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ABSTRACT

The practice and processes of articulated tech prep programs were examined in Spring 1991. Two major areas of focus were getting a general picture of the status of tech prep programs in the United States and learning about tech prep programs for at-risk students. A literature review focused on three areas: definition, background, and philosophy; characteristics and categories of at-risk students; and link between tech prep programs and at-risk populations. A survey was developed and mailed to 354 institutions in the United States. After a second instrument was mailed as a follow-up, a total of 200 institutions responded. Thirteen sites were selected for follow-up through case study observations. Findings showed that most tech prep programs were at the planning stage. The Perkins Act provided the skeletal form for all programs. Tech prep would take many forms but have a core of formal articulation agreements; core curriculum of math, science, technology, and communication; counseling component; and 2+2 program design. Primary clients had not been identified. Programs were building from established connections between educational institutions. A very positive aspect was the connection among faculty. The middle school was the beginning point for most programs; postsecondary institutions were passive in their involvement. No models had emerged. Barriers were similar to those faced by any innovation. As currently practiced, tech prep did not address the needs of at-risk students well. (Appendixes include 65 references and survey instrument.) (YLB)

National Center for Research in
Vocational Education

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EXECUTIVE SUMMARY

It is imperative that we develop more effective education and training alternatives for a much larger number of young people if we are going to meet the challenges of the 1990s and solve the twin problems of a surplus of disadvantaged individuals and a shortage of skilled workers. Too many of our young people end their schooling in high school; too few young workers have the necessary skills for employment. We must build a broader bridge for connecting alternatives of secondary and postsecondary systems. Articulated Tech Prep programs represent such an alternative and must be broadened beyond the scope of the academically able student to accommodate a much higher percent of the at-risk population.

The major purpose of this study was to examine the practice and processes of articulated Tech Prep programs as they existed in the Spring of 1991. There were two major areas of focus in the project: (1) getting a general picture of the status of Tech Prep programs in the United States and (2) learning about Tech Prep programs for the at-risk students.

The summary, conclusions, and recommendations which are based on a comprehensive literature review, national survey, case studies/site visits, and general observations of the project research staff are presented in five sections: (1) "Present State of Tech Prep," (2) "Taxonomy for Tech Prep Programs," (3) "Tech Prep Models," (4) "Barriers to and Enhancements of Tech Prep Programs," and (5) "Tech Prep Programs for the At-Risk." The summary, conclusions, and recommendations should be useful to anyone involved or planning to get involved in Tech Prep.

INTRODUCTION

This report describes the research activities, findings, conclusions, and recommendations of a two-year study on the identification and dissemination of articulated Tech Prep practices for at-risk students. The introduction includes a review of background information for, the purpose and objectives of, and definitions of terms used in the study. The next section of the report presents a review of related literature. The literature review has three foci: (1) the definition, background, and philosophy of Tech Prep; (2) the characteristics and categories of at-risk students; and (3) the link between Tech Prep programs and at-risk populations. The third section reports the methods used in the two-year study. The methods consisted of a national survey of existing Tech Prep projects and selected site visits, interviews, and observations. The fourth section of the study presents the findings and results of the national survey and the site visits. The last section of the report presents the summary, recommendations, and implications drawn from the research.

Background

For a decade and more, concerns have been expressed about the quality of education in America at both the secondary and postsecondary levels. Workforce preparation has been a particular concern as the nation's and the world's economies have slowed and showed signs of faltering. A number of writers (Johnston & Packer, 1987; Parnell, 1984, 1991; William T. Grant Foundation Commission, 1988) have identified the need to develop a technologically sophisticated workforce and the failure of existing educational systems to serve the needs of noncollege-bound youth as major societal problems which may have a common solution. Technical training for this "neglected majority" is proposed as that solution. This technical training is seen as the vehicle for addressing the twin problems of a surplus of disadvantaged and undertrained would-be workers and of a shortage of skilled workers.

The Carl D. Perkins Vocational and Applied Technology Education Act Amendments is the primary legislative vehicle for supporting this solution; and Tech Prep is the primary programmatic vehicle. The earlier Carl D. Perkins Vocational Education Act of 1984 supported the development of articulation agreements between

secondary and postsecondary institutions with technical programs. The 1990 Perkins legislation builds upon the initiatives developed under the earlier Perkins legislation, but Tech Prep is also seen as a part of broader educational reform efforts aimed at improved workforce preparation (Hoerner, 1991a). As an effort at systemic educational reform, one dimension of Tech Prep is the clear effort to include the noncollege-bound students—the "neglected majority" (Parnell, 1984) or the "forgotten half" (William T. Grant Foundation Commission, 1988)—as a major emphasis in educational programming. A further dimension of Tech Prep as systemic reform is the emphasis placed on including at-risk students in the opportunities offered by Tech Prep programming.

Several studies have looked at articulated programs (Hoerner & Horne, 1982; McKinney, Fields, Kurth, & Kelly, 1988; National Council for Occupational Education, 1989). Studies have addressed the role and importance of remedial and developmental programs (Clowes, 1984, in press; Clowes, Hinkle, & Smart, 1986). State and local educational agencies have developed articulation agreements and are now developing Tech Prep programs in a wide variety of technical areas. No studies are currently available that describe the status of Tech Prep programs as they are beginning to emerge, and no studies describe the status of early efforts to include at-risk students in the emerging Tech Prep programs. This study is intended to fill those voids.

Purpose and Objectives of Study

The major purpose of this study was to examine the practice and processes of articulated Tech Prep programs that provided the connective tissue between secondary and postsecondary education programs as they existed in the Spring of 1991 throughout the country. There were two major areas of focus in the project: the first was to get a general picture of the status of Tech Prep programs in the United States; the second was to learn about Tech Prep programs for the at-risk students.

Specifically, the study addressed the following objectives:

1. to identify operational criteria for Tech Prep programs in practice;

2. to determine the present status of Tech Prep;

3. to develop a taxonomy for Tech Prep, including
   - clientele being served,
   - institutional connection processes,
   - programs, and
   - common and unique strategies;

4. to identify the barriers to and enhancements of institutional cooperation among schools, colleges, and business organizations that support the determination of models to be recommended;

5. to identify alternative models and strategies for the broad array of at-risk students;

6. to identify specific incentives for recruiting and retaining at-risk students in the education/training pathway, including cooperative business/industry partnerships; and

7. to disseminate information and recommendations for practice.

Definitions of Terms

For the purposes of this study several terms were defined. It was especially necessary to incorporate a definition of "at-risk" to use in the survey conducted in the Spring of 1991 since at-risk can mean many things to many people. The definition below was essentially what was given in the Perkins Amendments. It was also necessary to establish a working definition of a "Tech Prep program" for the 1991 survey. Again, the definition was gleaned from the Perkins Amendments. There is disagreement on the best definition for Tech Prep; however, the one below was used for the survey and for this research.

For the purposes of this study, we define the necessary terms as follows:

- *Articulation Agreement*: A commitment between institutions to a program designed to provide students with a nonduplicative sequence of educational achievements leading to competencies in a Tech Prep program.

- *At-Risk*: Those students who have dropped out of school or dropped out and re-entered, minority students, students whose primary language is other than English, handicapped students, and disadvantaged students.

- *Postsecondary Institutions*: Public and private educational institutions designed to serve students who have completed secondary school. These institutions may include community and technical colleges, postsecondary technical institutes, postsecondary vocational centers, proprietary schools, and institutions offering apprenticeship programs of at least two years beyond secondary school.

- *Tech Prep Program*: A program consisting of two years at the secondary level and two years at the postsecondary level in higher education or apprenticeship training which includes a common core of mathematics, science, communications, and technologies and leads to an associate degree or a certificate in a specific career.

Limitation of Study

The study had one major limitation. Since the Perkins Amendments did not provide funding for Tech Prep until July 1991, the projects identified for this study were started under the Perkins Act. The act did not provide specific setaside funding for Tech Prep. The act did, however, provide for 2+2 articulated vocational programs between secondary and postsecondary programs. This study was conducted on Tech Prep programs identified by state directors and the researchers as being in existence in the Spring of 1991. Although the researchers believe the 354 institutions identified as lead institutions in a Tech Prep consortium represent a realistic sample of existing Tech Prep programs, there is potential for bias. Earlier articulated programs developed under the Perkins Act may be overrepresented. The timing of this study may distort program features since provision for at-risk students may be made at a late stage in the development of Tech Prep programming and this study could only include the early stages of Tech Prep programming for most institutions.

LITERATURE REVIEW

The review of literature explores three issues as they relate to this project. First, the definition, background, and philosophy of the Tech Prep education initiative are examined. Next, the characteristics and categories of at-risk (special needs and skills deficient populations in our nation's educational settings) are investigated. The final section discusses the link between Tech Prep programs and the at-risk population as well as the barriers to programmatic success.

Tech Prep

Tech Prep 2+2 programs are seen as a link between secondary schools and community colleges in preparing people for technical careers for the twenty-first century (Key, 1989; Parnell, 1991; Scott, 1991; Wimmer, 1988). The national commitment to this concept is evidenced by the passing of the 1990 Perkins Amendments and its substantial funding in Congress. This legislation authorized federal funds to the states and territories for the support of Tech Prep.

Educational institutions at every level are experiencing external pressures from business and industry; labor; and national, state, and local governments to implement change while increasing program quality, accountability, and effectiveness. Tech Prep programs are viewed by many in education as an avenue and strategy for change, reform, and even educational revolution (Council of Chief State School Officers, 1991; Hoerner, 1991a).

Tech Prep Defined

The Perkins Act addresses Tech Prep education and stipulates the requirements for these programs. The act defines Tech Prep programs as consisting of two years at the secondary level plus either two years of higher education or at least two years of apprenticeship training, with a common core of mathematics, science, communications, and technologies and leading to an associate degree or certification. Some of the program goals set forth in the Perkins Act are that (1) an articulation agreement must be developed between the educational agencies involved in the program, (2) training programs must be provided for both teachers and counselors, and (3) equal access must be available for

special populations. Special considerations for funding are to be given to those programs addressing the at-risk and minority populations, involving business and industry, and providing employment placement to students or transfer of students to four-year baccalaureate programs.

The literature strongly suggests that there is no consensus on how to define Tech Prep programs. At the Tech Prep workshop held in October of 1990 in Hagerstown, Maryland, Maurice Dutton's presentation provided evidence of the many different programs in existence; related programs include articulation, 2+2 articulation, 2+2 Tech Prep/associate degree, 2+1 articulation, 1+2 articulation, 4+2 articulation, Tech Prep 2+2 or 4+2, and 2+2+2 articulation. The numbers refer to the years of school at each level—for example, 2+2+2 refers to two years of high school, two years at a community college, and two years at a university.

A 1991 delphi study conducted in California indicated the difficulty of defining Tech Prep. The study failed to develop a consensual definition of 2+2 programs. The study reported

> that because the label *2+2* has been used broadly within the field, that what ought to constitute a 2+2 program is not clear: there is no general agreement about what the essential components of such a program are (Ramer, 1991, p. 1).

Additional definitions in the Tech Prep literature refer to various unique components such as business and industry linkages, general occupational skills, specific job training, applied technology education, high technology, sequential course of study, and apprenticeship training (Bragg, 1991; Center for Occupational Research and Development [CORD], 1991; Hammons, 1992; Hoerner, 1991; Hoerner, Clowes, & Impara, 1991; Hull, 1991; North Dakota Tech-Prep Initiative, 1991; U.S. Department of Education, 1991).

While a number of states have developed their own definition for Tech Prep, there is a lack of consensus on a definitive definition. As a result, each educational agency and/or consortium has flexibility when developing Tech Prep programs, thus making each program adaptable so that education, business, industry, and government can mold the program to meet their collective regional needs. However, the issue has been raised

about whether federal policymakers or state leaders should establish further definitions of and restrictions on what constitutes Tech Prep programs (Grubb, 1991).

Background of Tech Prep Programs

While Tech Prep is a relatively new concept for education in our nation (Parnell, 1984, 1985), the ideas behind Tech Prep are not entirely new. Tech Prep may be traced back to 1925, when a similar concept was introduced by Leonard Koos in *The Junior College Movement.* Koos proposed a "6+6+4" plan which called for six years of elementary school, four years of middle school, and four years of high school/junior college work (Vaughan, 1985). Another citation in the literature mentioned the longevity of the Tech Prep concept: Successful developmental programs had been in operation for over twenty years (Feldman, 1988).

The Tech Prep concept has some of the characteristics of the career education conceived in the 1960s and 1970s and actually evolved from the articulation movement of the 1970s. Articulation is a process for coordinating the linking of two or more educational systems within a community to help students make a smooth transition from one level to another without experiencing delays, duplication of courses, or loss of credit (CORD, 1991).

An example of the evolution of Tech Prep from articulation is referenced in the literature. In the Commonwealth of Virginia, formal articulation agreements between secondary and postsecondary institutions have existed for two decades. From these agreements, the creation of a 2+2 model for comprehensive articulation has evolved.

The 2+2 plan was fueled by business and industry demands for professionally trained workers requiring more skills than two years of secondary training could develop (Virginia Department of Education, 1987-1988). Some states have not had the success with articulation that Virginia enjoys. For example, the attempts at articulation in California have not been widely successful. When they have occurred, they were done "sporadically and on a course-by-course basis" (Ramer, 1991, p. 13). "Stubborn provincialism" (Parnell, 1984, p. 9; 1985, p. 134) was seen as a cause of failure of many of these programs.

Examples in the literature which noted the indiscriminate use of the term "articulation" include the use of "2+2 articulation" to refer to many types of articulation, including advanced placement, Tech Prep, 2+2, and 2+2+2 programs (CORD, 1991) and "Tech Prep" as an advanced skills articulation model (Lankard, 1991). The term "articulation" has become synonymous with Tech Prep because of agreements which link secondary and postsecondary institutions (National Council for Occupational Education, 1989). The Perkins Act, with its inclusion of applied academics and advanced technical skills training, creates Tech Prep programs that are now designed to advance students beyond the coursework offered by traditional 2+2 articulated programs (Hull, 1991).

Philosophy of Tech Prep Programs

The current Tech Prep philosophy is credited to Dale Parnell (Hammons, 1992; Hoerner, 1991b; Hull, 1991; Scott, 1985, 1991; Shapiro, 1986), who announced the program in his book *The Neglected Majority* (1985). The common theme among Tech Prep 2+2 programs is to preparation of students for both higher education and the workplace. To accomplish this, the programs must develop applied, articulated, academic, and technical coursework for students in grades eleven through fourteen, although some programs begin an exploration process for students entering the program in their middle school grades. Generally, students enter the program as high school sophomores. After graduation from high school, they may choose either to receive apprenticeship training or continue with a postsecondary education and graduate with an associate degree. The program's coursework stresses heavy concentrations of applied math, science, communication, and technology skills and technical job training. Another characteristic of Tech Prep programs is that they involve business, industry, labor, and government agencies in the development and advisory process of these programs (Hull & Parnell, 1991).

Tech Prep programs are not designed to replace college prep programs but rather to offer students an alternative to higher education through technically skilled occupations. About one third of all high school students are in college prep curricula and continue their education at a traditional four year college. Another quarter of high school students plan to enter the workforce directly after graduating, and the remaining forty percent follow a general curriculum with little focus and preparation for either the workplace or higher education. The student enrolled in a general high school academic

track is the primary audience for Tech Prep programs (Hull & Parnell, 1991; Parnell, 1985).

There are three major approaches for advanced education and skills training in Tech Prep programs. The first is called the Advanced Placement Program, also known as the time-shortened program. The program grants students advanced placement in postsecondary programs, offering them a number of advantages. These include the elimination of coursework redundancy, which decreases the time spent at a postsecondary institution. The second major approach is called the Advanced Skills Program. This approach, unlike Advanced Placement, does not offer a shortened program but does offer students advanced placement at the postsecondary level with advantages: reduced coursework redundancy, advanced training, and exposure to higher level occupational skills. The third approach is the apprenticeship model which offers students an alternative in the form of advanced training outside the traditional postsecondary educational setting. The apprenticeship model offers its own advantages: applied academics and vocational skills training in high school and at least two years of apprenticeship training after high school leading to a certificate (Dutton, 1991).

The general philosophy of the national Tech Prep initiative establishes a series of goals which may give all of education a much needed boost in addition to providing an opportunity to implement change. One major Tech Prep goal is the development of linkages between educational institutions and environments, allowing students to move from one level of learning to another without unnecessary repetition or duplication of coursework. The most obvious connection is the linkage between secondary and the postsecondary institutions. There is additional incentive and emphasis written into the Perkins Act to extend and encourage these linkages to include four year colleges and universities. Bringing these various educational environments together along with their vocational and academic faculty and staff allows for a working interaction and dialogue long overdue in the profession. This interaction among all parties is said to be one of the most rewarding experiences of the Tech Prep initiative (Hammons, 1991).

Another major goal of Tech Prep is to prepare students to assume the roles of a highly skilled workforce, which can be a competitive advantage for the twenty-first century. This goal fits perfectly into the country's new national strategies for attaining educational excellence, the *National Goals for Education* (1990) and *America 2000: An*

Education Strategy (1991), because both stress the need for Americans to possess the knowledge and skill necessary to compete in a global economy. Tech Prep programs are focused to attract nearly one half of all high school students who are enrolled in the noncollege-bound general curriculum, which "provides neither strong academic nor vocational skills" (National Center on Education and the Economy, 1990, p. 46). The primary approach used by the Tech Prep initiative to facilitate the emergence of a highly skilled workforce has been the development of a competency-based, relevant curriculum. In addition, the Tech Prep initiative has begun the process of integrating applied math, science, communications, and technology concepts into the curriculum. By using this type of applied, integrated curriculum, it is expected that Tech Prep programs will reduce school dropout rates; structure and substance will be provided to the ordinary learner; and students will be assisted in developing sound lifelong learning skills and knowledge while obtaining technical education preparation (Shapiro, 1986). If successful, Tech Prep may well be the educational sequence for supplying highly technical vocational teachers in the future (Welch, 1991, p. 20).

Philosophically, the goals outlined in *National Goals for Education* (1990) and the basis for Tech Prep are very similar in nature (Hoerner, 1991a). Both emphasize higher education in the areas of math, science, and literacy skills for *all* students. The basic philosophy behind Tech Prep is to provide an avenue for our nation's nonbaccalaureate youth to pursue further learning and productive employment (Parnell, 1985). Currently, our nation has no system which can set high academic standards and assess achievement against these standards for the student who is not college bound—the nonbaccalaureate (National Center on Education and the Economy, 1990).

At-Risk

Over nine years ago, the term "at-risk" became a household word with the publication of *A Nation At Risk* by the National Commission on Excellence in Education (1983). This document, like no other in recent history, has had a profound effect on our nation's educational system, with assertions that every citizen may be at-risk if society is unable to fulfill the following promise:

> All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost. This promise means that all children by virtue of their

> own efforts, competently guided, can hope to attain the mature and informed judgement needed to secure gainful employment, and to manage their own lives, thereby serving not only their own interests but also the progress of society itself. (p. 8)

Currently, each state has educational reform efforts under way that target the improvement of school to workplace transition (Council of Chief State School Officers, 1991).

Characteristics of the At-Risk

Many terms are used which describe a particular characteristic or a personal attribute exhibited by the at-risk population and many are often used interchangeably: forgotten half, neglected majority, disadvantaged, special needs, low-achieving, displaced, economically depressed, handicapped, dropouts, special populations, minorities, and limited English proficiency are but a few of the terms used to describe this population (Blum & Spangehl, 1982; Brown, Asselin, Hoerner, Daines, & Clowes, 1992; Carl D. Perkins Vocational and Applied Technology Education Act Amendments, 1990; Lieberman, 1989; National Assessment for Vocational Education [NAVE], 1989; Parnell, 1985; William T. Grant Foundation on Work, Family, and Citizenship, 1988). From these characteristic terms there emerge two broad categories of at-risk persons. The first category is the special needs populations that include the physically, mentally, and emotionally handicapped. The second category includes those individuals who lack the skills necessary to participate in our nation's highly technological and competitive workforce. Both categories of individuals are in need of special assistance to help overcome their particular at-risk characteristics.

Special Needs Populations

An example of the special needs population served by vocational education is given in the NAVE (1989) final report, *Handicapped and Disadvantaged Students: Access to Quality Vocational Education.* The purpose of this document was to report the findings used to "evaluate the access of special needs students to high quality high school vocational programs, along with any supportive services these students might need in order to succeed in those programs" (p. 1).

Chapter 2 of the NAVE report deals with the vocational enrollment patterns of handicapped students. These students are classified by the characteristics they exhibit.

For example, cognitive ability is rated according to the severity of the individual's disability. Other students with handicaps are classified as having either sensory or orthopedic difficulties, other health problems, or multiple handicaps. The data provides a demographic profile of these handicapped individuals. Handicapped students were more likely to be male or African American and somewhat less likely to be white or Hispanic than other high school students. They tended to be older than their nonhandicapped peers. Nearly all of the enrolled high school handicapped students had conditions (learning disabilities, mental retardation, or serious emotional disturbances) that inhibited their basic skills achievement. As judged by special education teachers, more than seventy-five percent were performing less than high school level math, and nearly seventy-five percent were reading at less than high school level. Less than sixty percent of the credits earned by the handicapped students were from mainstream courses. Over eighty-one percent of their vocational credits were earned in mainstream courses. The dropout rate for handicapped students was significant. In their senior year of high school, more than twice as many handicapped students dropped out of school as did their nonhandicapped peers.

Section 3 of this same report defines and profiles the disadvantaged vocational high school students. Each of these students is categorized as either academically disadvantaged, academically nondisadvantaged, or academically advantaged. The delineation for each group was based entirely on a four-point grade scale. The criteria for each of the three categories were, respectively, 2.0 or less, 2.0 to 2.9, and 3.0 or higher. Using these criteria, a demographic profile of the academically disadvantaged relative to the advantaged student was presented. The academically disadvantaged were more than five times as likely to be African American and three times as likely to be Hispanic as high achieving students. Males made up the majority of academically disadvantaged students and twenty percent of academically disadvantaged students were nineteen years of age or older in the twelfth grade, compared to only three percent of the high achieving students. Additionally, fewer of the academically disadvantaged graduated with their class, and nearly thirteen percent dropped out during their senior year, compared to a dropout rate of less than one percent for the academically advantaged.

Skills Deficient Population

The second broad category of at-risk students includes those individuals who lack the skills necessary to participate in our nation's highly technological and competitive

workforce. This point has been accentuated by business and labor leaders who point out that our nation's young people are not even prepared for present jobs, let alone the more challenging jobs of the future (Dole, 1989; Kerns, 1988). Large numbers of individuals are included within this at-risk group. A report prepared by the William T. Grant Foundation Commission on Work, Family, and Citizenship (1988), *The Forgotten Half*, speaks of approximately twenty million young Americans who are not likely to attend college. These individuals who lack advanced technological and learning skills will be locked out of the higher paying jobs. This report also highlights the correlation between low educational attainment and low income. Another example is given by Parnell (1985) in *The Neglected Majority*, which suggests the majority of students enrolled in an unfocused general high school track "which relates to nothing, leads to nothing, and prepares for nothing" (p. 37) should certainly be included within this at-risk population.

A projection of the labor force required for the twenty-first century was provided by the Bureau of Labor Statistics (1989) and paints a picture of dramatic demographic change for our nation. The nation's labor force growth rate is slowing, and a drop from 2% to 1.2% growth is anticipated by the year 2000. Minority workers in the workplace will continue to increase with Hispanics showing the largest growth rate of three percent and African Americans, Asians, and others growing at a steady one percent in the next decade. Women will claim a larger share of the workplace with steady growth to the year 2000, at which time women are predicted to occupy forty-eight percent of the labor market.

The predicted age of our workforce is in dramatic contrast to what we have experienced historically. The workforce is getting older, with fewer young people filling the void. For example, in 1988 the sixteen to thirty-four year age group constituted forty-eight percent of the workforce population while the remaining fifty-two percent was thirty-five and older. Projections for the year 2000 show startling numbers. The sixteen to thirty-four year age group will only hold a thirty-eight percent share of the workforce while the thirty-five and older group will have a sixty-two percent share. Additionally, the number of Americans over age sixty-five now surpasses the number of American teenagers, and this fact is not expected to change in our lifetime.

The educational requirements for our future workforce are increasing. In 1988, only forty-two percent of jobs required more than a high school education, with a median

school year requirement of 12.8 years. In the year 2000, over fifty-two percent of the jobs will require more than a high school education with an increase in median school year requirement to 13.5 years. Yet, of the top eight projected fastest growing occupations between 1988 and 2000, only one occupation currently requires a four-year college degree.

In addition to the traditional occupational skills required to be successful in the workplace, reports are being produced in conjunction with business, industry, labor, and sometimes education saying that these traditional occupational skills are not adequate for the future workplace. A much cited example is *Workplace Basics: The Skills Employers Want* (Carnevale, Gainer, & Meltzer, 1988), which suggests an educational model that consists of seven required basic skill groupings. The first skill grouping forms the foundation of the continuum for learning that will be necessary for the worker of the twenty-first century. This concept of learning to learn is the basic ingredient for a worker's adaptability, productivity, innovation, and competitiveness within the future workforce. The second step of the model is called three-Rs competence: reading, writing, and computation. The third step is communication: listening and oral communication. The fourth step is the inclusion of adaptability: creative thinking and problem-solving. The fifth step involves personal management: self-esteem, goal setting/motivation, and personal/career development. Step six is group effectiveness: interpersonal skills, negotiation, and teamwork. The last step is influence: organizational effectiveness and leadership.

Other publications are similar to *Workplace Basics* (Carl D. Perkins Vocational and Applied Technology Act Amendments, 1990; Parnell, 1985; Secretary's Commission on Achieving Necessary Skills [SCANS], 1991; William T. Grant Foundation, 1988); however, the common theme of each addresses the issue that the individuals who will comprise the future workforce must possess the skills necessary for lifelong learning, which is increasingly more important when research suggests that the average future worker is projected to change jobs 6.8 times and occupations three times within a lifetime. Furthermore, industry will, as a norm, retrain employees several times during a career.

The Link Between Tech Prep Programs and the At-Risk Population

Title II of the Perkins Amendments addresses as one of its priorities the access to vocational programs for at-risk populations. Within Title III of the Perkins Amendments, Tech Prep, Part E, challenges state officials to give special consideration for funding to programs that address issues of dropout prevention and re-entry; minority youth needs; and youths with limited English proficiency, disadvantages, and handicaps. In addition, the program supports strategies established by the Perkins legislation for Tech Prep; and the strategies to accommodate at-risk populations are, in many instances, identical.

Tech Prep and At-Risk Strategies

There are many strategies noted in the literature designed to benefit the at-risk individual within a learning environment. Examples of these strategies include remedial and developmental coursework, mentoring, articulated programs, alternative satellite learning programs, financial assistance, effective and timely transfer counseling, stronger academic preparation and basic skill development, instructional prescriptions based on assessment, content based instruction, career exploration, and transitional re-entry and retraining programs for dropouts (Blum & Spangehl, 1982; Budig, 1986; California State Postsecondary Education Commission, 1985; CORD, 1988; Lieberman, 1986; Powell & Kelly, 1989; Roueche, Baker, & Roueche, 1986; Taylor, 1985; Von-Destinon, 1983; Warmbrod & Long, 1986; William T. Grant Foundation, 1988).

The Perkins legislation for Tech Prep programs has encouraged strategies to provide program access for every student. Some strategies are encouraged because they contribute to providing access to training programs for both teachers and counselors to assist with recruitment, placement, student retention, and dropout prevention; to providing for preparatory and remedial services for all participants; to linking business, industry, labor; to effective employment/placement activities; and to competency-based instruction and integrated vocational and academic curricula. Brown et al. (1992) support the conclusion that

> support services for learners with special needs are intended to be an integral component of Tech Prep programs and that these programs are intended to provide a mechanism for helping special populations enhance their status in the workplace. (p. 23)

The literature also notes barriers to the success of both Tech Prep and initiatives to facilitate at-risk populations: lack of academic preparation to succeed in college; turf battles; rifts between colleges and high schools that neither meet the needs of the other or of students; lack of communication among all involved; lack of funding, staffing, faculty training, teaching materials, and resources; inaccurate methods for separating those students who have the skills (aptitude) to do academic work from those who need remediation; state leadership; scheduling conflicts; and community college image (Lieberman, 1989; Parnell, 1985; Payne, 1989; Scherini, 1985; Von-Destinon, 1983).

RESEARCH METHODOLOGY

Overview

This project was planned as a twenty-one month enterprise. The first year of the project centered around gathering the data that presently existed regarding articulated Tech Prep programs and analyzing it to determine their present status. Data was sought through various methods, including a reputational survey of information and programs that existed in states with articulated Tech Prep programs and project reports of state and federally funded Tech Prep programs. In addition, the available materials from the defunct American Association of Community Colleges (AACC) National Tech Prep Clearinghouse in Pendleton, South Carolina were obtained. A comprehensive literature review, including an analysis of the barriers to and enhancements of institutional cooperation among schools, colleges, and business organizations was also conducted. The project staff also sought as much information as possible through participation in and attendance at various regional and national professional conferences that included programs and activities related to Tech Prep: AACC, National Council for Occupational Education (NCOE), American Technical Education Association (ATEA), American Vocational Association (AVA), Association for the Study of Higher Education (ASHE), American Association for Higher Education (AAHE), and National Association of Developmental Education (NADE).

From the national survey and the other data collected, fifteen sites were selected to serve as potential sites for case study and further observation. Thirteen from the list were selected and observed as part of the study.

The National Survey

The national survey effort consisted of first developing an instrument to survey the existing Tech Prep programs in the United States as of Spring 1991. The instrument was developed with the help of a practitioner's steering committee of five individuals working with current Tech Prep programs. The practitioner's committee was asked to react to a draft instrument developed by the project staff. After a four hour meeting of project staff and the practitioner steering committee, the project staff prepared a second draft which was again reviewed and completed by the practitioner committee. Following the second practitioner input, the instrument was prepared for national distribution (see the appendix for a copy of the instrument).

Three hundred and fifty-four institutions were identified by contacting the fifty state directors of vocational education who identified the current Tech Prep programs in each state. Eleven states reported not having any Tech Prep programs as of July 1991. The survey instrument was then mailed to the 354 institutions identified. After four weeks, a second instrument was mailed as a follow-up to those who had not responded. Two hundred institutions responded, representing a fifty-six percent return.

Case Study/Site Visits

Based on the analysis of the two hundred national survey responses, fifteen sites were identified for follow-up through case study observations. These sites were selected by the project staff on the basis of reported activity for at-risk students and stage of Tech Prep program implementation. Also, geographic location and rural/urban status were used as criteria for selection. Thirteen institutions were actually selected, providing a reasonable balance between rural/urban representation and a fair representation geographically of northeastern, southeastern, midwestern, southwestern, and northwestern institutions. The observations and analyses of the site visits are provided in the "Findings and Results" section of this document.

Analysis of Data

The national survey was analyzed and tabulated for simple frequencies of responses to the twenty-three items to which a quantitative response could be provided. Items 24, 25, and 26 were qualitative responses and were analyzed for their content. The analyses of the national survey is reported in the "Findings and Results" section.

The case study/site visits were audiotaped and anecdotal notes were taken by the project staff facilitator. The project staff analyzed the site visit tapes and anecdotal records.

FINDINGS AND RESULTS

The following discussion includes a comprehensive review of the overall findings and results of this two-year study. The major purpose of the study was to identify models and strategies that work for a broad array of clients, including at-risk populations, in order to further the Tech Prep initiative in providing a more effective educational pathway for a greater number of youth. The study specifically set out to (1) identify operational criteria; (2) determine the present status of Tech Prep; (3) develop a taxonomy, including clientele being served and institutional connection processes, programs, and common and unique strategies; (4) identify barriers to and enhancements of institutional cooperation; (5) identify models and strategies for a broad array of at-risk students; and (6) identify specific incentives for recruiting and retaining at-risk students. To meet the major purpose and specific objectives of the study, two major strategies were used. First, a national survey was developed and conducted of 354 institutions that were identified as having Tech Prep programs. The second major approach to collect further information for the study was to conduct case study/site visits to probe further for specific Tech Prep practices. What follows is a discussion of the findings and results from the national survey and the case study/site visits.

National Survey

During June and July of 1991, the 354 institutions that had been identified as having articulated Tech Prep programs were mailed copies of the national survey instrument (see the appendix for a copy of the instrument). Two hundred institutions, or fifty-six percent, returned the completed instrument. The two hundred institutions reported a total of 238 Tech Prep programs. Eleven states of the fifty contacted reported not having Tech Prep programs as of July 1991.

Item 1 – Date of first students

Approximately fifty percent of the 238 Tech Prep programs identified were started during the last three years (1989, 1990, 1991). One program was started as early as 1976, and one started in 1978. Ten percent of the institutions reported plans to start additional programs during the period between 1991 and 1993.

Item 2 – Occupational focus of program

Approximately fifty percent of the 238 programs reported by the 200 institutions were occupationally specific. The other fifty percent were reported as being nonoccupationally specific or as having a multi- or general occupational focus.

Item 3 – Program brochure

One hundred nineteen, or fifty percent, reported having a brochure for their Tech Prep program.

Item 4 – Identification of activities focusing on at-risk students

Of the 238 programs, 113, approximately fifty percent, reported having or planning secondary or postsecondary activities to focus on at-risk students.

Item 5 – Configuration of Tech Prep program

Approximately fifty-seven percent, 135 programs, were reported as being 2+2 programs (two years high school plus two years postsecondary). Thirty, approximately twelve percent, of the 238 programs were reported as being 2+2+2 type programs (two years high school, two years community college, and two years university level). The rest, approximately thirty-one percent, reported being some other combination or configuration.

Item 6 – Written articulation agreement

Approximately eighty percent of the 238 programs had an articulation agreement. The other, approximately twenty percent, reported no agreement.

Item 7 – Number of secondary schools, school systems, and postsecondary institutions participating in Tech Prep programs

Thirty-three did not respond to Item 7. Of the 167 respondents, the number of secondary schools in the systems ran from 1 to 43, and the number of postsecondary institutions varied from 1 to 9. There seemed to be no particular pattern in the number of institutions.

Item 8 – Stage of development

Approximately fifty percent, 120 programs, were reported as having been in operation one year or more. The other fifty percent were reported as just getting started and in operation for less than one year. Twenty percent of the 120 reported having some graduates from at least one postsecondary occupational area.

Item 9 – Grade level at which students are informed about Tech Prep programs

Of the 120 programs in operation for one year or more, thirty-five percent reported informing students about Tech Prep in seventh and eighth grade. About forty-five percent informed their students in grades nine and ten. The other twenty percent reported a combination of other times for helping students learn about Tech Prep.

Item 10 – Number of students currently enrolled in Tech Prep

The 120 institutions reported a total of 29,971 secondary and 4,234 postsecondary students enrolled in Tech Prep programs.

Item 11 – Program approach

Item 11 dealt with determining whether the Tech Prep programs are advanced placement (time shortened), skill enhanced, or a combination of the two strategies. Thirty-six percent of the 120 programs reported using advanced placement. Twenty percent reported using skill enhanced and forty percent reported using a combination of the two strategies.

Item 12 – Indications of curriculum offerings

Forty-five percent at the secondary level and twenty-five percent at the postsecondary level are offering applied math for Tech Prep. Thirty-five percent of the secondary and seventeen percent of the postsecondary are using applied science for Tech Prep. Forty percent secondary and eleven percent postsecondary are offering principles of technology. Forty-seven percent secondary and thirty percent postsecondary are offering applied communication.

Item 13 – CORD materials

Item 13 dealt with determining whether CORD (Center for Occupational Research and Development) applied academic materials were being used. Thirty-eight percent of the 120 institutions operating one year or more indicated that the CORD materials were being used for applied academics.

Item 14 – Tech Prep track

Fifty-five percent of the 120 institutions reported having a Tech Prep track, and an additional thirty-seven percent indicated that they were planning a Tech Prep track as an option.

Item 15 – Using business and industry

Twenty percent reported having no employer participation at this point in time. Eighty percent reported having employer participation.

Item 16 – Occupational specialization

Thirty-two percent of the institutions reported that all Tech Prep students specialize on the secondary level. Sixty-eight percent indicated that on the secondary level, they offered a common core or mixture of core and limited occupational specialization for the secondary students.

Item 17 – Administrator

Ninety percent of the 120 institutions reported having an assigned coordinator/administrator. Fifty-eight percent of the coordinators are part-time, twenty-nine percent are full-time assigned, and the remainder are a combination.

Item 18 – Location of administrator

Nineteen percent of the Tech Prep administrators are employed at the secondary level, sixty-four percent are employed at the postsecondary level, and fifteen percent having an assignment that is some combination of the two.

Item 19 – Job placement

Fifty percent of the 120 institutions operating one year or more reported that job placement was part of the Tech Prep program and the other fifty percent reported that it was not part of their program.

Item 20 – At-risk students

Fifty percent indicated that they have identified some at-risk students in their programs at the secondary or postsecondary level. Approximately fifty percent of the 120 institutions indicated that at-risk students are not identified specifically in their Tech Prep programs.

Item 21 – Specific activities for at-risk students

Thirty-four percent of the institutions reported having special activities for at-risk students; whereas, sixty-seven percent reported not having specific activities for the at-risk.

Item 22 – Starting level of activities for at-risk students

Fifty-five, or forty-six percent, of the 120 programs reported having something for the at-risk student, with the majority of the activity starting in the tenth grade or earlier.

Item 23 – Evaluation

Of the 120 programs that have been in operation one year or more, sixty-one percent reported that they have an evaluation plan.

Survey Findings and Research Objectives

To analyze the national survey in relationship to the research objectives of the study, the following discussion is divided into four sections. The first, "The Present Status of Tech Prep Programs," is a discussion that covers objectives one and two, which dealt with identifying operational criteria and determining the present status of Tech Prep. The second section, "Toward a Taxonomy of Tech Prep," reviews objective three, which dealt with developing a taxonomy for Tech Prep addressing clientele served, institutional connections, programs, and common and unique strategies. The third section, "Barriers to, Enhancements of, and Models for Tech Prep," addresses objectives four and five, which addressed barriers and enhancements that support models and strategies for at-risk students. The fourth section, "Tech Prep Programs and the At-Risk Student," addresses objective six, which dealt with identifying specific activities for the at-risk.

The Present Status of Tech Prep Programs

It is important to again remember that this national survey was conducted in June and July of 1991, when new Tech Prep programs were just getting started as part of the Perkins Act. As a result, the bulk of the programs responding to this study were begun under the Perkins Act.

Based on the best search that the research staff could make during early Spring 1991, 354 institutions were identified as having an articulated Tech Prep type program, with eleven states reporting no Tech Prep programs at that time. Two hundred institutions (56%) did respond to the survey and report that they collectively represented 238 Tech Prep programs. Over fifty percent of the 238 programs, however, were started during the years of 1989, 1990, and 1991. So, it is reasonable to state that Tech Prep is still a very young concept with the bulk of the programs less than three years old. As a result, many of the programs surveyed were still in their planning stages or just beyond.

However, based on the survey, several things can be said about the sample of approximately one half of the Tech Prep programs in the country as of mid-1991. First, about fifty percent reported being occupationally specific and that they had special activities in their programs that focused on at-risk students.

Another interesting aspect of the programs that existed in 1991 was that a little over half were 2+2 and only twelve percent were 2+2+2. Yet, the new legislation (the Perkins Amendments) said special consideration should be given to those programs that transferred to four-year baccalaureate programs. The Perkins Amendments also require that all Tech Prep programs include an articulation agreement between secondary and postsecondary institutions. However, twenty percent of the programs reporting in the 1991 survey indicated that they did not have an articulation agreement.

Of the fifty percent of the responding programs that have been in operation for one year or more, there are several things that can be said. About half (45%) tend to inform their students about Tech Prep in grades nine and ten. About one-third (35%) are informing students in grades seven and eight.

Another aspect of Tech Prep programs dealt with the connective arrangements between secondary and postsecondary levels. This study found that the majority (76%) are using the advanced placement strategy or a combination of advanced placement and skill enhanced strategies, with only ten percent using the skill enhanced strategies.

Another intriguing part of the profile dealt with the use of applied academic materials. With forty percent of the secondary schools using the principles of technology curriculum, thirty-five percent are using applied science, and twenty-five percent are using applied math for Tech Prep on the secondary level. It appears that from thirty-five to forty-five percent of the high schools are using applied communications, applied math, applied science, and principles of technology; whereas, twenty-five percent or less of the postsecondary programs are using applied academic materials. About one third of the programs reported using CORD materials for applied academics.

There are a few other interesting findings relating to current status. The majority of the institutions, ninety-two percent, have a Tech Prep track; fifty percent have job placement as part of Tech Prep; and eighty percent have employer participation.

Some findings relate to administrative structure: ninety percent of the institutions have an assigned coordinator/administrator; however, about half (58%) are part-time assignments and twenty-nine percent are full-time assignments. Also, the majority (61%) of the coordinators/administrators are employed at the postsecondary level.

About fifty percent of the programs reported that they have identified some at-risk students in their programs. The other half (47%) indicated that the at-risk are not identified in their Tech Prep program.

Toward a Taxonomy of Tech Prep Programs

The national survey did not yield sufficient data to generate a comprehensive taxonomy of clientele served, connection processes, programs, or common and unique strategies. At best, we can say that about fifty percent of the programs reported having some at-risk students in their programs. As for the connection process, seventy-six percent are using advanced placement or a combination of advanced placement and skill enhanced strategies between the secondary and postsecondary levels.

There was a great variety of programs reported, including all of the traditional vocational/occupational specialties. The responses did not yield any pattern of one occupational area over another. Therefore, we are unable to report anything significant about programs included in Tech Prep. It is our observation that Tech Prep is for the most part following the traditional vocational programs as they existed in the systems at the time of starting Tech Prep programs. While not part of the survey findings, the research staff has heard a number of discussions during site visits and other national meetings and conferences regarding which occupational programs are appropriate for Tech Prep. The question has been raised numerous times whether Tech Prep is primarily for those careers that best fit associate degree programs—that is, the high tech careers—or for other occupational specialties such as cosmetology, bulldozer driver, plumbing, and welding that may only be certificate programs. This question is being dealt with differently in various states. Those states that emphasize TPAD (Tech Prep Associate Degree) tend not to include certificate programs. Other states that see Tech Prep as being more inclusive and which follow the intent of the Perkins Amendments tend to include certificate and apprenticeship type programs.

The survey did not provide specific information relating to common and unique strategies. However, the site visits did provide some insight about certain strategies. These are discussed in that portion of the report.

Barriers to, Enhancements of, and Models for Tech Prep

Again, the survey did not yield much data regarding barriers and enhancements or models for Tech Prep programs. It was the intent of the research staff to probe within the case study/site visits for such. Because of the embryonic state of Tech Prep, the site visits did not provide much depth either, as will be discussed later.

One insight regarding models reflected in the survey has to do with the 2+2 versus the 2+2+2 models. Of the 238 programs reported in the survey, 135, or 57%, appear to be 2+2 (two years high school plus two years postsecondary) type programs. Only thirty programs, or twelve percent, were reported as being 2+2+2 (two years high school plus two years community college plus two years university or college) programs. This finding is probably influenced by the fact that these programs, reported in 1991 as operating for one year or more, were for the most part started under the Perkins Act as articulated 2+2 programs and had not been influenced by the Perkins Amendments that suggested special consideration for programs that transferred to four-year baccalaureate programs and, therefore, were 2+2+2 programs. The future will likely yield a greater number of programs linked to four-year colleges and universities, resulting in 2+2+2 programs.

Programs and At-Risk Students

The survey did yield some insight regarding Tech Prep activities for at-risk students. Items 4, 20, 21, and 22 addressed serving the at-risk population. Item 4 indicated that approximately fifty percent of the two hundred institutions had some special activities that focus on at-risk. The responses to Item 20 appeared to be consistent, with the fifty percent of the 120 respondents who had programs in existence for one year or more reporting that there were some at-risk students in their secondary and/or postsecondary Tech Prep programs. Item 21 responses showed a slight deviation, with only thirty-four percent of the 120 reporting having special activities for at-risk students. Item 22, which dealt more with what level activities for the at-risk students start, showed that 55 of the 120 programs have some at-risk activities that start for the majority at the tenth grade or before. While there is some discrepancy in the responses, it is reasonable to say that the survey findings do reflect that approximately one half of the programs perceive themselves as making some identified accommodation for addressing and serving at-risk students.

Site Visits and Research Objectives

Case Study/Site Visit Methodology

The case study method for determining further information regarding institutions which provide programs for at-risk students was the third element in this project. The preceding two elements included a literature review and survey questionnaire. The case study element includes selection of case study sites, development of case study-guiding questions/concerns, actual case studies conducted, and statistical and interview information in general and by site.

Selection of Case Study Sites

In order to develop a rationale for selecting institutions to survey for case studies, we examined the questionnaire for criteria with an emphasis on the at-risk population. The questionnaire was mailed to 354 institutions identified as having Tech Prep programs. Two-hundred and thirty-eight programs were identified at two hundred institutions. Those institutions which appropriately answered the following three questions on the questionnaire were selected for the case studies:

1. (Question 4) Does your program have any special activities, either planned or underway at either secondary or postsecondary, that focus specifically on at-risk students, as defined above? An appropriate answer was "Yes."

2. (Question 8) Indicate the stage of development that best describes your Tech Prep program. An appropriate answer was "We have had some students graduate from or complete a secondary/postsecondary school program in at least one occupational area; more are in the stream."

3. (Question 21) Are there special activities for at-risk students? An appropriate answer was "Yes."

The following thirteen institutions met the above criteria and were selected for the case studies:

1.	Coolidge Unified District # 21	Coolidge, AZ
2.	Maricopa Community Colleges	Phoenix, AZ

3.	Southwestern College	Chula Vista, CA
4.	Pikes Peak Community College	Colorado Springs, CO
5.	Manchester Community College	Manchester, CT
6.	Delaware Consortium	Dover, DE
7.	Columbus East High School	Columbus, IN
8.	Newton Schools	Newtonville, MA
9.	Columbus State Community College	Columbus, OH
10.	Portland Community College	Portland, OR
11.	Community College of Rhode Island	Warwick, RI
12.	School District of Greenville County	Greenville, SC
13.	Milwaukee Area Technical College	Milwaukee, WI

Of the original thirteen institutions selected, seven sites were surveyed and six were not:

Surveyed	Not Surveyed
Coolidge Unified District #21	Southwestern College
Maricopa Community Colleges	Pikes Peak Community College
Manchester Community College	Delaware Consortium
Portland Community College	Columbus East High School
Community College of Rhode Island	Newton Schools
School District of Greenville County	Columbus State Community College
Milwaukee Area Technical College	

Development of Case Study-Guiding Questions/Concerns

To assist with the development of case study-guiding questions/concerns and with the overall interview technique and structure, two pilot case studies were added: (1) Tri-County Technical College in Pendleton, South Carolina; and (2) Blue Ridge Community College in Weyers Cave, Virginia. As travel arrangements were firmed as a result of making mutually agreeable appointments, three other case studies were added: (1) North Harris Montgomery Community College District in Houston, Texas; (2) Alamo Community College District in San Antonio, Texas; and (3) Austin Community College in Austin, Texas. These institutions were added because they were frequently recommended to us by knowledgeable professionals.

A total of twelve case studies were conducted. Seven of the original institutions were selected as a result of appropriate answers on the questionnaire; two were pilot case studies; and three case studies were the result of recommendations from the field.

The following were the actual studies:

No.	Date	Name	Location
01	09-20-91	Tri-County Technical College	Pendleton, SC
02	10-07-91	Blue Ridge Community College	Weyers Cave, VA
03	11-04-91	Community College of Rhode Island	Warwick, RI
04	02-28-92	School District of Greenville County	Greenville, SC
05	04-14-92	Maricopa Community College	Phoenix, AZ
06	04-16-92	Coolidge Unified District #21	Coolidge, AZ
07	05-12-92	North Harris Montgomery Community College District	Houston, TX
08	05-14-92	Alamo Community College District	San Antonio, TX
09	05-15-92	Austin Community College	Austin, TX
10	06-25-92	Milwaukee Area Technical College	Milwaukee, WI

11	07-16-92	Portland Community College	Portland, OR
12	07-31-92	Manchester Community College	Manchester, CT

Statistical and Interview Information in General and by Site

In General

The interviews were conducted by Dr. Hoerner, Dr. Clowes, Dr. Reichard, Tom Lachowicz, and/or a combination of these four interviewers. The original plans called for separate focus group interviews with faculty and counselors from both secondary and postsecondary institutions. Other key Tech Prep coordinators and administrators were interviewed where appropriate. As the case studies progressed, the focus group interviews led to site interviews. Toward the end of the case studies, confirming individual interviews were conducted.

The original case study-guiding questions/concerns were found not to be as helpful as anticipated; therefore, tapes of the interviews and notes from the interviews were also used.

Persons interviewed included Tech Prep coordinators, administrators, faculty, counselors, and staff. Most of the community colleges in the case studies were established in the 1960s. The earliest was Milwaukee Area Technical College, established in 1934; the latest was Austin Community College in Austin, Texas, established in 1973. The number of campuses at the community colleges ranged from one to ten, with the most frequent being one and three. Maricopa Community College had both the largest number of campus locations (10) and the highest credit enrollment (91,202). The smallest credit enrollment was 2,935 at Tri-County Technical College in Pendleton, South Carolina. The mean credit enrollment was 22,493; the median was 16,138.

Three of the community colleges were characterized as rural and six as urban. The other three were characterized by a combination (rural-urban, suburban-rural, and suburban-urban). All of the community colleges were publicly owned and state operated.

By Site

What follows is a brief description of the twelve site visit institutions with information drawn from *American Community, Technical, and Junior Colleges* (1984) and *Who's Who in Community, Technical, and Junior Colleges* (1991) and from the surveys and site visits.

Tri-County Technical College in Pendleton, South Carolina (located about twenty-five miles southwest of Greenville), is in a rural setting with one main campus. It was established in 1963 and has a current credit enrollment of 2,935 students. The Technical and Trade Divisions provide a variety of courses in vocational-technical subjects and offer diplomas and associate degrees. Drs. Hoerner and Clowes conducted the case study on September 20, 1991.

Blue Ridge Community College in Weyers Cave, Virginia, is one of twenty-three community colleges in the Virginia Community College System. It is in a rural setting with one main campus. It was established in 1963 and has a current credit enrollment of 3,913 students. Drs. Hoerner and Clowes conducted the case study on October 7, 1991.

The Community College of Rhode Island in Warwick, Rhode Island, is one of the largest community colleges in New England. It is in an urban setting with two campuses and five satellite facilities. It was established in 1964 and has a current credit enrollment of 16,623 students. Vocational-technical career programs equip students with the skills needed to obtain employment in business, industry, and allied health. Dr. Clowes conducted a site visit on November 4, 1991.

Greenville Technical College in Greenville, South Carolina, is a combination rural-urban setting. It was established in 1962 and has a current credit enrollment of 7,917 students. The college is recognized as one of the most progressive and innovative in the nation, with high-technology equipment and instruction that prepares students for the changing needs of business, industry, and the professions. Drs. Clowes and Hoerner conducted a site visit on February 28, 1992.

Maricopa Community College in Phoenix, Arizona, is one of the largest community colleges in the United States. There are ten campuses strategically located in metropolitan Phoenix. Maricopa was established in 1963 and has a current combined

credit enrollment of 91,202 students. The instructional emphasis is technical in nature, with more than forty-five different certificate and associate degree programs offered. Drs. Clowes, Reichard, and Hoerner conducted the site visit on April 14, 1992.

Central Arizona College District in Coolidge, Arizona, is in a rural setting. There are three campuses with a combined current credit enrollment of 5,630 students. It was established in 1969. Drs. Clowes and Reichard conducted the site visit on April 16, 1992.

North Harris Montgomery Community College in Houston, Texas, is in a combination urban, suburban, and rural setting even though it is located in one of the most rapidly developing portions of the Houston region. Established in 1973, there are three colleges and ten off-campus public school facilities. Total current credit enrollment is 15,653 students. Drs. Clowes and Hoerner conducted the site visit on May 12, 1992.

The Alamo Community College District in San Antonio, Texas, consists of three distinct colleges: San Antonio College, St. Phillips College, and Palo Alto College. Established in 1945, it is one of the oldest institutions in this series of case studies. It is in an urban, suburban, and rural setting with a combined current credit enrollment of 29,521 students. Drs. Clowes and Hoerner conducted the site visit on May 14, 1992.

While the Alamo Community College District is one of the oldest institutions surveyed, Austin Community College in Austin, Texas, is the newest, established in 1973. Austin Community College is in downtown Austin in an urban setting. There are a total of six campuses with a combined current credit enrollment of 24,082 students. Drs. Clowes and Hoerner conducted the site visit on May 15, 1992.

Milwaukee Area Technical College in Milwaukee, Wisconsin, is in an urban setting with four campuses, serving in excess of 1.2 million people. The oldest institution surveyed, it was established in 1934. There is a combined current credit enrollment of 23,382 students. Drs. Clowes and Hoerner conducted the site visit on June 25, 1992.

Portland Community College in Portland, Oregon, is in an urban setting with four campuses. It was established in 1961 and has a combined current credit enrollment of 21,888 students. Dr. Clowes conducted the site visit on July 16, 1992.

Manchester Community College in Manchester, Connecticut, is in an urban setting, located ten miles from downtown Hartford. It was established in 1963 and has a current credit enrollment of 6,153 students. Dr. Clowes conducted the site visit on July 31, 1992.

The Present Status of Tech Prep Programs

Tech Prep programs can best be described as embryonic. The case study/site visit phase of the study was scheduled to begin in Fall 1991. An injury to one of the principal investigators caused a postponement until early Winter and Spring 1992 for most visits. Even with the delay, there were few programs in actual operation. If we accept an operating definition for Tech Prep that calls for occupational programs articulated from secondary to postsecondary institutions with attention given to a common core curriculum of math, science, technology, and communications; to at-risk students; and to professional development activities for faculty and counselors—then very few programs exist. If we look for programs with students actually in the core curriculum, with some students actually at the postsecondary level, the number drops to a scant few. This was the reality we encountered as we attempted to do case studies. The consortia and institutions identified through the survey indicated they had programs for at-risk students and some students in the pipeline. We visited a well-known and established program, the Partnership for Academic and Career Education (PACE) in Pendleton, South Carolina, to test our preconceptions and instruments. That institution had a situation where the case study buttressed by focus group interviews would yield results. There were significant numbers of faculty, counselors, and administrators who had experienced the planning and the implementation work involved in developing a Tech Prep program. Our next visit was to an institution that had made a tentative beginning. We concluded a full case study with focus group interviews would be inappropriate in this kind of setting since few practitioners had any direct experience of Tech Prep and its programming. An interview at Community College of Rhode Island and a final preparatory visit to the consortium at Greenville County in South Carolina gave us hope that there were well-developed programs where a case study would be fruitful.

Method of the Study

With this background, we visited two consortia in Arizona identified through the survey. Maricopa Community College heads a large urban consortium in Phoenix,

Arizona, while the Coolidge Unified School District in Coolidge, Arizona, leads a rural consortium. Each had positive things happening, but each was in such an early stage of development that only a few key administrators and selected actors were aware of the Tech Prep initiatives and few were able to address the process issues this study was designed to uncover. We reconsidered. Perhaps the too optimistic responses to our questionnaire were at fault. Perhaps the field was in too early a stage of development to provide operational programs for study. Perhaps the survey instrument itself was flawed. We asked professionals in the field to identify active and successful programs. Three consortia in Texas were identified, and we decided to visit them. Again, many positive things were occurring, but no full programs were in existence (an exception was the Leander School District working with Austin Community College). We modified our approach to a site visit with group and individual interviews. We concluded this phase of the study by doing site visits at three consortia identified through the survey. Again, programs existed but were in an early stage of development. Site visits and interviews were the data gathering techniques used for these and for the balance of the sites visited. Milwaukee Area Technical Institute headed a consortium with a long history of 2+2 articulation, and Portland Community College led a consortium with a marked attention to at-risk students. This process concluded with a visit to the Manchester, Connecticut, site where the tentative interpretations developed from the prior site visits were clarified and confirmed by checking them against the perceptions at that site. Since concurrence was high and no significant new information was forthcoming, we concluded that the checks for trustworthiness were positive and concluded this phase of the study.

Toward a Taxonomy of Tech Prep Programs

The early stage of development of most Tech Prep programs identified and visited does not allow us to present a definitive taxonomy of Tech Prep programs. We can make tentative efforts at categorizing what we experienced and give some indication of the directions we see emerging from our data; however, these efforts must be seen as very tentative. Tech Prep as an idea is reasonably well-described. Tech Prep as an operational reality is just beginning to emerge. It is the operational reality that is meaningful for this study, and that reality is still below the horizon.

Tech Prep Programs Defined

The literature does not yield a single definition for Tech Prep. However, practice is approaching consensus on the ingredients of that definition. All the sites visited considered formal articulation agreements among secondary and postsecondary institutions the foundation of a Tech Prep program. The core of articulation, however, is the integration of curriculum between secondary and postsecondary institutions, and this integration makes a real difference. Institutional articulation agreements such as those developed under the earlier Perkins Act are accomplished administrator to administrator; curriculum articulation as necessitated by the Perkins Amendments is accomplished faculty to faculty. This involvement of faculty in cross-institutional discussion and planning is a unique and positive aspect of Tech Prep and distinguishes it from the prior articulation agreement activity under earlier Perkins legislation. Another distinction between early Perkins articulation programs and Tech Prep is the emphasis on using applied curriculum approaches in the technical and the academic areas. The emphasis upon an increased academic emphasis in occupational programs is also a defining characteristic of Tech Prep. The form of Tech Prep goes beyond the older 2+2 models which assumed a beginning in the eleventh grade and the completion of a two-year college degree. Current Tech Prep practice includes the 2+2 option but also envisions beginning much earlier in the schooling process (often in middle school) and providing options like direct entry to work after secondary school, apprenticeships, and work toward the bachelor's degree. Most of these options are undeveloped and untested currently, but they are a significant part of the planning and thinking for the development of Tech Prep programs. Attention to the at-risk student and to professional development for faculty and counselors are not active parts of the planning and emerging praxis of Tech Prep.

Tech Prep Clients Identified

Although some students are called Tech Prep students and are in postsecondary institutions, most have not come through a full Tech Prep program. The "seamless path" envisioned in the literature is not yet a reality for most. Even the most advanced program visited, PACE in Pendleton, South Carolina, is still putting the secondary school applied academic curriculum in place. To this point, students have used the existing curriculum and moved through the institution as a result of program, not course, articulation. The other institutions visited were not far enough along to have meaningful numbers of students completing the secondary programs and entering the postsecondary institution.

Which students are served? In actual Tech Prep programs, the answer is selected, technically oriented students with an interest in the areas under development for Tech Prep. Because these are "beta" (or experimental) groups, efforts are usually made to select students who are likely to succeed. The criteria may be ability or it may be motivation, but there is a criteria, and it is a positive one. This is reasonable and sensible from a program development perspective and from the perspective of those students selected. This process begs the question of who the ultimate students of Tech Prep might be. Many of the sites visited could properly claim the majority of their students met the criteria for being disadvantaged on economic or social grounds. Since their Tech Prep students were selected from this general student population, some claim can be made for the disadvantaged being represented even in these beta groups. There was no indication of special efforts to include the special populations student in these early groups.

Tech Prep Institutional Connection Processes Identified

Institutional connections appear to be a strength of Tech Prep programs. All of the programs identified for site visits from the survey had existing articulation agreements forged under the earlier Perkins legislation. Thus, Tech Prep is nourished by the roots established in formal programmatic articulation done under the Perkins Act. Much closer institutional connections are established under Tech Prep, however. The need to articulate curriculum and courses, not just programs, introduces a totally new group of players. Now faculty and counselors of the various institutions must work and train together to make Tech Prep programs real and successful. At site after site, this emerging relationship was seen as one of—if not *the*—most significant outcome of the Tech Prep process. This relationship is now a function of the planning process which dominates most current consortium activity. This active involvement of faculty, counselors, and administrators from secondary and postsecondary institutions shows signs of continuing through the curriculum design process. Ensuring the continuation of this relationship through formal professional development activities and continued opportunities for informal exchange may be a critical ingredient in the success or failure of Tech Prep programs at the operational level.

An important dimension of this connection is the extension of course articulation and counseling program articulation among the postsecondary institution, the secondary school, and the middle school. While we anticipated increased communication and connection from postsecondary to secondary personnel as planning and implementation

work moved beyond the administrative level, the extent to which communication was enhanced among secondary and middle school personnel was a pleasant surprise.

The site visits revealed Tech Prep to be more of an evolutionary development than a revolutionary development. Tech Prep may represent a new combination of elements, but it clearly is evolving out of existing linkages and programs. The clearest illustration is the development of Tech Prep programs from the existing articulation agreements of the Perkins Act. No institution visited had a Tech Prep program that did not develop in this way.

While later programs may be developed in new areas, clearly the pathfinders came from the early articulated programs. Counselors often had existing linkages across institutional lines, and these have proven important in developing Tech Prep programs. Linkages among counselors at the secondary and postsecondary level are obvious, but equally important have been the linkages between middle and secondary school counselors. Often these reflect the interests of the earlier career education models. This linkage has led most consortia studied to envision Tech Prep as a curriculum option that begins in the middle school with career awareness activities. This is reinforced by the awareness of teachers and counselors that course selection decisions in the middle school often control the choices available to students in the secondary school. Math is the clearest example. Without preparation and proper course selection in the middle school, many students cannot avail themselves of the Tech Prep option with its enhanced academic demands. Thus, the established linkages among counselors in particular are ensuring proper planning for Tech Prep—and this requires the involvement of middle school personnel. The linkages with industry developed by occupational technical faculty and administrators at the secondary and postsecondary level have been an important resource for Tech Prep programming. Curriculum assistance, work site experiences, and financial and staff support have all existed previously and have been utilized and even expanded. The existence of these linkages has made extensive involvement of industry possible. Thus, existing linkages have played an important part in the development and shaping of the Tech Prep programs observed. From this perspective, Tech Prep is a natural evolution from the existing linkages and programs.

An underdeveloped linkage is the connection between Tech Prep programs and the at-risk student and especially the special populations student. Programs and

personnel are in the schools for the special populations. In only a few institutions and consortia have these personnel and programs been linked with the Tech Prep program to provide a clear pathway to the Tech Prep curriculum and programs. There is no indication of efforts to exclude these students; there also is little evidence of proactive efforts to include them. In the instances where there are clear efforts for inclusion (and we encountered two), the basis for the inclusion effort is an existing strong program for at-risk and special populations with strong advocates in positions to influence the planning process for Tech Prep programs. From the sites visited, these instances of inclusion appear to be the result of local priorities and interests and not the result of broad initiatives attributable to Tech Prep legislation or leaders. This appears to be an area where linkages need to be established and utilized. This area appears to be an exception to the general pattern of Tech Prep building from the existing linkages developed under a series of prior programs and initiatives.

Tech Prep Program Components Identified

Some components of Tech Prep are very clear and need little more than enumeration. The literature discusses these; all programs visited include or plan to include them, and they are consistent with the existing legislation. They are the following:

- articulation agreements between secondary and postsecondary institutions
- core curriculum of mathematics, science, technology, and communications
- counseling as a central element in the program
- programs accessible to at-risk students
- two year programs at secondary and postsecondary levels, leading to a degree or certificate
- extensive participation of business, industry, government, labor, and employers through partnerships with education

Some components of Tech Prep programs are not consistently found in the literature or in the programs visited:

- Although the legislation describes Tech Prep programs as beginning in the eleventh grade, the great majority of the programs visited plan a much earlier beginning. As discussed earlier, if there is to be an enhanced academic emphasis through the Tech Prep curriculum, the student must be ready for this in the middle school years. This curriculum reality paired with the interest in career awareness expressed by counselors has lead to an emphasis on the middle school as the beginning point for Tech Prep programming and planning.

- Systematic professional development to support Tech Prep is not currently in place or clearly in the planning process for most of the sites visited. This may be a function of the very early stage of development for most programs. However, this absence of an essential component is troubling. The history of failed reforms or change initiatives attributable to inadequate preparation and training of the operational personnel involved is too clear. This component must be included.

- Connections between programs and personnel serving the at-risk and especially special populations are not consistently established. This is a component of the programs that must be developed and included. Again, the early stages of development of Tech Prep programs and the pilot or experimental nature of many of the early ventures can serve as an explanation for not including this component at this time. However, this situation also presents a risk of neglect. This component must be included in Tech prep programs at the earliest possible stage.

Tech Prep Program Types Identified

It is possible to point to different program types based on the site visits, but it may not be helpful. Austin Community College in Texas and its consortium use the systems model as a planning protocol. Portland Community College and its consortium use planning for the at-risk as their central theme, and others use a strong link to industry as their defining characteristic. No type dominated, no type is proven. It appears from the site visits that all programs are shaped by the legislation and influenced by the literature. Perhaps the most determining factor, however, is the history of the institutions involved and the pattern of existing linkages and priorities represented by that history. Tech Prep programs are evolving, and they do that in the context of their local environment or community. Local priorities, state policies, and federal legislation all play a role. The existing pattern of connections among institutions within a community or service area are

also powerful and determine much of the form and direction programs take. At some later point, valid types of programs may be identifiable. At this time the best one can conclude is that within limits set by state and federal policy, programs are evolving in response to the community's history and current situation.

Tech Prep Common Strategies

The institutions and consortia selected for site visits were all active in the development of Tech Prep programming. Thus the common strategies identified were all associated with programs that had been aggressive in initiating a Tech Prep program. Several strategies were shared by most of the programs studied. Dependence upon existing articulation agreements was the most common strategy. Another was the existence of a local champion within the community who served as the catalyst for following up on the Tech Prep initiative, forming the local consortium, and encouraging the local school district(s), community college(s), and industry to come together to support the program. This "champion" could be an official of the local education agency (LEA), the community college, or a community leader outside education although most came from within education. In a similar way, there was usually a local champion at one or more of the school or college sites who carried forward the advocacy and catalyst role at the operational level. This "champion" could be a vocational director, school principal, college president, faculty member, or a consortium director. The location within the organization did not appear critical; presence within the consortium and ability to influence school- and college-based personnel did matter. A common strategy was to locate the consortium director at the community college which would serve as the primary receiver of Tech Prep students. This might mean the individual was from the ranks of the community college, was housed at the community college, or at least was partially paid by the community college. However, there were exceptions to this pattern, and there was no strong consensus that this was an important element in the success of programs.

When the Tech Prep program planning was in place and curriculum development became a priority, another common strategy emerged. The lead faculty selected at either the school or college to develop and pilot courses designed as Tech Prep were special. These faculty were the faculty seen as most receptive to new ideas, most creative, and usually most effective as an instructor. While some individuals came from the ranks of the vocational or technical faculty, the vast majority came from the ranks of the academic

teachers. In part, this was a function of the need for strong math, science, and technical skills. In part, it may have come from the higher status of academic teachers compared to vocational or technical teachers. Nevertheless, it was academic teachers who generally took the lead in developing the new, applied academic courses. If this pattern continues, it needs to be studied for its positive and negative effects on the development of Tech Prep programs.

Tech Prep Unique Strategies

Since Tech Prep programs are so embryonic, one could argue that most features are unique and dependent upon local conditions. Some features of particular programs did stand out from the rest, and those will be the "unique strategies" identified here. Two institutions—Maricopa Community College and Community College of Rhode Island—practiced aggressive recruitment for Tech Prep programs in the late middle school. These institutions worked to identify potential students, to encourage the students to see the Tech Prep program and the community college as their special place, and to involve the family in the students' commitment to this curriculum choice. Special summer and weekend programs were used to motivate the students. Activities were conducted that identified these students as "special." At both institutions, these activities were the result of adapting existing successful programs directed at at-risk youth to the particular demands of the Tech Prep programs.

One institution—Portland Community College—did extensive planning to accommodate the at-risk student. The LEA identified at-risk students and provided extensive support for them. Counselors encouraged these students to consider appropriate programs at the community college. The community college provided academic and counseling support for these students in addition to that normally available to all students. Although the academic components of the Tech Prep curriculum were not in place, the institutions worked together to provide the student services-based support at-risk students needed and with that support adapted the existing curriculum to these students special needs. Again, this program used existing programs to provide the base for Tech Prep programming—in this case programming that targeted the at-risk student for Tech Prep programs.

One school within an LEA—Coolidge High School, Coolidge, Arizona—planned to use Tech Prep programming as the base and starting point for a major reform of the

school's curriculum and support services. This school saw Tech Prep as the connector of the middle school, the high school, and the community college. They were beginning by addressing the low attendance rates at the high school and middle school through revised attendance and student services policies; curriculum revision was just beginning. These preliminary steps were designed to make the Tech Prep option possible for the school population in this rural and agriculturally oriented community. For this high school and its community, Tech Prep was the hope for involving the students in academics with a technical emphasis at the high school and possibly the community college, with potential for employment in areas not available locally. For this community with its poor and declining economy, Tech Prep offered hope. School leaders saw this and were encouraging community leaders to share their vision and participate in the process.

Are There Models for Tech Prep Programs?

In a word, no. This study did not reveal models of successful programs. Clearly LEAs and consortia are identifying lead institutions for the development of Tech Prep programs. These lead institutions are usually chosen because they have a history of successful programming for at-risk students or for occupational programs. From these bases they adapt Tech Prep to local conditions and needs. Thus, the most we can report is an "adaptive" model. This is a local model rooted in local history and the community. At this stage little is generalizable or transferable from the local level.

Barriers to and Enhancements for Tech Prep Programs

Barriers for Tech Prep programs come from several sources. Situational barriers occur when the community has too few or no significant employers who need workers with technical skills. This is least likely to occur in urban areas and most likely to occur in rural areas. When the only available employment in fields related to the Tech Prep program are outside the base community, there is some indication of resistance to the programs from students and parents. Another situational barrier that impacts rural communities more is the availability of faculty with the appropriate mathematics, science, and technology backgrounds to deliver the programs. If Tech Prep flourishes, this could become a significant problem for many schools.

Attitudinal barriers exist already. Some, perhaps many, administrators and academic teachers see Tech Prep as one more vocational initiative and dismiss it as an

activity of "those" people. This step back from involvement is a major concern since the active involvement of administrators, student services personnel, and academic faculty is essential to the success of Tech Prep programs. Addressing this attitude is a role for the leadership of the community, LEA, and community college. It is also an area where the local champions of Tech Prep will have a significant role. Vocational faculty themselves are a potential barrier to Tech Prep. Faculty with strong backgrounds in math, science, and technology are almost always supportive of the Tech Prep initiative. Those without these skills are less supportive. They find Tech Prep a threat to their role and a competitor for their students. Often the vocational faculty not equipped to function in a Tech Prep curriculum see their programs becoming a lowest tier curriculum option where the least able students will be warehoused. Indeed, there was some evidence in the site visits that this was indeed a likely outcome.

A more abstract attitudinal barrier is the rhetoric and raised expectations for the development of "high tech" workers with strong employment possibilities through Tech Prep programs. The rhetoric is stronger than the supporting data in this area and may lead to a credibility gap and barrier. In a similar vein, there is a strong rhetoric on the effectiveness of "applied academics" as the distinguishing characteristic of the Tech Prep curriculum. Yet definitions of "applied academics" are vague, examples are few, and results are undocumented. The site visits revealed no clear understanding of what "applied academics" might be or how schools could develop appropriate curriculum. The attitude of high expectations and the assumption that instructional personnel can easily produce a successful "applied curriculum" in many academic and technical areas may clash with reality. This could become a major barrier.

Several barriers are organizational in nature. Strong leadership and local champions are essential for the establishment of successful Tech Prep programs at this early stage. Those conditions are not easy to find and are difficult to create. Thus, the development of early programs will probably be uneven. This barrier is often addressed by the self-selection process in use in most states when the local consortium must initiate an application for Tech Prep funding. The further process of proposal selection helps to address this leadership barrier.

A very important barrier is the curriculum development issue addressed above as an attitudinal barrier. Creating the "applied curriculum" deemed necessary for Tech Prep

is essential. It is an organizational barrier. State leadership must assist the consortium in developing a practical concept of the applied curricula in various academic and technical subjects. Technical assistance must be provided to local faculty struggling to develop their own course curricula. This could be done through the consortia or the LEAs and community colleges, depending upon the state organizational strategy. However, curriculum assistance through technical support is needed. Its lack or a breakdown in the delivery system for technical assistance in curriculum would pose a major barrier. Related barriers are the lack of professional development activities delivered or planned for the support of Tech Prep programs and in some settings the limited funding available for support activities like staff and curriculum development at the local level. The site visits revealed widely variant patterns of consortium organization and support. For many consortia this has meant an emphasis on planning and early development activities at the state to consortium level of the organizational structure. Lesser amounts of attention, funding, and development activity have been directed to the LEAs and the individual schools. This is natural given the early stage in development. However, as the actual work begins in order to develop curricula, support programs, and coordinate activities essential to a program spanning two or often three institutional levels, the available funding becomes very thinly spread. At this time, the lack of strong staff, curriculum, and professional development programs delivered at the local level is a serious barrier.

A major structural barrier is the absence of significant programming for the at-risk student. Many LEAs have existing programs to serve the disadvantaged, the non-English speakers, and the special populations. Few Tech Prep programs interfaced with these public school-based efforts as sources of students or as support activities for at-risk students who might be in the program. This was a conspicuous omission and a potential barrier. Postsecondary institutions have not yet received significant numbers of Tech Prep students, but there was little indication of planning to make any special provision to assist those at-risk students who might negotiate the Tech Prep program and arrive at the postsecondary institution. As programs come on-line and students move through, this too could become a barrier.

There are strong enhancements for Tech Prep programs. Perhaps the strongest is the appeal to school people for programming addressed to the average student. The rhetoric of Tech Prep has struck a responsive chord among professionals in the field and has stimulated interest in many outside the vocational areas. This is a very positive

development. Counselors especially seem challenged and attracted by the promise of Tech Prep. The special funding made available through the Perkins legislation is an obvious enhancement as are expressions of support from state and national leaders in education, industry, and government for the emphasis represented in Tech Prep programming.

A less obvious but very powerful enhancement is the stimulation of ongoing communication among faculties encouraged by Tech Prep. Formal articulation agreements among institutions can be negotiated by administrators and result in little impact within the institution. Curriculum development and course articulation among institutions requires that teaching faculty work together to develop related materials. This shared work and the communication it engenders among faculty from various institutions is a positive development. Faculty typically work in isolation in their classroom with limited professional communication even within a building. Establishing professional communications with fellow subject specialists in other institutions opens new doors and stimulates faculty. Consistently, faculty and staff reported this as the most positive outcome of their Tech Prep activities. This can only expand as involvement in Tech Prep expands.

Tech Prep Programs and the At-Risk Student

At this early stage in the development of Tech Prep programs, accommodating the at-risk student is not a priority. Despite selecting many institutions for a site visit because they indicated on the survey that they make special provisions for at-risk students, only one—Portland Community College—actually made specific provisions for the at-risk. When pressed, program administrators indicated that most of the students targeted for Tech Prep were among the disadvantaged and thus at-risk. Some indicated that the Tech Prep programming itself would serve to advance the situation of disadvantaged students and thus provide a special benefit beyond traditional school programs. Generally, the site visits revealed programs in early stages of organization and at the planning stage for curriculum development. The identification of students for the programs was also in an early stage. Most programs were identifying pilot groups of students who would be the guinea pigs for the program. These students were selected from the general population, which often contained significant numbers of disadvantaged students. However, the students selected were chosen on the basis of ability or motivation. The intent was to identify strong students with a good likelihood of success. This would protect the

students against program breakdown since they would have the ability to succeed despite the program's failures. This would also help the program since these students' early success would encourage the development of the program and would encourage other students to enter the program. No matter the motive, the result was to begin programs with only incidental involvement of at-risk students. As a result, there were very few special programs or provisions in place or planned for the at-risk student. The Portland program was an exception. Existing programs to serve the at-risk were in place. These were used as the base on which the Tech Prep program was built and thus accommodations for the at-risk were an integral component of the Tech Prep program as it emerged.

When the at-risk student was considered, it was the disadvantaged student that most programs referenced. The site visits revealed no systematic efforts to include and assist special population students or the language impaired in programs across the middle, secondary, or postsecondary levels. The most conspicuous omission was programming to address the needs of non-English speaking students.

Because most programs have not matured enough to have the basic elements for a Tech Prep program in place, serious consideration has not been given to programming for the at-risk student. That in itself may be the most significant finding from the site visits. The at-risk student was not a priority in most Tech Prep programs.

Given that the at-risk student was not a priority, it is not surprising that only scattered examples of programming for the at-risk were found. With so little specific data, no meaningful findings were developed on strategies and models for serving at-risk students in Tech Prep programs. Recruitment and retention strategies also cannot be meaningfully described. Instead, some observations are offered as a result of the site visits and the related discussions of at-risk students and their relationship to Tech Prep programming.

Observations on the At-Risk Student and Tech Prep Programming

Most LEAs have existing programs and personnel for at-risk students—the disadvantaged, the special populations, and the non-English speaking. Tech Prep programs are evolving out of existing programs, but most do not include the at-risk programs in their initial planning and programming activities. This has resulted in Tech

Prep programs with minimal connections to the at-risk students and their support programs and personnel. Although the intent may be to bring these on-line at a later stage in development, this would seem a questionable policy. Perkins calls for addressing the needs of at-risk students as a priority; this can best be accomplished by inclusion of the at-risk from the beginning of the planning process. Early inclusion of at-risk students' advocates in the planning process and inclusion of at-risk students in the early programs should maximize awareness of the strategies needed for recruitment and retention of these students. When inclusion occurred, the resulting program looked very different from those programs resulting from exclusion.

One unanticipated outcome of Tech Prep may be the creation of a new tracking system which could further marginalize the at-risk student. As Tech Prep replaces the existing general curriculum, there is a downward displacement of the vocational programs which are not absorbed under the Tech Prep banner. The site visits revealed career centers with dated trade and industrial programs and equipment as the possible new gulags of the educational system. Disadvantaged and special population students were often sent to these centers because support personnel were housed there, and vocational programming was judged appropriate for their abilities. This tracking pattern employed Tech Prep as another program to exclude, rather than as a program to include, the at-risk.

Programming for Tech Prep is usually presented as a skill enhanced program grounded in a solid background of mathematics, science, technology and communication. The rhetoric of Tech Prep describes "high tech" programs as the hallmark of the movement. With this orientation, there is a tendency to focus on exotic programs and, especially at the postsecondary level, sophisticated programs. Some at-risk students can adjust to these "high tech" programs with careful preparation and support. Many cannot. Attention needs to be given to providing Tech Prep programs that offer less sophisticated programs—that prepare students for "mid tech" and "low tech" as well as "high tech" work.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Based on the national survey, case study/site visits, and general observations of the project research staff, the following summary is presented in five sections: "Present State of Tech Prep," "Taxonomy for Tech Prep Programs," "Tech Prep Models," "Barriers to and Enhancements for Tech Prep Programs," and "Tech Prep Programs and the At-Risk."

Present State of Tech Prep

- Tech Prep as a concept and as a program is at an embryonic stage.
- Those Tech Prep programs which exist are new, with most beginning in 1989 or later.
- Existing Tech Prep programs are usually derived from articulated programs developed under previous Perkins legislation.
- Most programs are at the planning stage; a very few programs, the pathfinders, are operational.
- There is little consistency in purpose, design, or curriculum across states and often within states.

Taxonomy for Tech Prep Programs

Tech Prep Defined

- Legislation has set the perimeters for definitions of Tech Prep. Practice is producing a consensus that programs will have articulation agreements, will employ a common curriculum of math, science, technology, and communication, will involve a strong counseling component, and will have at least a 2+2 design leading to a certificate or associate degree.

Tech Prep Clients Identified

- Students in the mid-range of aspirations and abilities are the primary target clients for Tech Prep. These are the students who currently might take a "general" curriculum or be on the margins of the collegiate or vocational track.

- Students identified to participate in early trials of Tech Prep are generally selected on the basis of strong motivation or ability.

- At-risk students are usually not involved in early trials of Tech Prep except as they represent the general population of a school.

Tech Prep Institutional Connection Processes Identified

- Most Tech Prep programs derive from existing, articulated programs developed under the Perkins Act.

- Connections among faculty working on the common curriculum core is a major strength. These connections are being forged within and among faculties from the middle, secondary, and postsecondary institutions involved.

- Connections among counselors at the various institutions are strong and can become a major source of strength for the Tech Prep program. The interest and involvement of middle school counselors is especially noteworthy.

- The connection between school personnel serving the at-risk and the Tech Prep programs is underdeveloped in most consortia.

- The majority (80%) of the consortia report employer participation.

- The majority of consortia report having a Tech Prep coordinator or administrator. Over half (58%) are part-time and about two-thirds (64%) are employed at the postsecondary institution.

Tech Prep Program Components and Types Identified

At the Secondary Level

- Approximately half the programs are occupation specific, and half are general or cluster oriented.

- Approximately half are organized as 2+2 programs while the remainder use a variety of postsecondary and industrial options.
- Approximately half use or intend to use some form of applied academics.
- There is little agreement on what "applied academics" is, and few institutions have attempted to develop such curricula at this time. The CCRD material is used as a starting point by many schools.
- Approximately half have or plan to have activities and accommodations for at-risk students.
- A majority of the institutions have or are planning to have a Tech Prep track or curriculum.

At the Postsecondary Level

- Little or no programming is in place to support Tech Prep.
- Support and coordination are the roles assumed by most postsecondary institutions at this time.

Tech Prep Common Strategies

- Use existing articulated programs as the basis for developing articulated curricula for the Tech Prep program.
- Use existing connections among counselors and faculty and with industry and the community as the basis for Tech Prep programs.
- Use "champions" of the Tech Prep initiative at the community and the school level.
- Use academic faculty as the lead faculty in developing core curricula and applied academics.
- Use the postsecondary institution as the base for the consortium director.
- Use the linkage between the state department of education and the consortia as the focus of attention during this early stage of program planning and development.

Tech Prep Unique Strategies

- Unique strategies are results of existing local situations. Examples are pre-existing programs to recruit the at-risk, serve special populations of students, or initiate local school reform programs.

Tech Prep Models

- No models have emerged at this early stage.

Barriers to and Enhancements for Tech Prep Programs

- Situational barriers are represented by local conditions that limit programming possibilities and the availability of qualified faculty to teach in the core curriculum. These especially impact rural areas.

- Attitudinal barriers come from many sources and are most powerful.

    - Vocational faculty often see Tech Prep as a threat to existing programs.

    - Vocational faculty often are excluded from the Tech Prep program because they do not have the necessary math, science, and communications skills.

    - Academic faculty often see Tech Prep as vocational education with new clothes.

    - Unrealistic expectations set forth by vocal advocates of Tech Prep could present difficulties as programs evolve slowly and with early difficulties and failures.

- Organizational barriers exist.

    - Programming for the at-risk is minimal.

    - Professional development activities to support curriculum and program development at the school level are minimal.

- Enhancements exist and provide a base for program development.
    - School and community people respond very positively to Tech Prep's message that average students need programming specific to their needs and that Tech Prep has the potential to provide an appropriate curriculum track.
    - Funding in support of Tech Prep is an enhancement.
    - Counselors are very receptive to Tech Prep's message and its appeal to a client group not well-served by schools.

Tech Prep Programs and the At-Risk

- At-risk students are not well-represented in current programming efforts.
- When included in current programs, the at-risk students are disadvantaged students representative of the general school population.
- Few programs were identified that served special population students.
- Few programs were identified that served non-English speaking students.

Conclusions

Present State of Tech Prep

- Tech Prep programs are at an embryonic stage. This study began with the assumption that programs would be developed and functioning during the time of the study and thus that we could learn from "what worked." That assumption was flawed. There were few programs that were fully planned, had secondary and postsecondary curricula in place and students in the classes, and had matured to a point where placement of regular and at-risk students could be observed. Few programs are beyond the planning stage. Curriculum development is only beginning at the secondary level. The related curriculum work at the middle and postsecondary level has not begun. Recruitment strategies are under development, but only the first groups of students are currently being identified.

- The present state of Tech Prep cannot yield definitive statements about the direction of the programs or their strengths and weaknesses. These must be left for later studies.

- The present state of Tech Prep can inform our current knowledge and our future decision making about issues related to Tech Prep. While gaps and failures should be pointed out, they should not be taken as condemning. They are better seen as warnings and caveats. The early stage of development has left many unfinished agendas and many ragged edges. Time, planning, and awareness could resolve all of these.

Taxonomy for Tech Prep Programs

Tech Prep Defined

- The legislation in the Perkins Amendments provides the skeletal form of all Tech Prep programs using federal funds. The regulations supporting that legislation have only recently been released. These will help clarify the practice of Tech Prep and thus its real definition.

- Practice indicates that Tech Prep will take many forms. The core will consist of formal articulation agreements among educational institutions; a core curriculum of math, science, technology, and communication; a counseling component; and, at last, a 2+2 program design.

- Additional elements specified or recommended in the legislation but not yet evident in practice can be expected to appear. Among these are professional development activities to support programs and faculty, programming for the at-risk, and involvement of entities outside the public sector of education such as proprietary schools and industry-based apprenticeship programs.

Tech Prep Clients Identified

- It is unclear who will be the primary clients for Tech Prep programs. Some identify the "mid-range" student, the student in the middle two quartiles by standard school measures. Some talk about "high tech" programming with strong math and science skills as being essential. Historically, this would mean the highest quartile student, although Tech Prep advocates say the use of "applied

academics" will enable average students to develop higher skills and compete in "high tech" programs. Some target the at-risk student and look to add a variety of "middle" and "low tech" programs to the "high tech" programs identified for Tech Prep.

- Local conditions and priorities are most likely to shape decisions on clients served.

Tech Prep Institutional Connection Processes Identified

- Tech Prep programs are building from a healthy base of established connections between educational institutions. Vocational programs and the community colleges have well-established connections with industry and the community; these also provide a solid base for program development in Tech Prep.

- Tech Prep programs are providing a positive connection among faculty working on curriculum. This is a very positive aspect of Tech Prep and a strength upon which to build.

- The connection with programs and personnel serving the at-risk is underutilized. This must be improved. The one institution that systematically employed this connection, Portland Community College and its consortium members, demonstrates the potential of this connection.

- Few programs provide a connection with four year institutions, so the opportunity to progress through the Tech Prep program to the Bachelor's degree is underdeveloped. Since few programs have students approaching this stage, it is reasonable to assume that this connection will be among the last to be addressed.

- The connection to be provided by the consortium coordinator is unclear. Half the coordinators are part-time. With a half-time assignment, it is difficult to provide leadership, professional development programs, and coordination and management of consortium affairs. While the majority of the coordinators are physically located at the postsecondary institution, the needs and responsibilities of the middle, secondary, and postsecondary institutions are still evolving.

Tech Prep Program Components and Types Identified

- The middle school is seen as the beginning point for most Tech Prep programs. Career awareness and guidance activities are seen as an essential first step by most school personnel. Proper course selection at the middle school is also essential if strong academic skills are to be developed. This is an area of need. The current provisions in Title II of the legislation allowing support of middle school activities needs to be expanded.

- Secondary school personnel are supportive of the enhanced academics planned in Tech Prep. "Applied academics" are often cited as the preferred vehicle for providing enhanced academic skills. Few personnel had a clear sense of what "applied academics" are and how they would be developed at the local site.

- Counseling is an important program element which must span all the education institutions involved.

- Postsecondary institutions are passive in their involvement with Tech Prep. They participate in planning activities and in articulation discussions. However, since few students are in the pipeline, institutions will not be impacted for some time. Few institutions are directly involved with curriculum development issues despite plans for enhanced curricula at the secondary and postsecondary levels and for changes in pedagogy envisioned with the development of "applied academics."

- Sponsored programs to identify and assist at-risk students are in place in most public schools. These are not well-connected with Tech Prep programs. There are far fewer services at the postsecondary level. Most at-risk students will be offered the regular remedial programs, testing, and support provided all entering students. Without special connections with the secondary school programs, these are not likely to be helpful.

Tech Prep Common and Unique Strategies

- Tech Prep programs are developing out of existing programs. That is a positive sign. A totally new program would be unlikely to flourish in the rather barren ground of the public school. Tech Prep programs are evolving out of the federal and local initiatives associated with vocational programs and programs for special populations.

- Tech Prep programs take on distinctly local coloring. Because they evolve out of local programs and environments, they are each unique to some extent. The distinctiveness of the programs visited was perhaps the strongest impression on the observer.

Tech Prep Models

- We found no models. This means the future direction of Tech Prep programs is still unclear.

- One half of the programs are occupation specific and half are general or use a cluster approach. This reflects the uncertainty within vocational and technical education about the proper approach to training. Tech Prep has yet to resolve this issue on anything but a local level.

- Which technologies will be taught is unclear. The debate over "high," "middle," and "low" technologies and their place in Tech Prep is ongoing. This debate will intensify as initial programs are developed and planners move to consider which options ought to be developed further under the Tech Prep banner.

- Where technologies will be taught is also unclear. Some secondary school programs are concentrating almost exclusively on the enhanced academic core and allow little or no time for technical or vocational courses. These programs call for the postsecondary institution to deliver the technical skill training. Other programs call for extensive skill training at the secondary level to prepare students for advanced placement in technical courses at the postsecondary institution.

- Overall program design is itself not clear at this time. The 2+2 design leading to a certificate or degree is common to most programs. However, some programs see this as the primary design with 2+2+2 resulting in a bachelor's degree as the secondary pattern. Other programs see multiple exit points from the Tech Prep program. These would include high school graduation, completion of a cooperative education placement or an internship, apprenticeship, or the completion of a short-term certificate program.

- The place of at-risk students in Tech Prep programs is unclear. Only half the institutions surveyed planned for at-risk students. Few of the institutions visited

had programs or special provisions for at-risk students. Therefore, we can only conclude the place of at-risk students in Tech Prep programs is still unclear.

Barriers to and Enhancements for Tech Prep Programs

- The barriers to Tech Prep are similar to those faced by any innovation. Those associated with the old way of doing business can be expected to be resistant whether they are vocational or academic faculty. Those receptive to change are those who find some aspect of Tech Prep congenial to their own interests and preferences. If Tech Prep can overcome the resistance offered by vocational teachers and administrators, it should stand a good chance of success since it fits many other movements for change in schools and in society.

- Faculty, especially the stronger faculty, seem stimulated by the challenge of developing an "applied" curriculum. The opportunity to participate in program development and to benefit from the enhanced communication with peers attracts many faculty. These activities fit well with current reform initiatives designed to empower teachers.

Tech Prep Programs and the At-Risk

- Tech Prep, as currently practiced, does not address the needs of the at-risk student well.

- There are more expressions of interest in developing programs for the at-risk than there is evidence of actual programs in existence.

- When at-risk students are served, it is the disadvantaged who are served because they represent the population served by the school.

- Little or no programming was found to serve the needs of special population students or non-English speakers through Tech Prep.

Recommendations

- A study of best practices in Tech Prep ought to be conducted. Such a study should begin about early 1994 and extend for a three to five year time span. This would enable the field to develop and would provide the researchers material and opportunity to produce a useful report.

- A study ought to be conducted on the emerging meaning of "applied academics." This is seen as the critical element in making enhanced academics accessible by the average student. An element so critical to the success of Tech Prep needs to be studied. The field needs to know what is being done, which approaches are useful and which are barren. Successful programs and meaningful examples representing "applied academics" need to be disseminated.

- Professional development activities in support of Tech Prep programs and curriculum development need to be encouraged and supported.

- Increased attention to inclusion of at-risk students must be given. This should start at the federal level and be supported at the state and local levels.

- Local initiatives and priorities ought to be encouraged within the framework of a broad definition of what constitutes Tech Prep. Vitality and imagination appear to come from the local level and need to be encouraged.

- Multiple options for Tech Prep ought to be encouraged and supported beyond the 2+2 and 2+2+2 models dominant in the literature. Tech Prep is evolving to fit local situations, and maximum flexibility ought to be encouraged. It is too early in the developmental stage to limit options and variation.

- Studies ought to be conducted to determine whether some patterns of consortium organization are more effective than others.

    - Do very large or small consortia encourage local initiatives, professional development, or the articulation of a common core of subjects?

    - Are consortia with a full-time coordinator more effective than those with only part-time coordinators? Our site visits suggested those with full-time coordinators were further along.

REFERENCES

America 2000: An educational strategy. (1991). Washington, DC: U.S. Department of Education.

American Community, Technical, and Junior Colleges. (1984). New York, NY: Macmillan.

Blum, M. E., & Spangehl, S. D. (1982). *Developing educational programs for the high-risk secondary school and college student* (ERIC/CUE Urban Diversity Series, Number 80). New York, NY: Columbia University, Institute for Urban and Minority Education.

Bragg, D. D. (1991, May). *The leadership challenge: Planning and implementing Tech-Prep.* Presentation at the National Association for Vocational Education Program Improvement Conference, St. Louis, MO.

Brown, J. M., Asselin, S. B., Hoerner, J. L., Daines, J., & Clowes, D. L. (1992). Should special needs learners have access to Tech-Prep programs? *Journal for Vocational Special Needs Education, 14*(2/3), 21-26.

Budig, J. E. (1986, June). *An evaluation of a junior college developmental education program.* Paper presented at the Association for Institutional Research (AIR) 1986 Annual Forum. (ERIC Document Reproduction Service No. ED 280 393)

Bureau of Labor Statistics. (1989). *Workforce 2000.* Washington, DC: U.S. Government Printing Office.

California State Postsecondary Education Commission. (1985). *Commission comments on the Inter-Segmental Task Force Report: Facilitating the transfer of community college EOPS students to California's Public Universities* (Commission Report 85-25). Sacramento: Author.

Carl D. Perkins Vocational Education Act of 1984 (P.L. 98-524). 98 Stat. 2435, 20 U.S.C. 3034 (1984).

Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 (P.L. 101-392). (1990, August 2).

Carnevale, A. P., Gainer, L. J., & Meltzer, A. S. (1988). *Workplace basics: The skills employers want* (Grant No. 99-6-0705-75-079-02). Washington, DC: U.S. Department of Labor, Employment and Training Administration.

Center for Occupational Research and Development (CORD). (1988). *Mentoring in 2+2 programs: LISD/ACC 2+2 Articulation Project.* Waco, TX: Author.

CORD. (1991, April). *2+2 Tech Prep articulation: A "win-win" experience.* Handbook for National Articulation Workshop held in Boise, Idaho. Waco, TX: Author.

Clowes, D. A. (1984). The evaluation of remedial/developmental programs: A stage model of program evaluation. *Journal of Developmental Education, 8*(14/15), 27-30.

Clowes, D. A. (in press). Remediation in higher education. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. VIII) (pp. 460-493). New York, NY: Agathon Press.

Clowes, D. A., Hinkle, D. E., & Smart, J. C. (1986). Enrollment patterns in postsecondary education, 1961-1982. *Journal of Higher Education, 57*(2), 121-133.

Council of Chief State School Officers. (1991). *State initiatives for school and the workplace.* Washington, DC: Author.

Dole, E. (1989). Preparing the work force of the future. *Vocational Education Journal, 64*(7), 19-20.

Dutton, M. (1990, October). *How many ways can you spell articulation?* Presentation at a workshop on Tech Prep for CORD, Hagerstown, MD.

Dutton, M. (1991). It's a team effort. In D. Hull & D. Parnell (Eds.), *Tech-Prep associate degree: A win/win experience* (pp. 89-111). Waco, TX: CORD.

Feldman, M. (1988, December). *Vocational education: Issues for our future.* Paper presented at the National Convention of the American Vocational Association, St. Louis, MO.

Grubb, W. N. (1991). *Tech-Prep programs: Issues in implementing the Carl Perkins Amendments of 1990* (MDS-233). Berkeley: National Center for Research in Vocational Education, University of California at Berkeley.

Hammons, F. T. (1991, December). *Leadership characteristics of Tech-Prep directors in Virginia.* Paper presented at the National Convention of the American Vocational Association, Los Angeles, CA.

Hammons, F. T. (1992). *The first step in Tech-Prep program evaluation: The identification of program performance indicators.* Doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg, VA.

Hoerner, J. L. (1991a). Tech-Prep and educational reform. *Occupational Education Forum, 20*(1), 1-5.

Hoerner, J. L. (1991b). Tech-Prep: A viable solution for the forgotten half. *ATEA Journal, 18*(4), 18-21.

Hoerner, J. L., Clowes, D. A., & Impara, J. (1991). *Identification and dissemination of articulated Tech-Prep practices for at-risk students.* A research project funded by the National Center for Research in Vocational Education, University of California at Berkeley.

Hoerner, J. L., & Horne, R. A. (1982). Articulated competency-based vocational education: Direction for the 80's. In *Technical education yearbook* (pp. 7-12). Ann Arbor, MI: Prakken Publications.

Hull, D. M. (1991). Tech-Prep: More than articulation. *Vocational Education Journal, 66*(6), 45-46.

Hull, D. M., & Parnell, D. (Eds.). (1991). *Tech-Prep associate degree: A win/win experience*. Waco, TX: CORD.

Johnston, W. B., & Packer, A. H. (1987). *Workforce 2000: Work and workers for the twenty-first century*. Indianapolis, IN: Hudson Institute.

Kerns, D. T. (1988, November/December). Help to restructure public education from the bottom up. *Harvard Business Review, 88*(6), 70-75.

Key, C. (1989). *Tech-Prep: Connecting to your future*. Waco, TX: CORD.

Lankard, B. A. (1991). *Tech-Prep* (ERIC Digest No. 108). Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education.

Lieberman, J. (1986). *Middle college: A ten year study*. New York, NY: New York City Board of Education and LaGuardia Community College.

Lieberman, J. (1989). *The Pew Charitable Trusts: Center for at risk students*. Long Island City, NY: LaGuardia Community College.

McKinney, F. L., Fields, E. L., Kurth, P., & Kelly, F. E. (1988). *Factors influencing the success of secondary/postsecondary vocational-technical education articulation programs*. Columbus: National Center for Research in Vocational Education, Ohio State University.

National Assessment for Vocational Education (NAVE). (1989). *Handicapped and disadvantaged students: Access to quality vocational education* (Final Report, Vol. V). Washington, DC: U.S. Department of Education.

National Center on Education and the Economy. (1990, June). *America's choice: High skills or low wages!* (Report of the Commission on the Skills of the American Workforce). Rochester, NY: Author.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform* (Stock No. 065-000-00177-2). Washington, DC: U.S. Government Printing Office.

National Council for Occupational Education. (1989). *Occupational program articulation* (Monograph Series Vol. 12, No. 1). A report of a study prepared by the Task Force on Occupational Program Articulation. Wausau, WI: Author.

National goals for education. (1990). Washington, DC: White House, Office of the Press Secretary.

North Dakota Tech-Prep Initiative. (1991). *Tech-Prep: A path to mid-level technology careers and a lifetime of learning.* Bismarck: Author.

Parnell, D. (1984). *2+2 Tech Prep/Associate Degree Program: A working degree for America.* Washington, DC: American Association of Community and Junior Colleges.

Parnell, D. (1985). *The neglected majority.* Washington, DC: American Association of Community and Junior Colleges.

Parnell, D. (1991). Every student a winner. In D. Hull & D. Parnell (Eds.), *Tech-Prep associate degree: A win/win experience* (pp. 3-29). Waco, TX: CORD.

Payne, L. J. (1989). The high school/college interface: A new challenge for the community college. *Community College Review, 16*(4), 22-27.

Powell, R. B., & Kelly, M. G. (1989). *Report concerning the activities involved in the development of a rural regional skill center reported to the Granter Partnership Development Fund of the Sears-Roebuck Foundation.* Moses Lake, WA: Big Bend Community College.

Ramer, M. H. (1991). *Community college/high school articulation in California: 2+2 program definition and barriers to implementation.* Sacramento: California Community College Administrators of Occupational Education.

Roueche, J. E., Baker, G. A., III, & Roueche, S. D. (1986). Access to excellence. *New Directions for Community Colleges, No. 55: Advances in Instructional Technology, 14*(3), 29-40. San Francisco, CA: Jossey-Bass.

Scherini, R. (1985). *Transfer students at Berkeley.* Berkeley: University of California at Berkeley, Office of Student Research.

Scott, D. (1985). From homeless hogs to two-plus-two. *Community and Junior College Journal, 56*(2), 14-18.

Scott, D. (1991). Making the case for Tech Prep. *Vocational Education Journal, 66*(2), 22-23.

Secretary's Commission on Achieving Necessary Skills (SCANS). (1991). *What work requires of schools: A SCANS report for America 2000.* Washington, DC: U.S. Department of Labor.

Shapiro, B. C. (1986). Two plus two: The high school/community college connection. *NASSP-Bulletin, 70*(494), 90-96.

Taylor, L. E. (1985). *Future-look: An examination of the future of the community college from the perspective of the environmental, economic, and educational influences on courses, programs, and services.* Fullerton, CA: North Orange Community College District.

U.S. Department of Education. (1991, October 11). *Federal Register Part II, 56*(198), 51448-51557.

Vaughan, G. B. (1985). *The community college in America: A short history.* Washington, DC: American Association of Community and Junior Colleges, National Center for Higher Education.

Virginia Department of Education, Vocational Education Evaluation in Virginia (VEEVA). (1987-1988). *VEEVA handbook: Secondary schools.* Richmond: Virginia Department of Education, Vocational and Adult Education.

Von-Destinon, M. A. (1983). *Assessment and remediation issues in articulation.* Douglas, AZ: Author, Cochise College.

Warmbrod, C., & Long, J. (1986). College bound or bust: Ten principles for articulation. *Community, Junior, and Technical College Journal, 57*(2), 28-31.

Welch, F. G. (1991). Who will be the students in vocational education? *School Shop/Tech Directions, 50*(9), 17-20.

Who's Who in Community, Technical, and Junior Colleges. (1991). Washington, DC: American Association of Community and Junior Colleges.

William T. Grant Foundation Commission on Work, Family, and Citizenship. (1988). *The forgotten half: Non-college bound youth in America.* Washington, DC: Author.

Wimmer, D. K. (1988). Enabling professionalism: The master technician program. *New Directions for Community Colleges, No. 63: Collaborating with High Schools, 16*(3), 95-100. San Francisco, CA: Jossey-Bass.

APPENDIX

TECH PREP PROGRAMS: A NATIONAL STUDY

This questionnaire contains two parts. Part 1 is intended to determine how far along your Tech Prep program has progressed. Programs beyond a certain point of development are of particular interest to our project. Your answers to Part 1 will determine if you will be asked to respond to Parts 2, 3, and 4. Unless directed otherwise, please check only one response choice for each item.

If there are several Tech Prep programs in your institution, please complete a separate form for each program. Make as many copies of the questionnaire as you need.

Thank you for your participation.

As noted in the cover letter, there are two major areas of focus of this project. The first is to get a general picture of the status of Tech Prep programs in the United States. The second is to learn about Tech Prep programs for at-risk students. Tech Prep, at-risk, and other terms are defined to assist you in responding to the items below.

Name of Tech Prep Program: _____

Part 1 – Screening Items

1. When did your Tech Prep program first begin enrolling students? _____ 19 _____
   Month Year

2. What is the occupational focus of your Tech Prep program?

   ___ a. Omnibus program (a single "program" which includes either several specific occupational specialties or no identified specific occupational specialties, a general track from which students specialize).

   ___ b. The occupational specialization is _____

3. Do you have a program brochure that describes your Tech Prep program?

   ___ a. No
   ___ b. Yes (please enclose it)

4. Does your program have any special activities, either planned or underway at either secondary or postsecondary, that focus specifically on at-risk students, as defined above.

   ___ a. Yes, activities for at-risk students are part of the program.
   ___ b. No, no activities are included specifically for the at-risk student.

5. Which configuration best describes your Tech Prep program?

___ a. 1+2
___ b. 2+2
___ c. 2 + 2 + 2
___ d. Other (please specify) _____

6. Does this program have an articulation agreement?

___ a. No
___ b. Yes

7. How many secondary schools, school systems, and postsecondary institutions are participating in your Tech Prep program?

___ a. Secondary schools
___ b. School systems
___ c. Postsecondary institutions
___ d. Other institutions _____

8. Indicate the stage of development that best describes your Tech Prep program.

___ a. Initial curriculum development is essentially complete and the program has been in operation for a year or more. No graduates yet.
___ b. We have had some students graduate from or complete a secondary school program in at least one occupational area, more are in the stream.
___ c. We have had some students graduate from or complete a postsecondary program in at least one occupational area, more are in the stream.
___ d. We have not yet reached point a, b, or c but are making progress.

You have completed Part 1 of this survey.

If your program has been operating for at least one year and you marked "a," "b," or "c" in Item 8, please continue. If you marked "d" in Item 8 above, you are finished. Return this form in the envelope provided. Thank you very much. If your program is just beginning and you have any comments, please feel free to make them here.

Part 2 – Program Description

For all items, respond in terms of the typical situation. We recognize that some schools or systems may operate differently, but we are now trying to get the general picture.

9. Although your Tech Prep program may first enroll students in the upper grades of secondary school—for example, grade ten or higher—at what point are initial contacts typically made with students to begin informing them of the existence of the program?
_____ Grade

10. Approximately how many students are currently enrolled in your Tech Prep program?

___ a. Secondary students
___ b. Postsecondary students

11. Which program approach best describes your Tech Prep program?

___ a. *Advance Placement* (Time shortened): Students who have two years at the high school in occupationally specific programs receive advanced placement from secondary to postsecondary. Such students may finish the postsecondary program in less than two years.

___ b. *Skill Enhanced*: Students who have two years at the secondary level in occupationally specific programs still take a two year postsecondary program including courses to enhance their occupational skills. Such students typically do not finish early.

___ c. *Combination*: Some students undergo the Advanced Placement option while others undergo the Skill Enhanced program.

12. The following list of program components has been identified as often occurring in Tech Prep programs. On the line provided under each program provider (secondary school and postsecondary institution), indicate the approximate number of Tech Prep students who use that program component.

CURRICULUM OFFERINGS	Approximate Number of Students: Secondary Schools	Approximate Number of Students: Postsecondary Institutions
Mathematics:		
a. Remedial	_____	_____
b. General/fundamental	_____	_____
c. Applied math (for Tech Prep program)	_____	_____
d. Algebra (I and/or II)	_____	_____
e. Geometry (any)	_____	_____
f. Precalculus/calculus	_____	_____
g. Other _____	_____	_____
Science:		
a. Remedial biology/chemistry/physics	_____	_____
b. General science	_____	_____
c. Applied science (for Tech Prep program)	_____	_____
d. Biology	_____	_____
e. Chemistry	_____	_____
f. Physics	_____	_____
g. Principles of Technology	_____	_____
Communications:		
a. Applied communication	_____	_____
b. Technical writing	_____	_____

13. Is your program using any of the applied academic courses from the Center of Occupational Research and Development (CORD)?

___ a. No
___ b. Yes

14. Indicate what "tracks" were or are available in the majority of the secondary schools now participating in the Tech Prep program? (Mark all that apply.)

	Before Tech Prep	Presently	Planned
Business	_____	_____	_____
College prep	_____	_____	_____
General education	_____	_____	_____
Vocational education	_____	_____	_____
Other (specify) _____	_____	_____	_____

15. Indicate how business, industry, labor union, or employer participation operates in your program. Check all below which involves or describes that participation.

___ a. No business, industry, or employer participation.

___ b. Curriculum development input (DACUM, advisory committees, etc.)

___ c. Provide employment experiences (check the ones that apply)

___ 1. Co-op programs
___ 2. On the job training (OJT)
___ 3. Apprenticeships
___ 4. Internships
___ 5. Mentorships

___ d. Financial support for students to pay college costs—for example, tuition and books.

___ e. Other (specify briefly): _____

16. At which point do students in your program begin to specialize occupationally? Select the choice below that best indicates how your program is currently running.

___ a. There is a common-core occupational curriculum for Tech Prep in secondary school (all Tech Prep students take a similar set of occupational courses). Limited occupational specialization at the secondary level may occur. Major occupational specialization occurs in postsecondary.

___ b. There is a mixture of common-core occupational curriculum for Tech Prep and limited occupational specialization in secondary. Many students are exposed to similar or the same courses in secondary, but occupational specialization at secondary level is not uncommon.

___ c. Only specialized occupational programs exist. Students begin these programs early in their secondary experience and generally continue through postsecondary. There is no common core Tech Prep occupational curriculum.

___ d. Other (describe briefly): _____
_____
_____
_____

17. Is there someone responsible for the administration of your Tech Prep program?

___ a. No (go to item 19)
___ b. Yes, part-time assignment
___ c. Yes, full-time assignment

18. If yes, is that person employed

___ a. In a secondary school, or
___ b. In a postsecondary institution

19. Is job placement part of the Tech Prep program?

___ a. No
___ b. Yes

Part 3 – At-Risk

20. Please indicate the approximate number of at-risk students enrolled in your program.

___ a. Number of at-risk students at the secondary level
___ b. Number of at-risk students at the postsecondary level
___ c. At-risk students are not identified specifically in our program (check if appropriate.)

21. Are there special activities for at-risk students?

___ a. No, there are no special activities for at-risk students (please go to item 17).

___ b. No, the activities that at-risk students participate in are part of the regular program and students who are not at-risk also participate.

___ c. Yes, special activities designed specifically for at-risk students are in the program and directed toward at-risk students (please describe).

_____
_____
_____
_____

22. At what point/level in the Tech Prep program do the activities for at-risk students begin?

___ a. Before or during the tenth grade
___ b. At higher secondary grades but before high school completion (grade eleven or twelve)
___ c. At postsecondary level

23. Use the space below to make additional brief comments to help us understand your Tech Prep program, especially as it relates to the at-risk student. Also, feel free to use this space to make any additional comments you wish.

Part 4 – Respondent Information

24. So that we may undertake later follow-up for certain programs, please provide the information below for the person completing the questionnaire.

Name: _____

Title: _____

Address: _____
_____
_____
_____

Office phone: ( ) _____

Thank you for your assistance. Please place your completed questionnaire in the stamped, preaddressed envelope provided and return it by July 15, 1991, to

James L. Hoerner, Project Director
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Virginia Tech
Blacksburg, VA 24061-0254