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ABSTRACT

The Southern Regional Education Board-State Vocational Education Consortium conducted a Fall 1992 forum as part of ongoing staff development for High Schools that Work leaders. It was devoted to the changing nature of the workplace and the need for upgraded standards of what to teach and what to expect of students in high school vocational courses. The keynote speech (Anthony Carnevale) described how international competition was changing the workplace and emphasized that more and more workers were required to possess broad skills. Increasingly, rank-and-file employees were called on to identify and solve problems, make decisions, negotiate, and learn new tasks. State and school leaders described efforts to work with employers to develop youth apprenticeship programs and ways to combine the apprenticeship initiative with the High Schools that Work program. Business, industry, and school leaders told about using standards developed cooperatively by employers and educators to modernize and upgrade the quality of vocational courses. Educational innovators described organization of academy or school-within-a-school efforts to involve employers in creating an integrated program of high-status vocational and academic studies using school and worksite settings. School leaders and teachers shared information on new and revised vocational courses that required students to use higher-level academic and technical content. (YLB)

REDESIGNING AND REFOCUSING HIGH SCHOOL VOCATIONAL STUDIES

Southern Regional Education Board

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REDESIGNING AND REFOCUSING HIGH SCHOOL VOCATIONAL STUDIES

Blending academic and vocational education,
connecting the school site to the worksite,
and linking secondary and postsecondary education

by

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1993

ABOUT THE AUTHOR

Gene Bottoms has been active in education for more than 30 years as a teacher, principal, guidance counselor, and college professor. He has held administrative positions in education at the local, state, and national levels.

During 13 years with the Georgia Department of Education, he directed educational improvements in academic and vocational education. As Executive Director of the American Vocational Association for eight years, he emphasized academics as an integral part of vocational education in high school and at postsecondary schools.

Dr. Bottoms has been director of the Southern Regional Education Board-State Vocational Education Consortium's *High Schools That Work* program since its inception in 1987. The program assists high schools in 19 states in integrating academic and vocational education to raise the achievement of career-bound students. In 1992, USA Today called *High Schools That Work* "the most ambitious and most successful" effort of its kind in the nation.

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SREB-State Vocational Education Consortium
High Schools That Work Program

The Southern Regional Education Board-State Vocational Education Consortium is a partnership of states, school systems, and school sites in 19 states, united in an effort to raise the achievement of career-bound high school students. Launched in 1987 with 28 pilot sites in 13 states, the Consortium is expanding rapidly and by fall 1993 will encompass 300 sites.

The Consortium's *High Schools That Work* program is based on the belief that career-bound students can master complex academic and technical concepts if schools create an environment that encourages success. *High Schools That Work* blends high-level academic courses with modern vocational courses in a planned program of study linking students to the real world.

Goals of the program are:

- To increase the mathematics, science, and communication achievement of students in general and vocational studies to the national average of all students by the year 2000.
- To combine the basic content of traditional college prep math, science, and communication courses with vocational studies by creating conditions that support school principals and faculties in carrying out certain key practices.

The key practices are to:

- Establish higher expectations for students in academic and vocational classes.
- Revise and develop vocational courses to emphasize math, science, and communication competencies, and the cognitive, intellectual, and problem-solving skills of students.
- Revise and develop academic courses to teach concepts from the college prep curriculum through functional, applied strategies that enable students to see the relationship between course content and the future.
- Require students in general and vocational studies to complete a challenging program of study that includes three credits in math and three in science, with at least two credits in each course equivalent to college prep courses; four courses in a vocational major; and two courses in related areas.
- Encourage academic and vocational teachers to integrate curriculum and instruction by providing them with staff development, materials, and time to work together.
- Revise the instructional process so that students are actively engaged in learning.

- Provide guidance and counseling services to help students connect what they learn in school with their goals for the future, and to involve parents in developing and updating a planned program of study.
- Provide extra help to enable students to complete a program of study that includes high-level academic content.
- Participate in program evaluation and use student assessment data to check and improve the curriculum, instruction, school climate, and school organization and management.

Studies show that high schools following the key practices are able to raise significantly the achievement of career-bound students.

In 1992, the Southern Regional Education Board (SREB) received a six-year, multi-million dollar grant from the DeWitt Wallace-Reader's Digest Fund for expansion of the *High Schools That Work* program. The funding enables SREB to provide expanded staff development, communication, and evaluation services to states and an increasing number of sites.

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Succeeding With Career-Bound Students

President Bill Clinton—until a few months ago a member of the Southern Regional Education Board—has said it well: *Somewhere in America, people are dealing successfully with nearly every problem facing our nation.* He could be describing the SREB-State Vocational Education Consortium and its *High Schools That Work* program.

Working with high schools in 19 states, the Consortium is helping to redesign and refocus programs to prepare career-bound students for jobs and education in the future.

Career-bound high school students need programs that blend solid academic and vocational studies with opportunities to learn firsthand what modern business and industry expect. The *High Schools That Work* program encompasses modern vocational initiatives such as youth apprenticeships, schools-within-schools, and industry certification.

Accelerated academic learning, quality technical learning, cooperation between academic and vocational teachers, and collaboration with employers and postsecondary schools—these are keys to *High Schools That Work.*

Literally thousands of persons in our program now have a new vision of vocational education. Unfortunately, in too many high schools, the vocational curriculum is out of step with the nation's high tech, information-based economy. The emphasis is on learning to perform a specific task or use a certain piece of equipment. Not enough time is devoted to helping students acquire a broad technical and academic foundation for effective problem-solving, decision-making, and communication at the worksite.

We have a unique opportunity to change this—to help students develop the characteristics of success that American business and industry are beginning to embrace: clarity of purpose, emphasis on quality, teamwork, and flexibility.

Who can make these changes? High school administrators, vocational directors, teachers, counselors, parents, postsecondary educators, and representatives of the private sector who are concerned about the future of career-bound students in our economy. How can we make these changes? This publication can help you begin or continue your efforts.

Mark D. Musick
President
Southern Regional Education Board

INTRODUCTION

The SREB-State Vocational Education Consortium conducts an annual Fall Forum as an integral part of ongoing staff development for leaders from *High Schools That Work* states and sites. The 1992 Forum was devoted to the changing nature of the workplace and the need for upgraded standards of what to teach and what to expect of students in high school vocational courses. New vocational programs:

- Have students apply principles and skills from mathematics, science, and communication in a broad field of business or technical study;
- Introduce students to a core of technical content necessary for systematic thinking and viewing the parts of a field of study in relation to the whole;
- Allow students to apply academic and technical knowledge to a specific job at the school or worksite.

State and local educators who attended the Forum received information from speakers and workshop leaders—many of them from *High Schools That Work* sites—who are actively engaged in defining the needs of career-bound students and creating and implementing programs to meet those needs. Speakers included:

- *Keynote speaker Anthony P. Carnevale, Chief Economist for the American Society for Training and Development*, described how international competition is changing the workplace. He emphasized that more and more workers are required to possess broad skills, which in the past were needed only by craftsmen, technicians, and college-educated supervisors and managers. Increasingly, rank-and-file employees are called on to identify and solve problems, make decisions, negotiate, and learn new tasks.
- *State and school leaders*, who described efforts to work with employers to develop youth apprenticeship programs and ways to combine the apprenticeship initiative with the *High Schools That Work* program.
- *Business, industry, and school leaders*, who told about using standards developed cooperatively by employers and educators to modernize and upgrade the quality of vocational courses.
- *Educational innovators*, who described the organization of academy or school-within-a-school efforts to involve employers in creating an integrated program of high-status vocational and academic studies using school and worksite settings.
- *School leaders and teachers*, who shared information on new and revised vocational courses that require students to use higher level academic and technical content.

Schools in the *High Schools That Work* program have made progress in giving career-bound students access to courses designed to teach higher level academic content. They are also making progress in getting more academic and vocational teachers to work together.

However, too little progress is being made in revising existing vocational courses and in developing new types of vocational courses to prepare students with the breadth of technical knowledge and skills they will need.

This publication is based in large part on new vocational programs described at the 1992 Fall Forum. While the publication is designed to address the needs of *High Schools That Work* sites, the information will be helpful to all high schools seeking to improve vocational programs and raise the achievement of career-bound students.

PART 1

CHANGES IN THE WORKPLACE

The Case for Revising and Upgrading The Vocational Education Curriculum

Anthony Carnevale, keynote speaker at SREB's 1992 Fall Forum, set the scene by pointing to worldwide economic changes that affect the way we prepare workers in the United States.

"America is facing a shortage of well-educated and trained workers looking for their first job," Carnevale said. "High schools must adjust the way they prepare students for new technology and expanding job requirements."

Carnevale stressed that in the new world order, learning drives successful economies. Increasingly, the *Fortune* 3000 companies depend on education for their success. Government's new role is to pursue policies that help the economy grow, as opposed to a more traditional role of dividing the pie.

He suggested that much of the high school vocational education curriculum is designed to prepare students for the old system of mass production—turning out more and more products at a cheaper and cheaper cost. In the old system, most workers were low-skilled and performed simple, repetitive tasks. A few highly skilled workers made and repaired the machines and designed the work system. There were a few educated people at the top and a few technical workers and craftsmen in the middle, but the very low-skilled workers at the bottom did the bulk of the work. Because of high volume and low cost, the United States remained internationally competitive; everybody had access to our products and services.

In the early 1970s, we began to see that mass production was no longer viable. We could sell our products at a price below that of other developed countries, but we could not compete. Our products had many defects and were not varied enough to meet customer demand.

Suddenly, quality products, variety, customized items, and convenience became the driving forces. Supermarkets went from 12,000 to 24,000 items in only a few years, and some superstores began to offer over 70,000 items. Magazines are another example. The old general interest magazines were replaced by special-audience magazines serving much smaller and targeted markets.

Changes in the workplace required engineers to begin designing products not for each other but to meet the needs of customers. Suddenly, workers had to be concerned about customers' needs. Customized products and customer demand became the driving forces in all manufacturing and service jobs.

In addition, the new economic order asks that the workplace meet a time standard. To compete, a company must be able to reduce the time between the idea stage of a new product and the point at which the product is available to customers. In the United States, Carnevale said, it can take 57 weeks to get a shirt from fiber to retail; in Japan it takes three weeks. We are not good at turning our innovative ideas into new products in a short period of time.

The new time standard also introduced the concept of constantly improving a product during the manufacturing stage —not waiting until the product is finished to inspect for defects.

New demands have created a need for better educated workers. In America, as you move down the line from college-educated managers to craftsmen and technicians, and finally to the mass of workers, the workers are not prepared to use the new technology and to work in an environment where they define problems and perform in a different way. Today, a much larger number of workers need many of the skills formerly possessed by craftsmen, technicians, and the college-educated.

All modern workers need the following skills:

- ✔ The capability to take responsibility for the end product.
- ✔ The ability to read, write, and use math to solve multi-step problems.
- ✔ The capacity to apply knowledge from many disciplines to solving problems.
- ✔ The ability to organize tasks and personnel.
- ✔ The capacity to see products through the eyes of the customer.
- ✔ The flexibility to meet the needs of the customer and the changing nature of the workplace.
- ✔ The organizational and communication skills necessary to work as a member of a team.
- ✔ The capacity to deal with exceptions.
- ✔ A broad academic and technical knowledge base and the good judgement to know when to use it and whether it has been used correctly.
- ✔ Creative and problem-solving skills associated with producing a variety of quality products.

In the high-skill, high-wage workplace, all workers have to become leaders and be equipped to take the initiative. In the old work setting, only the college-educated were perceived as leaders. **These changes create a need to revise the high school and postsecondary vocational education curricula.**

Guiding Principles for Revising and Developing Vocational Programs for a High-Skill, High-Wage Workplace

Anthony Carnevale's observations on the new world economy are the basis for six guiding principles for making changes in vocational programs.

1. The new and revised vocational curriculum must focus on learning activities aimed at developing the intellectual skills students will need in a workplace where symbols and abstract thought processes have replaced physical responses. Vocational instruction must focus on more than the action-centered skills of physical production.

To meet the intent of the *High Schools That Work* program, vocational leaders and teachers must shed old assumptions about vocational instruction. As quality and variety become the main attributes of productive workplaces, the emphasis shifts away from simple, repetitive tasks. Yet, many high school teachers continue to teach by lecturing, offering a highly repetitive curriculum, holding students to

very low standards, and assigning students to repetitive drill work on simple tasks. Too often, the vocational curriculum focuses on mastering skills without helping students understand the broader context.

New vocational programs must emphasize thinking as well as doing. Simply knowing how to perform a task is not enough. Employees are called on to think creatively and solve problems.

The vocational education curriculum must include math, science, and language arts in technical classes. Vocational teachers must form partnerships with academic teachers to improve the academic foundations of career-bound students. A broad base of academic and vocational/technical knowledge gives workers the confidence and flexibility to tackle new tasks.

High schools must educate rather than train career-bound students. An educational system that uses the context of an industry, business, or trade can teach broad-based technical skills *and* motivate students to acquire more complex academic knowledge.

2. The new vocational curriculum must focus on helping students master the several systems of technology and information. The narrow specialization of the old workplace gave rise to vocational courses that focused on a specific job or system. In the new economy, employees must know and demonstrate proficiency in several technology and information systems in a single work setting. Today, a worker may be expected to understand many related areas, such as electronics, hydraulics, pneumatics, robotics, machining, welding, mechanics, mechanic systems, and graphics.

Contemporary workers cannot expect to do the same jobs all their lives. They must be able to transfer their skills within a company and from one company to another as jobs change and/or become obsolete.

Newly-designed vocational curricula prepare students for the several technological and information systems in an industry or trade area. For example, in the past, bank tellers were expected to perform rudimentary job functions. Now, tellers must be able to operate a computer, advise customers about financial services, make on-the-spot decisions, and understand the banking business and the nation's economic system. They must be able to see how a variety of functions fit into the overall picture of banking.

3. New or redesigned vocational programs must be 4 to 6 years in length—beginning as early as the 9th grade and frequently continuing through two years of postsecondary education and/or worksite learning. The programs should be built around broad industry, business, or trade fields such as health and biomedical, agriculture and biotechnology, human services, office technology, foods and hospitality, financial services, and manufacturing technology. These programs will integrate high level academic and broad technical studies with specific job skills through challenging activities and an accelerated program of study using the school and the worksite.

The focus will be on integrating academic and technical studies and using knowledge to discover new insights, make products, or solve problems. A new vocational curriculum allows students to connect abstractions to concrete events, use system thinking to solve problems, try new ideas, work with each other, and investigate a broad range of technologies in their fields.

This new kind of vocational curriculum is designed to attract a cross section of students who learn, work, and stay together as they pursue academics in the context of a broad theme. In the case of a health or biomedical theme, the group would include students who might plan to be doctors, nurses, or medical technicians.

4. A new or redesigned vocational program must use the work setting to acquaint students with the full range of modern technologies in a broad field of study. Career-bound students must have access to challenging, integrated workplace-related programs of study. Students isolated from the real world in low-level academic courses and narrow-based vocational courses find it difficult to leap from high school to meaningful employment and additional education.

The cost of doing everything in a new vocational program is prohibitive to a school. New vocational programs must be planned in partnership with employers so that students can experience worksite learning.

Today, almost 80 percent of high school students pursuing a vocational major have jobs. Yet, many of the jobs are unrelated to the students' vocational studies or plans for the future. High school leaders—academic and vocational—must work hand in hand with community, business, and industrial leaders to find ways to better match in-school and out-of-school worksite learning. Community leaders must be convinced that students need the opportunity to work in meaningful jobs in hospitals, manufacturing plants, banks, and government agencies—after school, during the summer, on weekends, and on school holidays.

5. A new or redesigned vocational program must be planned with initial and continued involvement of a variety of professional and technical workers and employers from a broad vocational field of study. High school and postsecondary instructors who will teach the academic courses and worksite mentors who will teach the job specific courses must be included.

In the past, vocational programs often were planned and conducted with token input from employers and without any involvement of academic teachers and school counselors. This produced a fragmented vocational program, disconnected from the academic mainstream of high school and community or technical college. In the same way that modern employers break down barriers among departments and bring employees together to produce a quality product, a quality vocational program requires an interdisciplinary team of vocational and academic teachers to plan and deliver the instruction.

Involving professional, technical, and craft workers gives program planners and teachers a good grasp of the nature and requirements of the new workplace. Too often, vocational advisory committees are filled with the program's former students, who may not have the diversity to give needed input to the program. These committees should be composed of employees of all types—engineers, technicians, craftsmen, and managers—depending on the field of study.

A motivated team of teachers, counselors, and community leaders—willing to break old rules and assumptions—can find creative ways to teach complex technical and academic concepts that will prepare young people to enter and advance in a career field.

6. The new or redesigned vocational program must be organized around broad outcomes—not just lists of tasks for specific jobs. In old-style vocational programs, students often were asked to master a long list of discrete

tasks for a specific job. In new vocational programs, students learn all aspects of an industry or trade. For example, office technology students must learn how several systems of technology and software are used in a modern office setting.

In a new vocational program, if students do not meet broad outcomes, the team of teachers and their private sector partners define and fix the problem. Under a system of separate vocational and academic education, a high school continues to produce graduates who are unable to learn, cope, and solve complex problems by working with others. A new system makes it possible for an interdisciplinary partnership of school and worksite leaders to look constantly for ways to improve student achievement.

High schools and their community and postsecondary partners have the potential to blend *High Schools That Work*, tech prep, and youth apprenticeship into a new, accelerated system of education—one that integrates school and worksite learning into a planned educational experience leading to employment in high-skill, high-wage jobs. The new curriculum includes challenging academic studies, indepth technical studies in a broad field, and job-specific preparation. The emphasis is on opening rather than narrowing vistas of opportunity. The new system must incorporate career and education information and guidance, and be of sufficient quality to produce graduates who can continue their education if they so choose.

HIGH SCHOOLS MUST CONNECT VOCATIONAL STUDIES TO NEW DEVELOPMENTS IN THE WORKPLACE

Roy V. Peters, Jr., Director of the Oklahoma Department of Vocational and Technical Education, is a leading proponent of new and revised high school vocational education programs. The following quotes are from his speech at the High Schools That Work 1992 Fall Forum:

"We must provide quality education to our career-bound youth. Our goal is to ensure that all vocational students are prepared for the workplace and further education. It is not an either/or situation."

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"Our vocational programs must keep up with the escalating demands of the modern workplace. Business and industry need employees who can do more than string wire, hang light fixtures, and install wall outlets. They need workers who understand the scientific principles of electricity and can calculate, communicate, and work well with others."

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"We must connect educational reforms in high schools to new developments in the workplace. Students learn much better if they relate what they learn in academic classes to the real world."

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"Many vocational students have jobs while in high school, but too few of those jobs are related directly to vocational studies. That's why youth apprenticeship programs are so exciting. They make the transition to fulltime employment much easier."

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"We must rethink the nation's vocational education system. Vocational and academic teachers must work together to find ways to motivate students to master higher academic skills."

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"Vocational education makes a major contribution to the quality of life in this country by producing high-quality graduates who can use their minds as well as their hands."
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PART 2

YOUTH APPRENTICESHIPS

Connecting High Level Academic and Technical Studies With Workplace Learning: How Some States and School Systems Are Doing It with Youth Apprenticeships

Developing a youth apprenticeship initiative as an integral part of the *High Schools That Work* program was a major consideration during SREB's 1992 Fall Forum. Apprenticeship gives students a combination of academic, technical, and workplace learning that prepares them to step into high-skill jobs and/or continue toward a bachelor's degree.

The success of youth apprenticeship programs in Germany and other industrialized nations has inspired national, state, and local initiatives to improve collaboration of schools and employers in designing an accelerated and challenging pathway to a good job. The task is to develop a program that blends challenging academic, technical, and worksite learning.

The National Youth Apprenticeship Act of 1992 is designed to define youth apprenticeship, ensure high academic standards, and promote successful school-to-work transition nationwide.

The U.S. Department of Education and the U.S. Department of Labor provide funding for youth apprenticeship programs. Charitable foundations and national organizations, such as the Council of Chief State School Officers and Jobs for the Future, Inc., make grants to states and communities. Local efforts, such as *Craftsmanship 2000* in Tulsa, Oklahoma, engage educational, business, and political leaders in designing and delivering an avenue to good jobs.

Jobs for the Future—a private, nonprofit group in Massachusetts aimed at improving the quality of the nation's work force—has identified three basic elements of youth apprenticeships:

1. Employers provide students with guided learning experiences at the worksite;

2. A link is established between high school and postsecondary education;

3. Students receive integrated high level academic and technical learning at school and in the workplace;

Apprenticeship makes the school-to-work transition "transparent" to students, says Stephen F. Hamilton of Cornell University. Young people can see where they want to go and what they need to do to get there.

Business and industry leaders acquire a new interest in high school graduates. When they become partners with educators in designing an apprenticeship program, employers begin to see young people as qualified candidates for jobs that require the thinking and problem-solving skills gained through solid academic and technical knowledge.

Most youth apprenticeship programs last four years, including study in high school and at a technical or community college. During time on the job, students work side-by-side with experienced employees who help them apply what they are learning in school. Youth apprentices are paid while they study and learn; they

receive certification in a recognized apprenticeship field; and they earn credits at a community or technical college that they may transfer to a four-year college.

Why Should a High School Consider Developing a Youth Apprenticeship Program?

Youth apprenticeship is one way to encourage high school students to take advanced academic and technical studies. Apprenticeships:

- Make it clear to students what they must do and the effort they must exert to qualify for high-skill, high-salary occupations.
- Provide a visible and tangible route for young people to high-skill, high-wage employment.
- Supply the community, state, and nation with workers who can produce the quality and variety of products customers want.
- Bridge the gap between high school and postsecondary studies by helping young people see the connection between what they learn in school and its usefulness at the worksite. Make it possible for a young person to get a head start on a career by becoming a journeyman at the age of 21 or 22.
- Focus employers on the high school as a source of new workers with specific, advanced job skills.
- Provide a way for employers and schools to work together to prepare future workers.
- Allow teachers to impose higher standards in academic and technical courses to give students a solid background in problem-solving and creative thinking.

Youth apprenticeship is a new learning option that should not be confused with old programs or practices. Dr. Herbert Grover, State Superintendent of Public Instruction in Wisconsin, makes the following distinctions (*Student Apprenticeship News,* October 1992):

- Youth apprenticeship is *not* co-op education or a work experience program. Co-op students learn tasks that are specific to the companies in which they work. Youth apprentices are trained and certified to meet the standards required by all employers in a particular broad occupational field.
- Youth apprenticeship is *not* at-risk education. Apprentices must demonstrate a willingness and commitment to learn and must master complex academic and technical studies.
- Youth apprenticeship is *not* a General Educational Development (GED) program. The school-based academic and technical studies standards and work-based performance standards are high, and apprentices earn a high school diploma.
- Youth apprenticeship is *not* a salary subsidy. Apprentices receive at least minimum wage in return for mastering complex job skills.
- Youth apprenticeship is *not* a tracking system. Apprentices follow a difficult program of study that includes academic studies from the college prep curriculum and earned credits at a technical school or community college.

Two Youth Apprenticeship Models To Consider

Two models have emerged from among youth apprenticeship programs being conducted in SREB-State Vocational Education Consortium states:

- One model involves the participation of an entire class. Apprentices study the same academic and technical curriculum at the school site and are assigned to a group of cooperating industries for common on-the-job training. The *Craftsmanship 2000* program developed by the Tulsa Technology Center is an illustration of a class-size model.

- The second model is a modification of the cooperative education program in which small employers prepare their own high-skill work force in conjunction with the high school and community college. One student may be enrolled in machine shop, another in medical or dental care. Even though this model is based on the cooperative vocational education approach, it differs from a traditional co-op program in several important ways:

  ✔ Students are placed in an occupation classified by the U.S. Department of Labor's Bureau of Apprenticeship and Training as a principal occupation. (Traditional co-op programs do not always place students in apprenticeable occupations.)

  ✔ The school and the employer develop a training plan that meets the specifications of the Bureau of Apprenticeship and Training. (Training plans are not uniformly developed and followed in traditional co-op programs.)

  ✔ The occupation must provide a pathway to acquiring high skills and good pay. (Traditional cooperative placements are not always in jobs that offer a clear pathway to career preparation and advancement.)

  ✔ Employers must offer training on the job. (In cooperative vocational education, the emphasis is on getting a job and earning a paycheck, rather than obtaining related academic and technical skills at the school site and solid training under an assigned mentor at the worksite.)

- Arkansas, Alabama, and West Virginia are developing youth apprenticeship programs built on the modified cooperative education approach.

Craftsmanship 2000

Craftsmanship 2000, a nonprofit corporation in Tulsa, Oklahoma, works with education, industry, and the community in conducting a four-year apprenticeship program that prepares young people as highly skilled metalworkers. Competition for spaces in the program is keen, and academic and vocational standards are high.

Seven metalworking industries, three educational institutions, and the local Chamber of Commerce participate in the program. Tulsa's public schools provide teachers, textbooks, and transportation; Tulsa Technology Center and the sponsoring industries provide education and training; and Tulsa Junior College assumes academic responsibility for the students during the last . years of their apprenticeship. The sponsoring industries reimburse *Craftsmanship 2000* for apprentice salaries.

High school students chosen for the program become employees of *Craftsmanship 2000* as they complete a demanding program of academic and technical studies and on-the-job training in companies that include American Airlines and Webco Industries. Apprentices commit to an eight-hour day, 47 weeks a year, with 1 to 2 hours of homework nightly. They are paid to be in class and on the job.

The curriculum was developed by company engineering and technical personnel in collaboration with curriculum writers from the participating educational institutions. It combines high level academic, technical, social, and learning-to-learn skills in the classroom with learning in a company setting. In the 11th grade, apprentices take college preparatory level English, math, and science courses, balanced by an equal number of hours in technical coursework. The academic courses are taught using the applied learning method to make the content more meaningful. Students receive 360 hours of in-plant training in the first year.

In the 12th grade, the technical coursework and in-plant training increase as students move more heavily into the metalworking specialty. Students in the third and fourth years of the program attend the junior college for academic coursework and the community college for technical studies. The time devoted to in-plant training continues to increase in years three and four until it almost triples the level of the first year.

The recommended program of study for grades 9-12 for students who plan to enter the program includes four years of English; four math courses, including Al-

CRAFTSMANSHIP 2000 APPRENTICESHIP PROGRAM
Program of Study and Required Credit Hours

	YEAR 1	YEAR 2	YEAR 3	YEAR 4
Technical Studies (Theory)	300	290	391	236
Technical Lab Work at School Site	400	445	554	532
Academic Courses:				
English/Speech	175	175	48	96
Social Studies	175		48	
Science	175	175	64	96
Math	175	175	96	
Computers			80	
Total Academic Hours	*700*	*525*	*336*	*192*
In-Plant Learning	360	500	599	920
Other Activities	88	88	88	88
TOTAL HOURS	1,848	1,848	1,968	1,968

gebra I and II, technical math, and geometry; and four years of science, including physical science, biology, applied physics, and chemistry.

Students are selected during the sophomore year on the basis of prescreening, aptitude and interest tests, and a personal interview with the students and their parents. Students must have at least a C average overall in academic courses and at least a B average in vocational courses.

"They must be willing to work hard with their minds and their hands," says Gene Callahan, superintendent of Tulsa Technology Center. "Apprenticeship is not an 'easy way out'."

Students who complete the apprenticeship receive a diploma from their home high school and up to 25 credit hours from Tulsa Junior College. The credits can be transferred to a four-year college or university if the students decide to continue their education.

While in the program, students are treated like regular employees. For example, if they miss a day, they do not get paid. The annual pay scale ranges from $7,480 the first year to $14,080 the fourth year. As in a real work setting, youth apprentices earn bonuses for outstanding performance.

Employers who pledged money, time, and personnel to the program are enthusiastic about its potential. They see the program as a dual opportunity to help the schools educate young people and to gain qualified workers to fill a growing need in the metalworking industry.

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Alabama's Registered Youth Apprenticeship Program

Faced with a growing shortage of skilled workers to replace retirees and fill new jobs, Alabama launched a youth apprenticeship program in 1989. *Technology Plus of Alabama* conducts the initiative, in cooperation with the Alabama State Department of Education and the U.S. Department of Labor, Bureau of Apprenticeship and Training. *Technology Plus* was created by the state board of education to provide specialized training to business and industry.

The Student Apprenticeship Linkage Program is designed to connect academic and technical studies programs in high schools with apprentice programs in industry.

"Students need a career preparation path to high-skill occupations that is easy to identify and enter," said Steve Franks, Director of Vocational Education in Alabama. "They need an opportunity to learn what it is like to work in a real work setting under real working conditions."

High school students who have completed at least one year (in 10th or 11th grade) of technical training in an occupation that uses an apprentice system and have completed Algebra I or higher in math are eligible to participate in the program as student apprentices during their senior year. Selection is handled by an industry-based apprenticeship screening committee.

Youth apprentices participate in a worksite learning program in which they work up to 20 hours a week and receive credit that applies toward their total apprenticeship training program. Initially, the State Department of Education reimburses the business or industry up to $2.25 per hour for half of the student's wages.

A youth apprentice has the advantage of applying school site academic and technical learning by using state-of-the art equipment—unavailable in many school system vocational labs—in an actual work setting.

After high school graduation, students are expected to enter a full-time apprenticeship training program in which they can receive a journeyman's certificate by age 21 or 22.

Each participating high school appoints a coordinator to manage the apprenticeship program. The coordinator monitors students' progress by visiting them and their training supervisors on the job at least twice during each grade reporting period. The coordinator also conducts in-service meetings for vocational and academic teachers and guidance counselors to help them address the gap between what students know and what they are expected to do at work.

The Bureau of Apprenticeship and Training maintains standards for the program and certifies a company's training program. After a program has been certified, participating students register with the Bureau and begin receiving credit toward certification in the skill area while completing high school graduation requirements.

During the 1991-92 school year, a total of 206 students were placed in 46 different occupations in 143 companies. Career areas with the highest demand for apprenticeship training are: electricity/electronics technician, machinist, welder, computer peripheral personnel, automotive technician, nursing assistant, maintenance technician, dental assistant, drafting designer, and auto body technician. In the second year of the program, 78 percent of the participating students entered a full-time apprenticeship program after graduation.

Of the students participating in 1991-92, over 36 percent were females, and 15 percent were minorities. Female and minority students traditionally make up a very small percentage of workers in high-skilled craft and precision occupations. The apprenticeship program gives these young people direct entry into occupations that they might not have considered without the program.

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West Virginia's Registered Youth Apprenticeship Program

The registered youth apprenticeship program in West Virginia is an option within the state's tech prep associate degree program. It is one of five model apprenticeship programs sponsored by the Council of Chief State School Officers.

The West Virginia program provides career-bound students with a strong foundation of college preparatory level academic courses, modern technical courses, and job-site learning. The program is designed to help students make a smooth transition from high school to full-time apprenticeship employment or to a part-time apprenticeship combined with studies toward an associate degree at a two-year postsecondary school. Students can receive apprenticeship credit while in high school.

The West Virginia Department of Education manages the program through a cooperative agreement with the U.S. Department of Labor's Bureau of Apprenticeship and Training. The agreement connects high school academic and techni-

cal studies with nationally registered apprenticeship programs. Youth apprentices receive articulated credit for up to 50 percent of related training required by the Bureau. Students are selected by the same business and industry committees that select adult apprentices.

The program is introduced to students in the 7th grade through a college and career exploration process. Guidance activities—including career direction and selection in the 9th grade, job observation in the 10th grade, and full-time on-the-job training with a participating company during the summer between the 11th and 12th grades—intensify as the students move through high school.

A videotape and printed materials prepared by the West Virginia Department of Education introduce teachers, counselors, students, parents, and employers to the program. A booklet for students and parents answers questions on apprenticeships, enrollment in the program, tech prep, and four-year educational plans.

A booklet for employers describes the benefits of a well-planned, properly administered apprenticeship program: to attract highly trained applicants, reduce absenteeism, reduce turnover, increase productivity, reduce the cost of training, comply with federal and state employment requirements, improve employee and community relations, ensure availability of related technical instruction, strengthen the problem-solving ability and ensure the versatility of craftsmen, and establish a communication link between business/industry and education.

In a highly unionized state such as West Virginia, the participation of labor unions in the program is essential. "If we hadn't involved union representatives in the very beginning, our apprenticeship program never would have worked," says Adam Sponaugle, director of the Bureau of Vocational, Technical, and Adult Education.

Representatives of mine workers, boilermakers, and other organized labor groups serve on the state program advisory committee. They contribute input on program design, act as a sounding board for program strategies, and serve as advocates to recommend that their companies adopt the program.

Sponaugle lists three major benefits a state derives from an apprenticeship program:

- Apprenticeship students graduate from high school with the essential math, science, and communication background found in a basic college prep program of study. Youth apprenticeship gives career-bound students a clear vision of what they must study and do to become successful in a chosen occupation.
- Business and industry get good employees.
- Students get good jobs.

In-service training is underway in West Virginia to prepare 100 key personnel in 15 targeted counties to counsel, place, and monitor students in the program.

Some 80 students during the 1992-93 school year received preparation in health occupations and construction and maintenance of facilities.

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Arkansas Youth Apprenticeship Pilot Program

In 1991, Arkansas became one of the first states to enact youth apprenticeship/work-based learning legislation. Six pilot sites are serving 250 students in 12 job areas: agriculture; computer technology; culinary arts; drafting; health; industrial maintenance; radio broadcasting; business; retail management; machine tool technician; entrepreneurship; and heating, ventilation, air conditioning, and refrigeration.

The legislation was based on a feasibility study which revealed that students and parents favored a program that linked worksite learning with mainstream high school and postsecondary education. The Arkansas General Assembly directed the state vocational and technical education division to commission the study.

Eight discussion groups were held at four sites across the state to talk to parents and students about youth apprenticeship. Students were enthusiastic about the apprenticeship concept. They envisioned:

- Meaningful work experience with adult guidance in a field they plan to enter as a career;
- More job satisfaction and workplace learning opportunities;
- A more reasonable work schedule, unlike the long evening and weekend hours at fast food restaurants and other retail outlets;
- High school and college credits for worksite learning;
- An opportunity to develop valuable interpersonal skills.

To assist in setting up the program, Arkansas received one of 10 state planning grants from the Council of Chief State School Officers.

Through its six pilot sites, Arkansas is seeking the answers to four basic questions:

- What are the opportunities and barriers in establishing youth apprenticeship programs in a few key industries and occupations?

ELEMENTS OF A YOUTH APPRENTICESHIP PROGRAM SOUGHT BY PARENTS IN ARKANSAS

✔ **Students can transfer to a bachelor of arts degree any credits earned toward an associate degree.** Students and parents want the option of a bachelor's degree, which they believe carries more weight in the job market than an associate degree.

✔ **Students can leave an apprenticeship without penalty.** Many parents believe strongly that it is unrealistic to expect a 16-year-old student to make a multi-year commitment.

✔ **Students can attend classes with their peers and participate in extracurricular activities.** Parents want a program that does not isolate their children from their peer group or regular classes. They associate "separate" with "second rate." Parents and students worry that apprentices will miss out on the "broadening" experience of extracurricular activities if the program is conducted apart from the high school mainstream.

— Arkansas Apprenticeship Feasibility Study

- Can youth apprenticeship build on the state's efforts to develop self-employment and entrepreneurship among high school students?

- What modifications in the youth apprenticeship model would better meet the needs of the state's young people and employers?

- How can youth apprenticeship build on and strengthen other programs and education reform initiatives, such as the *High Schools That Work* program, and what can the state do to systematize the process?

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Planning and Communication Can Help Integrate Apprenticeship with *High Schools That Work*

Here are things to expect if you plan to adopt youth apprenticeship as a component of your high school:

- **Intensive planning—which can take from one to three years—is needed before the program begins.** For example, a group of Tulsa educators and business leaders made a trip to Germany to study the apprenticeship system in that country before launching *Craftsmanship 2000*. As part of the preparations, your school will want to develop some form of organizational and committee structure to plan, implement, and monitor the program, and deal with emerging issues. *Craftsmanship 2000* is a 501(c)3 nonprofit organization with a board of directors and four subcommittees to deal with curriculum, administration, finance, and marketing. More than 100 educators and representatives of business and industry participate. In Arkansas, an outside consulting firm was hired to conduct a feasibility study. The study resulted in legislation authorizing a statewide youth apprenticeship program.

- **Many employers—particularly in small business—have never been involved in an apprenticeship program.** They may be reluctant to participate until they understand what is expected of them and what they can gain. Almost all employers who took part in the first year of the Alabama program said they could not have offered the program without financial assistance from the State Department of Education, which paid all or part of students' salaries. However, 55 percent of the first-year employers said they liked the program so well that they would be willing to continue without outside funding. The West Virginia Department of Education prepared a booklet to explain the benefits of the program to employers.

- **Many teachers and guidance counselors do not understand youth apprenticeship.** The West Virginia Department of Education designed in-service education and prepared materials to orient staff members and introduce the program to more schools.

- **The role of organized labor in a apprenticeship program may confuse some people.** One of the myths of youth apprenticeships is that the program can be implemented in companies that have labor unions, since adult apprenticeships historically have been closely associated with unions. Programs exist in nonunion as well as union companies. Labor, management, or a professional association can operate an apprenticeship. While West Virginia educators believe that labor union support was essential to their program's success, Steve Franks of the Alabama Department of Education says, "We are willing to work with anyone who requests the program—a company, a group of companies, or a labor union."

- **The traditional trade occupations are not the only fields that youth apprentices can learn.** Hundreds of job categories are registered nationally, including many in the growing health care field. "We have an apprentice being trained in the intermediate intensive care unit at a Birmingham hospital. Others are learning to be radiology technicians, veterinary assistants, medical secretaries, and nursing and dental assistants," said Steve Franks of Alabama. "We are also making inroads in retailing."

PART 3

INDUSTRY STANDARDS

Certification Programs Help High Schools Update Their Vocational Courses

A number of industries and associations and the federal government are engaged in setting standards that vocational programs can follow to make sure students receive quality education in a broad occupational field. The academic and technical knowledge and skills obtained in an industry-certified program are recognized industry-wide rather than tailored to a specific employer.

Benefits of a Standards Program

Industry standards programs benefit high schools and their students in these ways:

- The curriculum reflects instructional standards and technical learning that are compatible with the modern work setting.
- The vocational program receives increased support from industry and the community.
- Schools, instructors, and graduates receive recognition.
- Students—whose qualifications are documented—increase their chances of finding employment in an industry in which they have been trained.
- The program is more relevant to students' needs.
- Students have a record of achievement that can be transferred among employers.
- Administrators, teachers, and supervisors sharpen program goals and direction.

Labor and Education Departments Underwrite Development of National Standards For Industries and Trades

The Carl D. Perkins Vocational and Applied Technology Education Act authorized a $4.7 million national program to develop skill standards for the nation's leading industries and trades.

Through grants from the U.S. Department of Education and the U.S. Department of Labor, national trade associations and education groups are developing standards for 13 occupational areas. Each field will have its own set of standards, which will specify the technical and related academic content and competencies that a course of study must include to prepare a student for employment. The standards also will specify the number of hours of study required for a student to be competent, tools and equipment needed, and qualifications of instructional staff. The standards will be broad-based and emphasize integration of academic and vocational education. (See Standards Development Projects on next page).

The Department of Education funded standards projects in nine additional occupational areas in April, 1993. The areas are human services occupations; heavy highway-utility construction and environmental remediation and demolition; chemical process industry; hazardous materials management techniques; pho-

STANDARDS DEVELOPMENT PROJECTS

U. S. Department of Education

Industry	Organization/Association
Health Science and Technology	Far West Lab for Educational Research and Development, San Francisco, CA
Electronics	Electronics Industries Foundation, Washington, DC
Computer-Aided Drafting	Foundation for Industrial Modernization, Washington, DC
Air Conditioning, Refrigeration, and Power	Southern Association of Colleges and Schools-VTECS (Vocational-Technical Education Consortium of States)
Biotechnical Sciences	Education Development Center, Newton, MA
Printing	The Graphic Arts Technical Foundation, Pittsburgh, PA
Automotive, Autobody, and Truck Technicians	National Automotive Technicians Education Foundation, Herndon, VA

U. S. Department of Labor

Industry	Organization/Association
Industrial Launderers	Institute of Industrial Launderers, Washington, DC
Tourism, Travel, and Hospitality	Council on Hotel, Restaurant, and Institutional Education, Washington, DC
Metalworking	National Tooling and Machining Association, Ft. Washington, MD
Electronics	American Electronics Association, Santa Clara, CA
Electrical Construction	National Electrical Contractors Association, Bethesda, MD
Retail Trade	National Retail Federation, Washington, DC

tonics (laser) technician; agriscience-biotechnology; welding occupations; forest-wood products production and manufacturing; and food marketing industry.

In *Youth Apprenticeship in America: Guidelines for Building an Effective System (1992)*, Sue E. Berryman of Columbia University and James E. Rosenbaum of Northwestern University give five major reasons for defining and certifying workplace skills.

1) Certification makes it easier to identify good training programs and improve (or eliminate) bad ones.

2) Certification provides students with incentives to learn—such as the assurance that the program meets the expectations of employers—and offers alternative (hands-on) ways to study and learn.

3) Certification helps overcome employers' mistrust of young workers. Employers who perceive workers in their late teens and early twenties as unreliable are more likely to hire "certified" high school graduates for good jobs and salaries.

4) Certification encourages students and employers to invest in more on-the-job learning. Students are more willing to stay with a program if they can expect to be certified, and are more apt to remain with the company at the end of their preparation.

5) Certification can benefit minority youth, who are often poorly served by schools and ordinary hiring procedures.

PrintED Is a Pioneer in Standards and Certification For High School Graphics Arts Programs

Some industry standards programs—such as the Printing Industries of America's PrintED program—were established before the government's recent activity in developing standards and certification.

PrintED gives high school graphic arts programs an opportunity to be certified as superior sites for preparing students to enter the printing industry. Through the program, graphics arts instructors receive industry guidance in creating a quality program of study.

Students in the program receive focused preparation equivalent to six months on the job. They learn to use modern printing equipment and perform the many tasks associated with a quality print job. They take pride in what they accomplish and feel better about their prospects for finding a responsible job.

High schools gain a clear understanding of what to teach career-bound students for good jobs in the printing industry. They receive support and recognition from printing professionals.

The program originated in Georgia in 1988 when industry and education professionals saw the need to certify high school graphic arts programs. The intent was to prepare students as skilled workers and to make sure education kept pace with rapidly changing business requirements.

Working as a team, educators and members of the Printing Industry of Georgia identified six curriculum areas to become the heart of the PrintED program. Desktop publishing—a computerized layout and typesetting technique that has had a dramatic impact on the printing

profession in recent year—is one curriculum area. The five other areas are Introduction to the Printing Industry, Art and Copy Preparation, Image Assembly and Platemaking, Duplicator Operations, and Reproduction Photography.

PrintED went nationwide in 1990 when Printing Industries of America, Inc., the world's largest graphic arts trade association, adopted the program. Financial support is provided by Rockwell Graphic Systems, a unit of Rockwell International.

To be certified, a graphic arts program must meet standards in nine areas: purpose, administration, learning resources, program budget, student services, curriculum and instruction, equipment, facilities, and instructional staff.

The certification process takes about a year. It includes an initial application, self-evaluation, and on-site team evaluation.

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Printing Industries of America

Certified Auto Training Program Available Nationwide

For students interested in careers in automobile and truck technology and autobody repair, a certified training program is available in schools in 48 states. The program produces workers with experience in repairing cars and trucks, and gives employers a standard by which to measure job applicants.

Automobile, autobody, and medium/heavy truck training programs at high schools and postsecondary institutions can receive certification from the National Institute for Automotive Service Excellence on recommendation of the National Automotive Technicians Education Foundation (NATEF).

NATEF examines the structure and resources of training programs and evaluates them against nationally accepted standards in these areas: purpose, administration, learning resources, finances, student services, curriculum and instruction, equipment, facilities, instructional staff, and cooperative work agreements.

Schools may apply for certification in 4 to 8 automobile areas, 5 autobody areas, and 5 to 8 medium/heavy truck areas; some areas are required in each category.

The certification process includes an application, a self-evaluation, and an on-site team evaluation.

NATEF standards are uniform across the nation. In 1978, the Industry Planning Council (IPC) of the American Vocational Association determined that improvements were needed in automotive training programs. The Motor Vehicle Manufacturers Association funded the standards project, and the Southern Association of Schools and Colleges—the region's accrediting agency—implemented it. In 1982, the first evaluation materials for automobile training programs were completed. Since that time, two additional areas have been added: autobody in 1989 and medium/heavy truck in 1992. Nationally, a total of 650 automobile programs, 49 autobody programs, and two medium/heavy truck programs have been certified.

NATEF is one of seven organizations and associations that received grants from the U.S. Department of Education to develop and implement industry skills standards. NATEF is using the grant to upgrade current certification standards and to identify the math and science skills that students need for success.

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Professionals Set Standards For Students in Building Trades

A certified construction program that meets industry standards is available for high school students who want to be carpenters, bricklayers, or other craftspeople associated with residential or commercial building projects.

The Associated General Contractors of America (AGC) and the National Association of State Directors of Vocational Education offer an accreditation program designed to recognize outstanding construction programs that prepare workers who are qualified to meet the standards of the construction industry. Co-sponsors are the Brick Institute of America and the National Association of State Supervisors of Trade and Industrial Education.

Some 211 programs at 182 schools in 18 states are accredited. More than 4,000 students were enrolled across the nation in the 1992-93 school year.

To ensure that graduates are ready for work, AGC has developed courses of instruction that reflect the technical knowledge and skills needed for successful employment in construction, one of the largest industries in the nation.

"Many high school construction courses are 20 years behind the times," says John W. Friedemann, AGC's National Training Program Coordinator. "They allow students to work on 'sawdust and glue' projects and build 'stick buildings' rather than preparing them for employment in a real work setting."

The AGC program recognizes qualified programs in seven construction areas: Carpentry, Bricklaying, Concrete Masonry, Machining of Metals (Millwright), Heavy Equipment Operation, Heavy Equipment Mechanics, and General Construction Technology (Multi-Craft).

After initial approval, the training program must pass an annual on-site review for accreditation to remain in effect. Programs must meet eight standards for approval and re-accreditation:

- *Goals and Objectives*—Are residential and commercial construction needs identified in the goal statements?
- *Educational Setting*—Is the program approved by an accreditation agency recognized by the state department of education?
- *Industry Advisory Committee*—Does a member of the local AGC chapter serve on the committee, and does the group meet at least twice a year?
- *Administrative Support*—Do instructors have access to in-service education and upgrading in the construction industry? Does the budget cover instructional materials, tools and equipment, and building materials and supplies?
- *Instructional Materials*—Does the course of study cover all the instructional areas identified by AGC as priorities, and are the instructional materials used by teachers and students?
- *Instructional Staff*—Do the instructors have a minimum of five

years of field experience? Do they participate in in-service education, and are they AGC certified in at least one area?

- *Facilities and Equipment*—Is the physical environment clean, orderly, and hazard-free? Are there enough tools, and do they meet industry quality standards?

- *Learning Resources*—Do teachers and students have access to technical magazines and reports on the latest scientific developments in the construction industry?

AGC publishes the names of recognized programs in its national magazine, which has 40,000 subscribers in the construction industry, and urges employers to contact those programs when they hire new workers. Students receive a wallet card that identifies them as graduates of a certified program.

"Accreditation establishes guidelines for new training programs and helps improve existing programs," AGC's Friedemann said. "It ensures that what students learn is a true reflection of industry training requirements."

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Horticulture Teachers and Professionals Develop Certification Program in Georgia

A committee of high school horticulture teachers and industry professionals created guidelines for a certification program sponsored by Georgia professional horticulture organizations in cooperation with the State Department of Education.

Certification is designed to determine the capability of a training program to prepare students for entry-level jobs and/or to encourage them to seek a college or technical school degree in horticulture. Nine schools have completed the certification process; six schools are nearing completion.

Guidelines are based on a survey of the top 29 horticulture industry experts in the nation, who were selected for their ability to predict the future of the industry. The experts recommended 30 essential content areas for a horticulture training curriculum, including math and science, communication, and problem solving along with such nursery and landscape topics as environmental protection and pest management.

Using results of the futures study and a list of tasks compiled by a horticulture industry committee, new curriculum guides were developed for high school horticulture programs. A group of teachers and industry personnel validated the guides.

A guide for determining whether a program should be "industry certified" was developed by a committee of high school teachers and horticulture professionals. The guide specifies that certification is reserved as a "high honor for superior programs," and the requirements are so exacting that few programs meet certification standards without improvement.

Certification consists of an application, a self-evaluation, and an on-site evaluation by a team that includes professionals from the Georgia Green Industry Association, the Georgia Commercial Flower Growers Association, and the Georgia State Florists' Association, Inc.

Programs that meet industry certification requirements have three components: a well-prepared teacher and excellent teaching, excellent local support, and superior curriculum and facilities. Evaluation is based on a program's goals and objectives, learning resources, student services, equipment, curriculum and instruction, administration, finances, and facilities.

Schools must pass at least three of five specialty areas in ornamental horticulture to be certified. The areas are floriculture, florist management, landscaping, nursery production and management, and turf grass production and management.

A week-long state workshop on industry standards is conducted annually to help teachers prepare for certification. The guidelines include a "quick-check" list of essential program standards.

Programs must have an active advisory committee that includes at least two members from commercial horticulture businesses. The committee should meet at least twice a year.

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HOW TO INVOLVE BUSINESS AND INDUSTRY IN UPGRADING VOCATIONAL COURSES

"Business, industry, and trade associations are willing to enter into partnerships with high schools, if you know how to approach them," Janet B. Bray, Senior Vice President of Printing Industries of America, Inc., told the SREB 1992 Fall Forum audience.

"When the call went out to involve industry in education, little regard was given to the needs of industry or to the ways industry operates," Bray said. "No wonder the response for the most part was silence."

Business leaders can identify the skills and competencies that industry needs and wants. They can also help write curricula, find instructional materials and supplies, and seek donated equipment.

To bring industry representatives to the table, Bray said, educators must understand what motivates them, how to communicate with them, and how to make it easy for them to become involved.

"Business people are bottom line oriented," Bray reminded. "Their focus is to make a profit by producing a quality product or providing a quality service."

Bray offered these tips:

- Let employers know how their involvement with the high school will affect the company's bottom line — qualified workers need less training and make fewer mistakes.
- Show them how you plan to upgrade the preparation of students, and tell them how their involvement will contribute to students' practical, real-world knowledge and skills.
- Schedule meetings at their convenience. Send or phone a reminder about the meeting. Follow an agenda, and keep the meeting short. Show results of the meeting. Write minutes, and include action items.
- Avoid the "politics" of education. Business and industry are interested in results — not turf-guarding or political maneuvering.
- Ask business and industry to share their needs, knowledge, and expertise.

Companies will share personnel, equipment, and materials if they believe their time and participation will make a difference, Bray said.

PART 4

NEW ORGANIZATIONAL PATTERNS

Academies and Magnet Programs Help "Personalize" Preparation Of Career-Bound Students

Many large high schools have changed the way they organize learning in efforts to "personalize" the preparation of career-bound students. The re-structuring consists of grouping students with common interests and educational goals into academies, magnet schools, or other types of schools-within-schools where they receive an integrated program of high-level, high-quality academic and vocational studies.

New Designs for the Comprehensive High School—a project of the National Center for Research in Vocational Education—offers a rationale and pattern for re-organizing large, comprehensive high schools.

At SREB's 1992 Fall Forum, George H. Copa and Virginia H. Pease outlined five organizational elements of small schools within large schools and recommended specifications for this type of organization.

"The ways in which the organizational elements come together makes a great deal of difference in the outcomes and learning processes," Copa said. "The key is alignment and coherence among the elements."

The elements include:

- *Learners* should be organized into smaller groups that will include a cross section of students—not all vocational or all college preparatory. The common thread should be interests, projects, or broad occupational field. When students are grouped into vocational or college prep tracks, the sorting is too often based on perceived ability level, social background, or race.

- *Learning settings* should include the community as well as the school. Students in an academy, magnet school, or other school-within-a-school should have access to resources in business and industry as well as postsecondary schools. Partnerships between school and community will extend and enrich the learning experiences of students.

- *Learning processes* should include the positive reinforcement of an integrated academic and vocational curriculum and a structured work experience. Academic and vocational studies should interact and relate to each other in many combinations. For example, business and language arts studies are a natural combination.

- *Learning time* should be flexible. Students in a school-within-a-school benefit from being together in an extended block of time during the school day. This enables academic and vocational teachers to work together, introduce more complex issues that surround the field of study, and plan in-depth projects for students to work on together.

- *The learning staff* should be organized to recognize teachers' special talents and encourage teamwork and innovation. Many schools find it helpful to set aside one period a day for teachers to meet and plan with each other and with community representatives—mentors in business and industry or faculty at postsecondary schools—who are contributing to the students' learning experiences.

The Design Group for the project recommends the following specifications for organizing a school-within-a-school:

- The five organizational elements should be aligned.
- The organization should be responsive to the learning plans of the students. Students should be involved in the planning.
- The number of students in a school-within-a-school should be limited to 250 to 500.
- Students should be grouped according to interests, projects, and expressed choices.
- The curriculum should combine academic and vocational studies.
- The learning time should be flexible to allow time for a concentrated effort when appropriate.
- The learning setting should extend into the community through partnerships and policy.
- Teachers should be connected to students in ways that provide maximum opportunities to focus or change direction as students move through high school.

Academies, Magnet Schools, and Other Schools-Within-Schools Provide Models For Creating the Right Kind of Vocational Programs

Schools-within-schools—such as academies and magnet programs—provide a new way to organize vocational programs of study. These models are characterized by small groups of students within the high school who are pursuing a broad occupational field, such as finance, business, or health science. The program of academic studies is demanding, and the occupational studies have direct ties to the workplace. Academic and vocational teachers work together to blend academic and vocational learning.

"Small school" organization allows high schools to shift from what many consider to be the wrong way of preparing career-bound students to a model that reflects the changing nature of the workplace and the need for students to learn upgraded skills.

Academies and magnet schools:

- Allow high schools to teach career-bound students the right way by combining high-level academic studies with practical studies in a given field.
- Increase the scope of vocational studies beyond job-specific learning.
- Attract students from the mainstream and from vocational studies who are bonded through a common interest.
- Are based on high expectations, extra help, and extra time to reach high levels of achievement.
- Use the work setting for learning as well as earning, and regularly

draw on the resources of post-secondary schools.

- Offer a unique opportunity for academic and vocational teachers to work together.

The challenge is for high schools to begin to look at academy and magnet school models to determine how to incorporate their best features into new vocational programs—programs that are broader and better integrated with high-level academics, belong to a core group of academic and vocational teachers, and involve business and industry and postsecondary schools as learning resource centers.

Academies and similar exemplary programs typically offer:

- ✔ Rigorous academic courses
- ✔ Career-related courses
- ✔ Curriculum development by education and industry leaders
- ✔ Training for teachers/coordinators
- ✔ Summer internships
- ✔ On-the-job training
- ✔ Association with industry leaders through mentoring programs, speeches, field trips, and summer/part-time work
- ✔ A link between hands-on learning and abstract and intellectual learning
- ✔ Motivation to continue learning on the job and/or at a postsecondary institution
- ✔ Instructional materials for students and teachers
- ✔ Small classes
- ✔ A block of time in the school schedule
- ✔ Academic and vocational teachers working together
- ✔ Parental involvement
- ✔ An advisory group of business leaders
- ✔ Prospects for future employment

California Partnership Academies Give Students a Second Chance

The academy concept has received a great deal of state-level attention in California, where the legislature allocated funds to help school systems establish academy programs. The electronics industry in California's Silicon Valley—seeing the need for a program that combines academic and vocational education to prepare students for high-tech jobs—was a strong supporter of the legislative action.

The business and education "partnership" academies that flourish in California give students who might have flunked or dropped out of high school a "second chance" for success. The academies are characterized by strong support from state and local school systems, dedicated academy teachers, watchful parents, and helpful mentors from the business community.

California academies specialize in preparing students for jobs in business technology, electronics, health, print and media, hospitality, and agribusiness. Academies link rigorous academic coursework with study in a technical field and employment in local companies. The technical focus of an academy is based on the local labor market.

Evidence shows that when the California Partnership Academies model is fully implemented, the school dropout rate declines, student achievement rises, and students find jobs in the fields in which they are trained, reported Marilyn Raby, Director of Curriculum Services at Sequoia Union High School District in California. Raby received a U.S. Department of Education grant in 1989 to set up two business technology academies as national models.

The California legislature funds 50 Partnership Academies, which enrolled 3,000 students in the 1991-92 school year. School districts and local business and industry, as partners, share in the cost. Many other academies are fully funded by local school systems.

Students are selected for the program in the second semester of ninth grade. They must be considered at risk of dropping out of school by at least three of four criteria: past record of irregular attendance, past record of underachievement (at least one year below grade level), past record of low motivation or disinterest in the regular school program, and economic disadvantage. (Many of these students are minorities from low-income families who traditionally have a hard time finding a job even if they graduate.) Academy students must demonstrate interest and need through a written application and personal interview. Parents must agree to provide encouragement and support throughout a three-year commitment in grades 10 through 12.

Academy classes are block-scheduled. Students spend the first four periods of the day in business technology and core academic courses—English, math, science, and social studies. Teachers use applied learning methods. For example, math students calculate the start-up costs of a new business, and English students write a report on their career field. For the remainder of the day, students attend other required or elective courses with other high school students. In senior year, academy students complete a semester of personal and business economics.

In three years of business technology, students receive introductory to advanced instruction in computer hardware and software:

- *Business Technology I*, sophomore year, introduces students to computer equipment and procedures, keyboarding, word processing, database, data entry, spreadsheets, business concepts and computer uses, practical applications of computers, and desktop publishing.

- *Business Technology II*, for juniors, continues with keyboarding, word processing, database, spreadsheets, and desktop publishing, and introduces charting/graphs, integration of various computer applications, and resume/letters of application and followup.

- Seniors take *Business Technology III*, in which they continue with keyboarding, word processing, desktop publishing, database, spreadsheets, and integration of computer applications, and are introduced to electronic mail, scanning graphics, and telecommunications. Seniors use desktop publishing to create a newsletter that features their work experiences and field trips, commentaries on regular versus academy classes, and their plans for the future.

Teachers who volunteer for the challenging academy assignment are given extra time to plan and work together, meet with students and parents, and communicate with mentors and others in local business and industry. A block of time for the academy allows teachers to schedule group learning activities.

BUSINESS TECHNOLOGY ACADEMY
Program of Study

GRADE 10	GRADE 11	SUMMER	GRADE 12
Academy Classes			
English II	English III		Business English
Western Civilizations	U. S. History		Economics/Government
Business Technolgy I	Business Technology II		Business Technology III
Algebra I	Geometry		
Non-Academy Clases			
Biology	College Prep Science		Electives or
Physical Education	Elective		Worksite Learning
Academy Activities			
Counseling	Counseling	Business-Related Jobs	Counseling
Field Trips	Field Trips	for Students Meeting	
Speakers	Speakers	Academy Standards	
	Mentors		

The ability and opportunity for academy teachers to plan and work together has resulted in assignments and projects that span more than one class. Numerous English and social studies assignments are "computer connected" to the skills learned in business technology. Using the computer lab, business technology students produce essays, reports and projects, newsletters, and other materials that are part of the English and social studies curriculum. For example, students construct a newspaper front page for U.S. History that reports on events of World War I.

Students get to know the business world in 10th and 11th grade vocational/technical "lab" courses that feature guest speakers and field trips. In 11th grade, students spend at least two hours a month with volunteer "mentors" who give them insights on business and industry.

The "employability" component of the curriculum includes proper language and dress, career planning, and job search techniques.

In the summer before senior year, students work at paid jobs where they are expected to be "all business" in the way they dress, speak, and behave. Many students change dramatically, returning to the academy in the fall with new skills and a new attitude toward school and work.

Students receive daily feedback from teachers and monthly evaluations patterned after employee performance reports.

Recognition is important for students who may not have received many "pats on the back" in the past. Parents and mentors are invited to attend school ceremo-

nies during which academy students are rewarded for noteworthy achievement.

"Upon graduation, academy students are academically and technically proficient, have marketable job skills, and are prepared to enroll in postsecondary education," Raby said.

Since two-thirds of academy graduates choose some type of postsecondary education, the academies increasingly are creating partnerships with local colleges and universities.

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National Academy Foundation Offers Programs in Finance, Travel and Tourism, and Public Service

The nonprofit National Academy Foundation is a leader in designing programs to prepare young people for careers in the future. The Foundation, which grew out of industry concern for a lack of qualified workers in New York City, enjoys support from many major companies.

The Foundation offers three model programs that link business, education, and the community: the Academy of Finance, the Academy of Travel and Tourism, and the Academy of Public Service. All three include a curriculum and on-the-job summer internships for high school students, and a staff development program for teachers.

The Foundation's courses are taken as part of a college prep program of academic studies, and deal more with theory than do traditional vocational courses. For example, the Academy of Finance does more than just teach students to be bank tellers. Students also study economics, the role of banks in local and world markets, and a basic accounting system.

Academy of Finance

The Academy of Finance gives high school students an opportunity to learn about and prepare for careers in the financial services industry: banking, investment, foreign currencies, credit, real estate, and insurance, as well as related fields such as accounting, computer programming, and telecommunications. Financial services is a growing industry, which is expected to create almost 1.9 million new jobs by the year 2000.

Started as a pilot project in the New York City school system in 1982, the Finance Academy is available in 52 schools in 25 cities. More than 3,100 students are enrolled. Most students enter the academy in the 11th grade. Some of the programs also include an optional pre-academy sequence which prepares students for the specialized courses they will take in 11th and 12th grades. A pre-academy sequence may be one or two years, beginning in either the 9th or 10th grade.

In addition to required academic courses, students in an Academy of Finance take two or three specialized courses per semester. Examples are Economics and the World of Finance, College-Level Accounting, Securities Operations, Banking and Credit, Financial Planning, and International Economics and Finance. The courses were developed by leading educators and industry experts.

Students play the Stock Market Game, in which they invest $100,000 in "play" money in a portfolio of stocks. In Banking and Credit, they learn about the Federal Reserve System and modern banking trends. The Financial Planning course teaches them about saving, investing, borrowing, insurance, and retirement and estate planning.

ACADEMY OF FINANCE
Course Sequence Option I

GRADE 11	SUMMER INTERNSHIP	GRADE 12
Fall Semester		*Fall Semester*
◆ **Economics and the World of Finance** – a course in macro- and micro-economics that provides an understanding of how our market economy functions in a global setting. The course covers 22 basic economic principles. A unit on capital markets acquaints students with the role of various markets and securities in our overall economic framework.	◆ Employment at a bank, insurance company, or other financial institution.	◆ **Banking and Credit** – a survey of the principles and practices of banking and credit in the U.S. Students learn the major functions of banks and other depository institutions, the Federal Reserve System, and modern trends in banking. The credit component covers credit functions, including credit risk evaluation, loan creation, and debt collection.
◆ **College-Level Accounting I**		◆ **Computer Applications ***
Spring Semester		*Spring Semester*
◆ **Securities Operations** – introduces students to a modern securities organization. Students study brokerage firms, the trading process, credit and margin practices, automated processes, government regulations, how a securities firm provides services to its customers, and the firm's role in our economy. Students relate their knowledge of economics, accounting, and data processing to the operations process. Emphasis is on skills and attitudes necessary for success in business and higher education.		◆ **Financial Planning** – introduces students to the financial planning process. Students prepare a financial plan that includes saving, investing, borrowing, risk management (insurance), and retirement and estate planning.
◆ **College-Level Accounting II**		◆ **College-Level Principles of Finance** – surveys the main areas of financial analysis and management. Special emphasis is on the valuation of physical and financial assets.

* To be completed by graduation, preferably by the end of the 11th grade.

Minimum two years of a foreign language recommended.

ACADEMY OF FINANCE
Course Sequence Option II

GRADE 11	SUMMER INTERNSHIP	GRADE 12
Fall Semester		*Fall Semester*
◆ **Economics and the World of Finance** – a course in macro- and micro-economics that provides an understanding of how our market economy functions in a global setting. The course covers 22 basic economic principles. A unit on capital markets acquaints students with the role of various markets and securities in our overall economic framework.	◆ Employment at a bank, insurance company, or other financial institution.	◆ **International Economics and Finance** – explores major components of the international financial system. Includes the study of foreign trade, the international monetary system, foreign exchange rates, foreign exchange markets, international financial markets, international banking, and the multinational corporation.
◆ **College-Level Accounting I**		◆ **Computer Applications ***
Spring Semester		*Spring Semester*
◆ **Banking and Credit** – a survey of the principles and practices of banking and credit in the U.S. Students learn the major functions of banks and other depository institutions, the Federal Reserve System, and modern trends in banking. The credit component covers credit functions, including credit risk evaluation, loan creation, and debt collection.		◆ **Financial Planning** – introduces students to the financial planning process. Students prepare a financial plan that includes saving, investing, borrowing, risk management (insurance), and retirement and estate planning.
◆ **College-Level Accounting II**		◆ **College-Level Principles of Finance** – surveys the main areas of financial analysis and management. Special emphasis is on the valuation of physical and financial assets.

* To be completed by graduation, preferably by the end of the 11th grade.

Minimum two years of a foreign language recommended.

International Economics and Finance, one of two optional courses in 12th grade, explores foreign trade, the international monetary system, foreign exchange rates and markets, international banking, and multinational corporations.

Academy students are required to complete a college prep sequence of math, science, and language arts courses. They must also take two years of a foreign language before graduation and a computer applications/keyboarding course, preferably by the end of the 11th grade. They take Principles of Finance, a college-level course, in their high schools or at a local college, where they receive credit.

In the summer between junior and senior year, academy students serve paid internships at local banks, insurance companies, and other financial institutions.

The Finance Academy is geared toward C-average students, some of whom are in danger of dropping out. Studies show that 95 percent of students in this program nationwide continue their education; 58 percent major in business or finance; 67 percent plan to pursue an advanced degree.

Students who complete the academy receive a Certificate of Financial Services.

A Finance Academy has the potential to make dramatic changes in a high school program of business studies:

- Many high schools—particularly comprehensive high schools—do not offer a concentration of business courses. Instead, they offer a group of elective courses that are not focused, do not impart in-depth knowledge of the business field, and are not necessarily linked to high level academic studies. Students in these schools simply "take some business courses."
- Many high school business courses continue to focus on teaching one particular skill rather than on preparing students for the broader world of business. These courses do not take into consideration that the modern workplace requires employees to have diverse knowledge and skills.
- Many business or marketing teachers need to upgrade the content of their courses. They cannot be out of touch with modern business and what it expects of employees.

Academy of Travel and Tourism

The travel industry is among the top three employers in 39 states. More than 5.5 million Americans are employed by hotels, airlines, travel agencies, and other companies serving travelers. Another 2.3 million employees work for companies that provide equipment or support services to the travel industry. Hundreds of thousands of new and challenging jobs are expected to be available in the travel and tourism field over the next 10 years.

The first National Academy Foundation travel and tourism academies opened in schools in New York City and Miami in 1986. Today, there are 19 program sites in 10 cities, with an enrollment of over 900 students.

The Travel and Tourism Academy is a new kind of vocational program that is best suited for a high school in a large urban area where travel and tourism is a major industry.

The academy experience begins with Passport to the Future, a three-week learning module to introduce 8th and 9th grade students to the world of travel and/or tourism. Students begin to think about travel as a possible career choice.

ACADEMY OF TRAVEL AND TOURISM
Two-year Program *

GRADE 11	SUMMER INTERNSHIP	GRADE 12
Fall Semester ◆ **Travel and Tourism I** – an introduction to the travel and tourism industry. Includes an overview and history of the industry, and an introduction to marketing and the careers available in travel and tourism. Students conduct a case study of their hometown and learn the latest trends in travel for leisure and business ◆ **Writing/Research for Travel and Tourism** (English for Tourism) *Spring Semester* ◆ **Physical Geography** – helps students develop broad geographic skills. Students learn to use the basic tools of the geographer. They also learn how economics, culture, history, and political issues impact on geography and how geography impacts other disciplines. ◆ **Art of Communication** (English for Tourism) – a course in American literature (selected works are travel related) combined with an emphasis on spoken as well as written communication. Students write resumes and prepare for job interviews. A major research project is completed in conjunction with Physical Geography. ◆ **Systems Applications** – the basics of how airlines, hotels, and car rental agencies use computer-based data to facilitate business and leisure travel. Students study the computer and word processing before learning the theory behind all reservations systems. Students use simulated activities to complete reservations under a variety of circumstances.	Employment in travel agencies, hotels, and other businesses in the travel and tourism field.	*Fall Semester* ◆ **Travel and Tourism II** – indepth study of particular components of the travel and tourism industry. Students examine airlines, hotels, cruise lines, and other aspects of hospitality and travel. They explore career opportunities and trends that affect each component of the industry. ◆ **Marketing** (college or external experience) *Spring Semester* ◆ **Destination Geography** – an opportunity for students to use what they have learned about travel and tourism to study major tourist destinations in the world. Students complete a major research project demonstrating their mastery of the material. ◆ **Economics for Travel and Tourism**

* **Three-year Program** – In a three-year option, students enter the academy in 10th grade. They take Strategies for Success and Keyboarding I in the fall semester and Computer Literacy and English for Travel and Tourism in the spring semester.

Note: One semester of computer applications/keyboarding to be completed by graduation. A minimum two years of a foreign language should be completed by graduation.

Students who select a three-year program begin their preparation in the 10th grade with a pre-academy option that includes courses in keyboarding, computer literacy, and English for travel and tourism.

Juniors and seniors in the two-year program supplement their regular courses with specialized courses: Travel and Tourism, Destination Geography, Systems Applications, Economics for Travel and Tourism, and Writing/Research for Travel and Tourism.

Travel and tourism students are required to take a college prep sequence of math, science, and language arts courses, plus two years of a foreign language.

English for Tourism—referred to as a "Magical Mystery Tour"—is a year-long American literature course that incorporates spoken and written communication. Students complete a major research project in conjunction with their Physical Geography course.

A summer internship between junior and senior years gives students real-life experience in travel agencies, hotels, and other travel-related businesses. They may help organize conventions, schedule flights, or make hotel reservations.

While in the academy, students visit local convention, meeting, or tourism facilities; attend industry meetings; hear guest speakers in the classroom; and meet business leaders who serve on the advisory board for the academy. Students also take "familiarization" trips to learn the inner workings of a hotel, tourist attraction, airline, or destination.

Travel and tourism students may take college-level courses in their high schools or at a local college. At graduation they receive a Certificate of Tourism Studies.

Academy of Public Service

In response to an increasing need for qualified workers in local, state, and federal government, the National Academy Foundation is developing an Academy of Public Service. The first one opened in Washington, DC in 1991, followed quickly by a program in New York City.

More than 22 million people—one in every five—are employed in the public sector. This includes 17 million in local and state government and 5 million in federal jobs. Millions of others work for companies that do business with public organizations.

Modeled after established National Academy Foundation programs, the Academy of Public Service introduces high school juniors and seniors to careers in public administration and public service.

The program is designed to help students qualify for civil service jobs immediately after high school or major in a public service field in college.

The program includes:

- ✔ A challenging academic program that emphasizes work-related skills, knowledge, and abilities.
- ✔ Paid internships in public service agencies during the summer and school year.
- ✔ College-level courses and job skills training.
- ✔ Job placement assistance for graduates.
- ✔ Staff development for teachers and administrators.

Courses include: Introduction to Public Service, Critical Issues in Public Service, English (Communications), and U.S. History (with public service emphasis) in the 11th grade. The 12th grade curriculum includes Government/Law/Civics, Ethics and Public Service, and Economics and Public Finance. Senior students also take a college course, for example Public Administration.

Students take a college prep sequence of math, science, and language arts courses focused on issues related to government service. For example, in science, students study the environment, and in math, students study demographics.

A Certificate of Public Service Studies is awarded to students who complete the program.

What a School System Receives From the National Academy Foundation

Help is available in designing and implementing an academy program. When a school system contracts with the National Academy Foundation to offer an academy program, the system can expect to receive:

- ✔ Training for the local program director/manager
- ✔ Travel and hotel reimbursement for teachers and counselors to attend an annual National Institute for Staff Development conference
- ✔ Administrative materials and forms
- ✔ Start-up assistance
- ✔ Management training
- ✔ Curriculum materials
- ✔ Teacher training and materials
- ✔ Assistance in organizing an advisory board
- ✔ National newsletter
- ✔ Regional and national meetings for directors/managers and teachers
- ✔ A "buddy" system
- ✔ Handbooks on recruitment and publicity

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Ford Academy of Manufacturing Sciences Prepares Students for Employment In Manufacturing, Engineering, and Skilled Trades

The Ford Academy of Manufacturing Sciences (FAMS) is a two-year program to prepare high school students for careers in manufacturing, engineering, and skilled trades.

FAMS provides a way for *High Schools That Work* sites to establish a broader, updated context for trades that traditionally have been taught in high school. The program prepares students to enter a modern manufacturing setting characterized by multiple information and technology systems, rapid changes, and added employee responsibility.

The FAMS program increases student awareness of career opportunities; helps students learn science, math, technology, and communication skills in real-life situations; and encourages students to continue their education at a college or university.

FORD ACADEMY OF MANUFACTURING SCIENCES (FAMS)

GRADE 11

Semester 1

- **The World of Manufacturing –** This course provides a broad view of the world of work. It includes the history and future of manufacturing, general concepts of economics, systemic thinking, manufacturing processes, quality control, and modern career opportunities. Students improve their communication skills, become team players, solve complex problems, develop a strong work ethic, and become personally responsible for their learning.

Credit in Business, Social Studies, Vocational Education

Semester 2

- **Statistical Methods for Manufacturing Quality –** Students are introduced to the quality tools and applications of statistical process control. The course includes the fundamental concepts of descriptive statistics presented in a variety of numerical and graphical formats. Students apply math knowledge in a statistical context, use computer skills to analyze statistical software, and develop the ability to make decisions based on quantitative and qualitative data.

Credit in Math, Computers, Vocational Education

SUMMER INTERNSHIP

- This Coordinated Manufacturing Experience provides a real-world link which supports and augments the manufacturing curriculum. A summer internship is an effective way for students to get experience and for schools to develop partnerships with business. Student interns are paid a fixed hourly rate at least equal to the minimum wage.

Each participating business orients its supervisors to the program and involves them in selecting the students, making work assignments, and evaluating students' work performance.

Students unable to participate in an internship may receive credit and attain program certification by completing a job shadowing experience or a research mini-project.

Under special circumstances, a non-summer internship may be completed.

Approval for all manufacturing experience projects must be received from a school administrator affiliated with the manufacturing program.

GRADE 12

Semester 1

- **Workplace Technologies & Applications –** This course is devoted primarily to principles of technology. The content is general and flexible to accommodate rapid changes in technology. Instructors provide hands-on learning experiences and use school/community technology facilities. Students develop real-world skills, learn to apply their academic knowledge to actual situations, and become more creative and innovative.

Credit in Science, Computers, Technology

Semester 2

- **Manufacturing Case Studies –** This course merges the basic concepts of the first three courses into real/artificial/simulated case studies. Instructors may also select case studies that are related to current events. Students are responsible for their own learning, are able to identify problems, brainstorm for solutions, design and implement a problem-solving plan, and collect data to measure the effects of the plan. Students look at problems/situations in a broad context, understand the impact of decisions on all parties, make decisions by considering long-term effects and short-term results, and become "big picture" thinkers on the job and in their personal lives.

Credit in Math, Science, Vocational Education

TECH PREP PROGRAM OF STUDY
for Students Pursuing a Concentration
in Manufacturing Studies at the High School Level

GRADE 9	GRADE 10	GRADE 11 *	GRADE 12
Social Studies	Social Studies	Manufacturing Science: The World of Manufacturing/ Semester 1; Statistical Methods for Manufacturing Quality/Semester 2	Manufacturing Science: Workplace Technologies & Applications/ Semester 1; Manufacturing Case Studies/Semester 2
Introduction to Technology	Electronics	Drafting and Design	Mechanical Systems
Physical Education	Physical Education	Machining Technology	Welding or Other Technical Systems
Applied Math I or Algebra I	Applied Math II or Geometry	Geometry	Algebra II or Other High-Level Math
Physical Science	Biology	Principles of Technology or Chemistry	Social Studies
College Prep English	College Prep English	College Prep English	College Prep English/ Technical Writing

* A Summer Internship between the junior and senior years gives students a real-world experience in Manufacturing.

High school juniors and seniors take four accredited courses—The World of Manufacturing, Statistical Methods for Manufacturing Quality, Workplace Technologies and Applications, and Manufacturing Case Studies. The courses are taught by science, math, and business teachers who have received specialized training in industry-specific content and innovative instructional methods. Teachers focus on developing students' problem-solving, teamwork, communication, and critical thinking skills.

In a unit on planning for production, students participate in the types of complex planning and scheduling activities required to produce, for example, an automobile or a computer. In the World of Manufacturing, students learn how the structure and functions of an organization affect its products and people.

Students have an opportunity to intern in a manufacturing environment during the summer between their junior and senior years. The school or school

district's business advisory group arranges for the internships in automotive and other manufacturing settings.

High schools could offer a manufacturing science program to college prep as well as career-bound students. Both groups would benefit from being together in four semesters of manufacturing science and in the summer internship experience. The college prep students would bring more theory and academic principles to the program, while the career-bound students would contribute an understanding of the work setting and the real-life applications of knowledge and skills.

The FAMS program was piloted in a Michigan school district in 1990-91. In the 1992-93 school year, the program was available in eight schools in seven school districts in Michigan, Ohio, and Tennessee.

Ford provided approximately $1 million to develop the program and also furnishes education and training expertise. School systems that adopt the program are responsible for implementation costs.

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COLLEGE PREP PROGRAM OF STUDY
for Students Pursuing a Concentration
in Manufacturing Studies at the High School Level

GRADE 9	GRADE 10	GRADE 11 *	GRADE 12
Physical Education	Physical Education	Manufacturing Science: The World of Manufacturing/ Semester 1; Statistical Methods for Manufacturing Quality/Semester 2	Manufacturing Science: Workplace Technologies & Applications/ Semester 1; Manufacturing Case Studies/Semester 2
Foreign Language	Foreign Language	Technology Course (Electronics)	Technology Course (Drafting and Design)
Social Studies	Social Studies	Social Studies	
Algebra I or Geometry	Algebra II or Geometry	Pre-Calculus	Calculus
Physical Science	Biology	Chemistry	Physics
College Prep or Honors English	College Prep or Honors English	College Prep or Honors English	College Prep or Honors English

* A Summer Internship between the junior and senior years gives students a real-world experience in Manufacturing.

Medical Professions Magnet Program in Texas Provides Students an Accelerated Program of Study

The Medical Professions Magnet Program at North Side High School in the Fort Worth Independent School District in Texas is a four-year school-within-a-school for health occupations students. The program combines rigorous academic courses with practical lab courses conducted in a health care setting.

High schools that offer health occupation studies can use the Texas program as a model for integrating high-level academic studies with medical and health studies in cooperation with the community. Too often, high school health occupations programs focus on preparing students to be nurses' aides rather than taking advantage of students' interest in the broad field of medical and health care. A program such as the one in Texas can prepare students to enter a number of health and medical science careers.

Each North Side High School student spends two hours four days a week studying one-on-one with a "preceptor" at a hospital, clinic, health department, medical school, or other health-related site. Every six weeks, the student rotates to a new lab assignment. Students choose the sites or departments in which they will study.

Students experience a wide variety of career opportunities. During the preceptorships, they observe and assist doctors, nurses, psychologists, veterinarians, dentists, physical and occupational therapists, and hospital workers at more than 20 participating medical sites.

In this partnership with education, the medical professionals visit the high school to talk with freshman and sophomore magnet students, help plan health fairs, and judge science projects.

Students make daily entries in a journal and complete a project during each rotation. Both activities count toward a final grade for the period. Preceptors contribute up to 50 percent of the grade by evaluating students on punctuality and attendance, appearance, human relations skills, ability to follow instructions, and work quality.

Health occupations teachers meet with the preceptors at least weekly to discuss how the students are doing and what extra help they may need. Magnet teachers work with the students to correct any deficiencies.

Students begin the magnet experience as freshmen with a course called Health Careers Exploration. Since occupationally-specific courses are not taught in Texas schools in 9th grade, the program received special permission from the Texas Education Agency to offer the introductory course. Magnet students take Health Care Science in 10th grade and participate in the on-site lab rotation during their junior and senior years.

The academic curriculum includes four years of college preparatory English and four years of math, beginning with algebra or geometry in 9th grade and continuing through pre-calculus or calculus in 12th grade. Students take four years of science: biology is required in 9th grade, chemistry in the 10th, physics or anatomy/physiology in the 11th, and a two-hour Advanced Placement Biology and Lab Management or a two-hour Advanced Placement Chemistry and Lab Management course in the 12th grade. Tenth grade students choose a health care science elective or anatomy/physiology in addition to chemistry.

Students apply for the program in the spring of 8th grade. They qualify on the basis of aptitude and achievement tests, academic achievement, and school attendance and citizenship.

Each student must submit a recommendation form completed by a middle school teacher or counselor.

The program is in its eighth year in the Fort Worth school system. A total of 259 students were enrolled in the 1992-93 school year.

"These students like being able to participate in a program that focuses on the many opportunities that are available in the medical field," said Vivian Smith, Vocational Program Director for the Fort Worth Independent School District. "The qualifications are high, and coursework is advanced. Most of the students continue their education at a college or university."

The school system and a local junior college are working together to develop a tech prep strand for the program, Smith said.

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MEDICAL PROFESSIONS MAGNET PROGRAM
Fort Worth Independent School District, Fort Worth, Texas

GRADE 9	GRADE 10
English I or II Algebra I, Geometry I, or Algebra II Biology Foreign Language: Latin, French or Spanish Health Careers Exploration or Business Elective Fine Arts/Health Elective/Athletics	English II or III Geometry I, Algebra II, or Pre-Calculus Chemistry U. S. History Foreign Language Health Care Science Elective or Anatomy/Physiology
GRADE 11	**GRADE 12**
English III or IV Algebra, Pre-Calculus, or Calculus Physics or Anatomy/Physiology World History Health Occupations Lab – Preceptorship (2 periods) Computer Math or Elective or Foreign Language	English IV or AP English Pre-Calculus, Calculus I or II AP Government/Economics Health Occupations Lab – Preceptorship (2 periods) or AP Chemistry & Lab Management (2 periods)

PART 5

COMBINING ACADEMIC AND TECHNICAL STUDIES

Programs at Two High Schools Help Vocational Students Develop Problem-Solving and System-Thinking Skills

Employers are critical of high school graduates who lack the ability to solve problems, concentrate, and think in terms of broad technology systems. This includes career-bound students.

Representatives of two high schools told the audience at SREB's 1992 Fall Forum what their schools are doing to prepare career-bound students to meet new worksite requirements. They are doing this through new types of vocational programs that incorporate applied science and applied math courses into broad technology studies.

Area Vocational-Technical School in Drumright, Oklahoma

Central Area Vocational-Technical School in Drumright, Oklahoma, requires trade and technology students in six occupational fields to take Principles of Technology as an integral part of a three-hour daily block. (Principles of Technology is the applied physics course developed by the Center for Occupational Research and Development (CORD) and the Agency for Instructional Technology (AIT).)

Trade and technology students in five occupational fields at the Oklahoma school take the CORD-developed Applied Math course in conjunction with their studies.

"This approach has raised the ability of students to solve problems and relate their academic learning to the work setting," said Phil Waul, assistant superintendent at Central Area Vo-Tech. "The program has made our students much more employable."

Robin Carney, the Principles of Technology instructor, conducts daily lab sessions for students and their vocational teachers to relate scientific concepts to what they are covering in the occupational areas. Carney has found that these students are better able to solve problems and look up information than was the case when students simply learned the manipulations without knowing how to use them.

Principles of Technology is integrated into six fields: electronics, robotics and automation, commercial electricity and air conditioning, auto mechanics, cycle mechanics, and computer repair.

Students in the second year of auto mechanics, the first and second years of diesel mechanics, and in air conditioning, robotics, and electronics, take Applied Math from a technical skills math instructor who leads one period a day in the five technical classes. "We take the CORD Applied Math course one step further by using real problems from the vocational program where the course is being taught," Waul said.

Central Area Vo-Tech has transformed its former learning center into an applied technical skills lab where the learning specialists relate all academic studies to vocational instructional areas. For example, math principles are pre-

sented in terms of rafter length for carpentry students; a special math system known as apothecary is used in assisting health services students. The learning specialists meet with vocational teachers to find out what the students need. They learn the terminology of the various vocational fields so that they can talk in terms the students understand.

Lovejoy High School in Clayton County, Georgia

Technology instructor Dwayne Hobbs and Principles of Technology (applied physics) instructor Terry Carden of Lovejoy High School in Clayton County, Georgia, described a broad technology program of study aimed at developing self-motivated, lifelong learners who are technologically literate and have the foundation for further education in a variety of fields.

Students in the 9th and 10th grades are encouraged to take Introduction to Technology, a course the county created and was asked to pilot for the state. The course has replaced industrial arts. Students in 11th and 12th grade are encouraged to enroll in Principles of Technology and/or electronics.

In Introduction to Technology, students choose 6 to 8 rotations a year from these seven modules: computer-aided design, computer numerical control, lasers and fiber optics, robotics, electronics, applied technology (physics), and automation.

"Rather than spoon feed the instruction, we developed modules where the emphasis is on problem-solving," Hobbs said. "Each module is a stand-alone instructional unit containing written materials and equipment, such as computers and robots. We put the resources there and let the students decide how to use the manuals and equipment and what to do to complete the assignments. The approach is opposite of the way we taught in the past." Students work in pairs, tutor each other, and make oral reports.

"This new approach to technology instruction has resulted in a mixture of students taking the course," Hobbs said. "We have college prep pre-engineering students as well as career-bound students, and about half the students are female."

SUMMARY

Examples set forth at SREB's 1992 Fall Forum and in this report provide ways for *High Schools That Work* sites and other high schools to examine their old vocational programs and develop new programs to give students the quality of academic and technical preparation that business and industry expect. Major components of the new vocational programs are:

- **Integration of academic and vocational studies by allowing students to master higher level concepts in the context of a broad technical field.** New vocational programs allow students to work cooperatively to master complex tasks.

- **A link between high school vocational education and postsecondary schools.** The tech prep curriculum model allows students to pursue a concentration in high school that is connected to studies at a two-year institution. New vocational programs can be rigorous and accelerated enough to attract college preparatory students who want to study a subject in which they have great interest.

- **A link between the school setting and the work setting.** New vocational programs, such as youth apprenticeships, academies, and magnet programs, link quality learning on the job with an accelerated program of academic and vocational studies. Many times, the focus is on learning, not earning.

- **The curriculum is suited to the new economic order.** Students learn to solve problems, communicate with people inside and outside the workplace, adapt to changing conditions, and continue to learn on the job or in postsecondary education. Students gain an understanding of a wide range of occupational functions, not just one specific job.

High Schools That Work sites and other high schools that update their vocational programs can change the way they prepare career-bound students. These schools can begin producing students who are ready to enter and advance in the workplace and are capable of continuing to learn in another educational setting or at the worksite.

ACTION TAKEN BY SELECTED HIGH SCHOOLS TO OFFER NEW OR REVISED VOCATIONAL PROGRAMS

SREB's 1992 Fall Forum inspired *High Schools That Work* principals and vocational directors to revitalize their vocational programs, giving students a head start on high-skill, high-wage jobs. Here are some examples.

Christine Carder, assistant principal and vocational director at Wheeling Park High School in West Virginia, followed up on the graphic arts and automotive/autobody industry standards programs. "To begin the process of aligning our graphic arts curriculum with industry standards," she said, "we contacted a regional printing industry representative, who responded quickly with information and materials on the PrintED program. We want our career-bound students to have access to vocational studies that meet industry standards."

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Robert W. Harrison, assistant director of Berks Career and Technology Center in Pennsylvania, hopes the center will be one of the first 11 schools in the state's youth apprenticeship program. "We are also interested in the Ford Academy of Manufacturing Sciences and the industry standards for printing and construction."

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Scott Hannah, vocational director for Rockbridge County Schools in Virginia, will use the Georgia Department of Education's standards to develop a horticulture curriculum—a new specialty in the school's agriculture department in 1993-94. "We are installing a greenhouse in our new agriculture facility," Hannah said. "We plan to go all out in horticulture—with industry standards like the ones used in Georgia and with a close relationship between the school's science and agriculture departments."

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Apopka High School is one of 15 high schools selected by the Florida Department of Education to pilot a medical careers academy, beginning with the 1993-94 school year. **Principal Joe Joyner** said the academy, or school-within-a-school, will serve 300 students in the ninth and tenth grades in the first year. The two upper grades will be added later.

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Dennis Loftus, superintendent of the New Castle County Vocational-Technical School District in Wilmington, Delaware, said a task force of state education and labor department officials and representatives of the private sector is examining youth apprenticeship. The group is looking at apprenticeship models in Alabama, Arkansas, and other states. "The Fall Forum was an excellent catalyst for sharing stimulating ideas," Loftus said. "The task force began meeting in January and expects to submit a design for a new type of vocational program by May 1 for implementation in the fall of 1993."