers to expanding cooperative education that were identified by the GAO study include parents’ fears that co-op participation would hurt their children’s chances of college admission, employers’ lack of knowledge about cooperative education, insufficient school staffing, and difficulties in transportation to and from the worksites. Despite these considerations, GAO concluded that “high-quality cooperative education programs show strong potential to enable the United States to better compete in global markets by improving work-force preparation and facilitating youths’ transitions from schools to work” (16).

A recent study interviewed employers who had participated in 18 high school work-based learning programs, most of which used the co-op model. The study found that the employers were quite pleased with the students and thought that almost all had been productive workers (7). The employers participated partly as a community service, partly as a way to recruit permanent employees, and partly as a way of filling low-paid part-time positions with good workers.

The estimated effects of high school co-op on employment and earnings have varied considerably from one evaluation to another, probably because the quality of the high school programs varied considerably. High school co-op programs have a widespread reputation for varying from well-planned learning sequences for conscientious students to hastily arranged escapes for stu-

dents unengaged in school. In addition, it is possible that the program elements of high school cooperative education are not powerful enough to have consistent effects on the students’ subsequent labor market success.

### *The College Level*

One of the most dramatic changes in American education over the past three decades has been the sevenfold expansion of enrollment in two-year colleges, which now totals more than 5 million students (18). Despite this trend, most research on cooperative education at the postsecondary level has been in four-year colleges. Those studies have repeatedly found that participation in college-level cooperative education is associated with the establishment of more realistic career goals, higher academic achievement, increased self-confidence, more “savvy” about the world of work, and better job-seeking skills (23). An estimated 40 percent of college co-op graduates take jobs with their former employers, and co-op students tend to have somewhat higher starting salaries in their first job after graduation (23). As with most evaluations of work-based learning, these probably have not fully accounted for initial differences in the co-op and non-co-op students.

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*Co-ops and internships that combine classroom learning with real-world experiences were among the most appealing features to students when choosing a college or university. —Finding from a survey of 10,000 high school junior and seniors (8).*

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A study of students at four two-year colleges found that those in cooperative education reported considerably more learning opportunities in their work experience than those in non-co-op jobs, even when the comparisons were limited to jobs in the same occupations (15). For instance, co-op students more frequently reported that their job was related to their career interests (74 percent vs. 43 percent), that the job was challenging (74 percent vs. 55 percent), that the job provided chances

to apply what they were learning in school (69 percent vs. 45 percent), and that they were learning things that would be useful in their future work (75 percent vs. 55 percent). The co-op students, however, also reported making an average of one dollar per hour less than did other college students holding part-time jobs.

A 1977 congressionally mandated national study of cooperative education programs at two-year and four-year colleges found that co-op and non-co-op students had similar background characteristics; co-op students and employers expressed strong support for the co-op program; the co-op jobs of students helped pay their college expenses; and more co-op students than non-co-op students reported acquiring job skills as they progressed through college, securing jobs in the field of their training and consistent with their career interests, avoiding unemployment, and having greater projected life-time earnings (22).

## OTHER MODELS

The following three models differ more from youth apprenticeships than do clinical training and cooperative education. Still, they offer instructive examples with respect to coordination, settings, and screening.

### ■ School-to-Apprenticeship Programs

In school-to-apprenticeship programs, high school seniors in vocational education programs participate part time in union- and employer-run apprenticeship programs. The school program is rarely altered, but a school coordinator usually screens students for maturity and conduct. The students often earn some credits toward graduation and are paid at the same rate as full-time participants in the apprenticeships.

School-to-apprenticeship programs concentrate on occupational development and production in the workplace. There is generally little coordination between the school-based and work-based learning except that most students take vocational education courses in the field of their apprenticeship. The work-based learning is usual-

ly more intensive than in the other models, running 20 to 30 hours per week.

In 1977 and 1978, the U.S. Department of Labor initiated eight school-to-apprenticeship demonstrations, which were variously referred to as New Youth Initiatives in Apprenticeship or Youth Apprenticeship Projects. The evaluation was limited to the first three cohorts of students, who were compared with a group of similar students. The apprenticeship students were generally quite enthusiastic about the program. Employers were also quite satisfied and their participation increased over each of the three successive years. About half of the participating students left the apprenticeships within a year following high school graduation—well before completion. Participating students had more stable employment and reported higher job satisfaction than the comparison group, although they earned about the same wages (21).

### ■ School-Based Enterprises

In school-based enterprises the students work part time in school businesses that produce goods or services for people other than the students involved. The activities have included manufacturing, auto repair, construction, publishing, retailing, and child care. Students acquire the necessary occupational and entrepreneurial skills in elective classes. The students usually start in entry-level positions and may move up into more skilled positions and the managerial ranks. Participants earn credits toward graduation and sometimes are paid.

School-based enterprises focus on academic reinforcement, some career exploration, and occupational development. Coordination is facilitated by the school's control over both the classroom courses and the work-based learning in the enterprise, by the location of the enterprise on the school grounds or nearby, and by the fact that the teachers of the occupational courses often supervise the enterprise. Students usually work in the enterprises during their later years of high school or during college. Enterprises give the students more opportunities to assume managerial or

entrepreneurial roles than they have in regular places of employment.

Stern and associates recently reviewed the literature on school-based enterprises (1994) and conducted 16 case studies. They found many anecdotal accounts of how students became more engaged in school, extended their academic skills by applying them in the enterprise, and acquired basic work habits and specific occupational skills. Many enterprises were found to have endured for years, although others did not. The review, however, did not find any rigorous evaluations of the effects that the programs had on the students' academic and occupational development, on their subsequent schooling, or on their employment and career success (14).

There have been cases in declining communities where the school-based enterprises have taken over failed stores and run them successfully, to the delight of the townspeople who were saved long drives to distant shops (14). In other cases, the enterprises have sold services that had previously not been offered by private businesses or public entities. But usually the enterprises sell goods or services that compete with local businesses, and the business owners have sometimes complained of unfair competition because the enterprises use public buildings and personnel, and sometimes unpaid student labor. Strategies that have been used to minimize complaints include seeking the support of local business associations, operating on a small scale, not advertising, and setting prices that do not undercut competitors (14). If school-based enterprises were to become widespread and to involve substantial proportions of high school students, it is doubtful that those strategies would suffice.

### ■ Career Academies

In career academies, high school students attend a small career-oriented “school within a high school.” Each academy focuses on one cluster of occupations, integrating college-prep academic education, occupational preparation, and career orientation. The program of study is developed with the assistance of local employers. Employees

from nearby companies serve as speakers, field trip hosts, and sometimes as mentors for the young people. Coordinated part-time jobs and summer jobs may be offered, usually in the senior year. Some graduates directly enter employment and others continue on to postsecondary education.

Career academies were developed primarily to serve economically disadvantaged or poorly performing students, and they continue to be targeted at those groups. The academies concentrate on enhancement of academic achievement, exploration of careers, and development of occupational skills. Career academies are increasingly adopting work-based learning, but it is often limited to a few weeks during the school year or to a summer job.

The first career academy was started in the late 1960s. There has been modest growth since then, and in 1992 scholars estimated that there were about 150 in the country (12).

A 1992 review of four evaluations of 14 career academies found mixed results. The dropout rates at the career academies were 7 to 15 percentage points less than the rates for the matched comparison groups, and there was some evidence that the lower dropout rates resulted from better attendance and grades. A year or two later, however, there was little or no difference in the percent of students employed, although the largest study did find that the employed academy graduates worked an average of 3 to 4 hours per week more than the employed comparison students. Two evaluations found that academy graduates were much more likely to be enrolled in postsecondary education, one found them much less likely to be enrolled, and the fourth found no difference (12).

### CONCLUSION

Prior models of work-based learning have motivated students, pleased employers, and often had small positive effects on grades, graduation rates, and postsecondary enrollments. Their effects on early employment have been more mixed, and their long-term effects on employment and career satisfaction have not been assessed.

The youth apprenticeship model that is to be used in STWOA is more ambitious, coordinated, and sustained than prior models of work-based learning. These differences make the work-based learning component of STWOA potentially more effective than prior models. The focus is not just on training, but on the broad development of young men and women. The work-based learning is not just for a year or two, but is to progress over several years. And the work-based learning is to be coordinated with several enhancements in schooling.

The differences between the youth apprenticeship model and the prior models also present daunting challenges to the implementing organizations. Ambitious goals are more difficult to achieve than modest ones. Comprehensive systems are more expensive to operate than simple and short programs. The extent of coordination that STWOA calls for between members of the partnerships, between academic and occupational instruction, between school-based and work-based learning, and between high schools and postsecondary institutions is probably unprecedented in the history of American education and training programs.

Can the states and local jurisdictions meet these challenges? Probably not on their own, but if schools join in strong partnerships with American business and labor, it might be possible.

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