TECH PREP'S ROLE IN EDUCATION REFORM: PERCEPTIONS FROM STATE TECH PREP DIRECTORS

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ABSTRACT

This study describes State Tech Prep directors' perception of the successes and challenges in demonstrating the impact of Tech Prep as a change agent for education reform. The most significant changes reported as a result of Tech Prep implementation included secondary and postsecondary collaboration, course and program articulation, and integration of contextual teaching and learning. State Tech Prep directors reported Tech Prep student data collection and reporting results as an ongoing challenge. This challenge was attributed to secondary and postsecondary data information systems and the lack of a common definition of Tech Prep students to ensure consistency of data reported. The majority of State Tech Prep directors identified Tech Prep as a minor player in education reform, indicating that although Tech Prep is a recognized secondary/postsecondary program of study, it has not yet made a large impact on how schools meet the needs of all students. As education reform moves forward, the results from this study will provide new ideas to improve Tech Prep and the essential components to benefit all students.

PURPOSE OF THE STUDY

Tech Prep has been evolving for over a decade. The fundamental premise of Tech Prep was to respond to the needs of high school students who were often identified as the neglected majority. Tech Prep was designed to provide a program for career preparation and workforce development. According to Bragg (2000a) "Tech Prep was intended to establish formal articulation agreements identifying seamless and increasingly rigorous academic and career-technical programs having a logical progression from secondary to postsecondary level" (p. 221). Tech Prep encourages students to attain higher levels of academic and technical competencies and to continue their education or enter the workforce.

Tech Prep continues to evolve and has been identified as one of six components driving career and technical education (CTE) reform (Lynch, 2000). Brand (2003) further stated "CTE pathways from high school to college, like the Tech Prep program, have been an important

reform and need to be continued and expanded in various ways" (p. 5). Overall results report Tech Prep has increased collaboration among businesses and the education communities (Bragg, 2000a; Hull & Grevelle, 1998; Lynch, 2000). This research study presents findings to report how Tech Prep has contributed to improving education in the nations' public schools – e.g., is Tech Prep reforming education?

The purpose of this study was to collect data from State Tech Prep directors regarding the impact of Tech Prep as a change agent for education reform. Specifically this study attempted to address the following research objectives:

1. Identify improvements in education as a result of Tech Prep implementation,
2. Identify the Tech Prep factors that attributed to education reform,
3. Delineate how Tech Prep has been implemented at the state level,
4. Identify the program designs used to implement Tech Prep,
5. Determine if career and technical education programs have assisted with Tech Prep implementation, and
6. Identify the challenges to reporting Tech Prep student data.

BACKGROUND

The literature review that follows describes the history of Tech Prep, Tech Prep's link to career and technical education, Tech Prep as a change agent for education reform, and evaluation of Tech Prep programs.

HISTORY OF TECH PREP

For over a decade, educators have pushed for higher student academic achievement, while employers continue to express concern with the quality of the nation's workforce. The Carl D. Perkins Vocational and Applied Technology Education Act of 1984 was the primary legislation supporting solutions to education and workforce preparation. This legislation addressed several issues affecting the workplace: skill shortages, ill-functioning high school vocational programs, lack of preparation for high tech jobs, and lack of clear career pathways for those students not pursuing postsecondary education and training (Brustein, 1993).

In 1990, Perkins was reauthorized (referred to as Perkins II) and contained Title IIIE, the Tech Prep Education Act. This legislation emphasized boarder education reform efforts to improve workforce preparation. Perkins II focused on integration of academic and career and technical education (CTE) programs, as well as articulation between secondary and postsecondary institutions. Through the development of Tech Prep programs, the non-college bound students; the "neglected majority" could transition from school to the workplace (Parnell, 1986). Perkins II required seven essential Tech Prep program elements including: (a) articulation agreements, (b) appropriate curriculum design, (c) curriculum development, (d) in-service teacher training, (e) counselor training, (f) equal access for special populations, and (g) preparatory services (Brustein, 1993).

Taking a closer look at Tech Prep essential elements Pucel and Sundre (1999) discovered that articulation agreements were developed but not necessarily implemented. They suggested that the funding formulae for consortia be examined further for those factors prohibiting implementation. Research by Puckett and Bragg (2000) revealed that mandated approaches to professional development for school counselors were not well received and also proved

ineffective as one-size-fits-all programs. Puckett and Bragg further stated "new professional development avenues need to be created to support counselor involvement in Tech Prep for the long haul" (p. 378).

In 1998, Perkins was reauthorized (referred to as Perkins III) and provided funding of Tech Prep programs for six years. Major changes in Perkins III included developing linkages between high schools and two-year and four-year colleges and universities, expanding the use of educational technology and distance learning, and strengthening linkages to businesses and higher education. Tech Prep consortia five-year plans included efforts that would: (a) provide education and training in areas or skills where there are significant workforce shortages, and (b) demonstrate how Tech Prep programs will help students obtain high academic and employability competencies ("A New Bill: Tech Prep Reauthorized for Six Years," 1998).

Perkins III increased accountability by requiring states to incorporate new data collection and reporting methods for the Perkins four core indicators: (a) student attainment, (b) credential attainment, (c) placement and retention, and (d) participation in nontraditional training and employment (American Vocational Association, 1998). Each state was required to include in their state plan, the development and implementation of Tech Prep programs.

Although the Tech Prep platform has been established at the federal level, individual state legislation ultimately influences the Tech Prep process at local levels. This permits each local Tech Prep consortium to develop programs adaptable to meet education, business, industry, and government regional needs. Research reveals that various combinations of strategies and programs are being implemented under the Tech Prep umbrella. Tech Prep Associate Degree programs have been surfacing across the nation, despite conflicting issues regarding ownership and involvement within the secondary and postsecondary components (Edgar & Parnell, 1996).

Collaboration between the U.S. Navy and Mountain Empire Community College in Virginia resulted in a unique Tech Prep program that combines high school courses, college courses and Navy training, ultimately leading to an associate degree in engineering electronics technology or manufacturing technology ("Navy's Tech Prep Program Sets Sail," 1999). In Pacific Grove, California, the high school Tech Prep program has been designed to concentrate on preparing students to succeed in life and the world of work, while offering non-technical career paths such as the arts and hospitality (Black, 1995). In Seattle, the Boeing Company offers a Tech Prep Associate Degree Summer Intern Program, which provides students with three progressive summer sessions of manufacturing career exploration and production floor skill training (Gayton & Parnell, 1996).

Through the local Tech Prep initiative, the Hand's-On Training (HOT) Lab located at the Lake Land College Workforce Development Center, Illinois, has expanded to introduce various occupations in manufacturing skill areas to those high school students interested in manufacturing careers ("HOTlabs Sparks Applied Learning", 2001). HOTlab allows students to experience math and science in real manufacturing situations. How secondary schools and two-year and four-year colleges and universities decide to implement Tech Prep will continue to be a major factor influencing CTE and whole school reform.

Tech Prep's Link to Career and Technical Education

Jacobs (2000) stated that Tech Prep could serve an important function as "the glue that holds the secondary and postsecondary career and technical education system together" (p. 52). In other words, CTE has a greater chance of benefiting students at the postsecondary level through implementation of an important Tech Prep concept- a seamless system between the secondary and postsecondary institution. According to Bragg (2000b), Tech Prep has been successful partially due to articulation agreements that require secondary and postsecondary schools to collaborate and develop seamless curriculum; and students stand to benefit most if the best of both CTE and Tech Prep can be shared extensively.

A major goal of Tech Prep has been centered on improving the academic achievement of students enrolled in CTE. Applied academics teaches academic concepts using real-world, work-related applications and has placed Tech Prep as a leader in contextual learning and applied academics (Flowers, 2000). D. E. Brown (2000) compared contextual learning to connected learning- a meaningful learning that occurs "when the learner sees purpose and application for newly acquired knowledge and skills" (p.32). Since the 1985 publication of *The Neglected Majority* (Parnell, 1986), educators have taken a closer look at different learning styles and teaching methods. Textbook content continues to be upgraded in an effort to reach both abstract and concrete learners (Dutton, 1996).

A successful outcome of CTE and Tech Prep integration is the career academy. Career academies, which are growing in number nationwide, are schools within schools described as small learning communities. "Students are enrolled in 'core courses' where academy-only students are taught academic and technical skills centered around a career focus" (Herrman, 2000, p. 1). The academy design ensures "graduates are academically and technically proficient, have marketable job skills, and are academically prepared to enroll in postsecondary education (Lynch, 2003, p. 37). Through the alignment of Tech Prep and CTE programs, career academies are increasing students' options for the future.

Tech Prep as a Change Agent for Education Reform

Tech Prep has led education reform by opening up communication lines between secondary and postsecondary institutions through the articulation process (Proctor & McElvey, 2001). Articulation promotes communication resulting in a successful seamless system whereby secondary and postsecondary instructors collaborate on a curriculum void of repetitive course requirements. Middle College programs, another interesting concept resulting from Tech Prep initiatives, are designed for underrepresented populations as a means of experiencing college while still in high school. Students are enrolled in community college classes as well as honors-level high school classes providing an opportunity to earn a high school diploma and associate's degree concurrently (Borsuk & Vest, 2002). At the Greenville Technical Charter High School in Greenville, South Carolina, ninth and tenth grade high school students take college courses at Greenville Technical College, that count as dual credits for high school and college (Williams, 2000). Although Tech Prep has moved beyond the neglected majority, at-risk students are the main focus of Middle College programs.

Tech Prep education reform efforts have extended to high school career counselors requiring them to participate in various professional development activities such as curriculum planning and action research as a means of preparation for their specific roles in Tech Prep (Puckett & Bragg, 2000). Math and science teachers are also participating in professional development

opportunities. Since math and science courses have traditionally been delivered in an abstract format many instructors in these fields must adjust their curriculum to integrate applied learning. Gilbert (1997) reports that science teacher educators are faced with the challenge of preparing secondary Tech Prep science teachers, who often lack occupational knowledge and skill, for presenting science content in an "occupational and technical context" (p. 210). Furthermore, Gilbert implies that this may be difficult to implement without some reorganization of science teacher education at the university level.

High Schools That Work (HSTW) was created in 1985 to address employer concerns that high school graduates were not being prepared for successful employment. HSTW is not synonymous with Tech Prep or CTE, but each has similar goals. All three programs have the common goal of closing the achievement gap between CTE students and those pursuing a college preparatory program of study. The HSTW program teaches academic content through an applied process, by requiring students in CTE programs to complete additional courses in math and science, and by encouraging academic and CTE teachers to work together (Bottoms, 1993). The collaborative efforts of CTE, Tech Prep, and HSTW will enable schools to achieve the goal of raising the academic achievement level of career-bound high school students.

Evaluating Tech Prep Programs

Accountability is a major component of Perkins III that requires reporting data for the Perkins four core indicators: (a) student attainment, (b) credential attainment, (c) placement and retention, and (d) participation in nontraditional training and employment (American Vocational Association, 1998). Although Tech Prep program implementation has been widespread, reporting of student outcomes data has been limited. "The collection, analysis, and use of Tech Prep data at the local, state, and national levels has been minimal" (Ruhland & Timms, 2001, p. 3). A study conducted by Bragg (2001) reported, "whereas some attention has been paid to evaluation of Tech Prep to document implementation, estimate enrollments, and ensure compliance with legislative requirements, little attention has been given to the relationship between Tech Prep implementation and student outcomes" (p. vii).

Perkins II did not require states to report Tech Prep student outcomes data. Evaluation efforts in most cases were left to the discretion of the local consortium. Adding to the challenge of evaluating Tech Prep programs was the lack of consistent processes for identifying a Tech Prep student. The Tech Prep concept was initiated at the state level resulting in a variety of Tech Prep definitions and implementation strategies; consequently inhibiting well-developed state reporting systems (Brown, C. H., 2000). Unfortunately, methods for identifying and reporting Tech Prep students vary within consortium, producing data that may not be consistent for comparison purposes at the local, state, or national levels (Barnett, 2002).

Evaluating Tech Prep programs is essential in order to improve programs and provide for accountability. Ruhland and Timms (2001) suggest incorporating quality improvement strategies such as action planning, continuous quality improvement, and total quality management to link evaluation findings with program improvement. By integrating one of these strategies with the evaluation process, consortia can create an effective plan for implementing recommendations for Tech Prep program improvement.

A statewide infrastructure for Tech Prep data collection is essential for collecting and reporting of student outcomes data. In addition to the data collection system, those responsible for

submitting the Tech Prep data need to know how to identify Tech Prep students. Hershey, Silverberg, Owens, and Hulsey (1998) noted in the final report of the national evaluation of Tech Prep that the ability to collect data at the local level was dependent on the consortium's definition of a Tech Prep participant and the ability to collect the information from member schools. The evaluation of Tech Prep programs will provide the student outcomes data essential to continue the support and implementation of Tech Prep programs on a national level. The data reported will encourage policy makers to continue funding Tech Prep programs and recognize Tech Prep's role in education reform.

METHODOLOGY

The methodology used in this study was survey research. The population was State Tech Prep directors (N = 50). A list of the State Tech Prep directors was obtained and reviewed by the National Association of Tech Prep Leadership (NATPL) regional directors to verify names and addresses to ensure accuracy.

INSTRUMENTATION

Following an extensive literature review, a survey was designed comprised of closed-ended multiple-choice questions and open-ended questions to allow for individual responses. The survey included three sections to collect data for the six research objectives. Section one included one closed-ended question. Respondents were asked to identify from a list the three most significant improvements in education as a result of Tech Prep implementation. Section two included both closed- and open-ended questions that focused on positioning Tech Prep as a change agent for education reform. Survey questions included identifying types of Tech Prep program designs, perception of Tech Prep, changes in the delivery of CTE programs, and changes needed to encourage greater participation in Tech Prep. Section three included open-ended questions that focused on collecting and reporting Tech Prep student data.

Members of the NATPL research committee reviewed and established content validity of the survey instrument. These experts were asked to make recommendations for improving, adding, or deleting any survey items. Recommendations from the reviewers were added to the survey where appropriate. A pilot test with three State Tech Prep directors and NATPL regional directors was conducted prior to sending the survey to the entire population in September 2001.

DATA COLLECTION

An initial E-mail communication was sent to State Tech Prep directors in September 2001 requesting their participation in completing the survey to collect Tech Prep data in their state. The survey was sent as an E-mail attachment and participants were asked to complete and return the survey electronically to the researchers. A follow-up reminder by E-mail communication was sent in October 2001. In addition, NATPL regional coordinators contacted State Tech Prep directors in their region if a response had not been received following the second E-mail communication to encourage State Tech Prep directors to complete and return the survey. A response rate of 56% was achieved after two E-mail communications and telephone contact by NATPL regional coordinators. The 28 states responding to the survey included: Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Louisiana, Maine, Michigan, Minnesota, Montana, Nebraska, Nevada, New

Hampshire, New York, North Carolina, Ohio, Oklahoma, Rhode Island, South Dakota, Tennessee, Texas, and West Virginia.

Findings

Findings from the six research objectives are presented in three sections: Impact of Tech Prep, Tech Prep as a change agent, and Tech Prep student data.

Impact of Tech Prep

The first research objective identified the three most significant improvements in education as a result of Tech Prep implementation. Respondents had a list of 21 improvements to choose from and could list other improvements (see Table 1). The most frequent improvement in education identified by 68% of State Tech Prep directors was secondary and postsecondary collaboration. The two other improvements in education most frequently identified were articulation, including dual credit (64%); and contextual or applied teaching and learning (36%). Of the 21 improvements in education listed, four items were not selected by any of the respondents. These included workplace competencies (e.g., SCANS skills) for students, addressing local workforce development needs, reducing the high school dropout rate, and addressing the needs of college bound students. The frequencies of response (N = 28) by improvement in education as a result of Tech Prep implementation are reported in Table 1.

Table 1

Improvements in Education as a Result of Tech Prep Implementation

Improvements in Education	f	%
Secondary/postsecondary collaboration	19	68
Articulation, including dual credit	18	64
Contextual or applied teaching and learning	10	36
Sequencing a 2 + 2 curriculum	9	32
Addressing the professional development needs forsecondary faculty	5	18
Addressing career development needs for students	5	18
Transition of students to postsecondary education	4	14
Education/business partnerships	3	11
Curriculum reform	2	7
Academic standards for students	2	7
Technical competency for students	2	7
Integration	1	4
Work-based learning	1	4
Addressing the needs of special populations	1	4
Addressing professional development needs for postsecondary faculty	1	4
Changing the role of school counselor	1	4
Other – Integration of Tech Prep elements into whole school reform	1	4
Other – Quality improvement system for all students	1	4
Other – Professional and curricular development related to student achievement	1	4

Note. N = 28.

An open-ended question asked respondents to comment on the evidence in their state that would substantiate the three improvements in education selected. Evidence reported by respondents to substantiate the improvements in education included: (a) increase in the number of articulated agreements, (b) increase in the number of students enrolling in Tech Prep, (c) conferences to provide professional development opportunities to teachers, counselors, and administrators, (d) knowledge of contextual teaching and learning, (e) counselors understanding their role in career planning, (f) curriculum designed to eliminate duplication of coursework at the secondary and postsecondary level, and (g) development of career pathways and seamless curriculum.

The type of data collected and reported was another way identified to substantiate evidence that improvements in education have emerged as a result of Tech Prep implementation. State Tech Prep directors reported the use of data from several sources (e.g., High Schools That Work, high school accountability reports, employer feedback, Tech Prep annual reports) to report improvements in education as a result of Tech Prep implementation. According to one State Tech Prep director "the year-end reports by consortium details activities conducted during the year and evaluation procedures utilized for the evaluation and measurement of each program segment". Another State Tech Prep state director reported a "decrease in the number of undecided students entering community colleges" as a result of Tech Prep implementation. One State Tech Prep director commented:

> Almost every high school and vocational-technical school in the state has articulated Tech Prep courses with a high school to college program continuum. Additionally, as a result of the Tech Prep program, high schools and post-secondary institutions are working together in many different venues, which have expanded to the middle schools and other program areas.

Tech Prep as a Change Agent

The second research objective identified the Tech Prep factors that attributed to education reform. State Tech Prep directors were asked to select from a list of six options, that which most closely describes the perception of Tech Prep in their state as a change agent for education reform. Recognition of Tech Prep as either a major or minor player in education reform is a success factor that indicates that Tech Prep personnel have been invited to the discussion regarding how schools must change to meet the needs of all students. Respondent discretion determined the extent to which Tech Prep has been "at the table" having a major or minor impact on overall education reform in their state.

Fifty–four percent of the respondents identified Tech Prep as a minor player in education reform and 43% of the respondents identified Tech Prep as a means to transform traditional career and technical (vocational) education (see Table 2). One State Tech Prep director stated the perception of Tech Prep in their state is "an encouragement to regular and vocational education, an incentive and opportunity for students to go to college and a head start with credits earned."

Table 2
Perceptions of Tech Prep

Perceptions	f	%
Minor player in education reform (depends on school and area of state)	15	54
Means to transform traditional career and technical (vocational) education	12	43
An alternative to traditional education	8	29
Major player in education reform (depends on school and area of state)	8	29
Not even on the education reform radar screen	2	7
Business as usual, with a new name	1	4
Other	1	4

Note. N = 28. Percentages do not equal 100% due to multiple responses describing the perceptions of Tech Prep.

An open-ended question asked State Tech Prep directors to identify the factors, activities, and/or circumstances in their state that enabled Tech Prep to be considered significant enough to be a part of education reform as a major or minor player. Responses from this question included: (a) common statewide Tech Prep definitions, (b) statewide articulation agreements, (c) Tech Prep career pathways, (d) Tech Prep state and local leadership, (d) professional development activities, (e) meaningful roles for business advisory councils, and (g) school-to-work. Respondents were consistent in noting leadership as a key factor in positioning Tech Prep as a change agent for education reform. One State Tech Prep director recalls how local Tech Prep leaders are a major factor:

> Tech Prep leaders at the local level were very much change agents in their consortia. They often worked closely with school improvement coordinators, faculty, and curriculum directors. They also worked closely with the intermediate school districts who coordinate much of the professional development in a region or county…this in turn helped to move the agenda…of our curriculum standards and benchmarks, applied academics, curriculum integration, etc…the key components of Tech Prep…forward.

The longevity of Perkins funding to support Tech Prep was reported as a key factor. One State Tech Prep director commented:

> Data collected through the 3-year statewide longitudinal research evaluation of Tech Prep shows that Tech Prep is making a significant difference for students. In both 1999 and 2000 data, significant differences were found between Tech Prep and non-Tech Prep students in the areas of grade improvement, career planning, usefulness of academic courses, and use of learning aids. This year's focus is on measuring

academic progress of Tech Prep students that have articulated to the community college after high school graduation.

The third research objective delineated how Tech Prep has been implemented at the state level. The structure for implementing Tech Prep varied from state to state. Structured programs of study were identified by 52% of the State Tech Prep directors, 21% identified randomly implemented elements of Tech Prep without a targeted population, and 17% identified an enhanced vocational education program. Ten percent of the State Tech Prep directors identified "other" ways that Tech Prep has been implemented and their responses included "Tech Prep is for all students" and "coordinated plan of delivery of Tech Prep elements across the state–integrated into vocational, technical and academic programs". One State Tech Prep director revealed this perception:

The way Tech Prep has been implemented has varied depending upon the consistency of leadership, the active engagement of the postsecondary partner(s), and the number of additional duties the consortium coordinator has to juggle. I have frequently stated that if you can't show me what the 2 + 2 programs look like, you are not doing Tech Prep.

The fourth research objective identified the program design used to implement Tech Prep. State Tech Prep directors were asked to identify the type of Tech Prep program design(s) and the percentage of the Tech Prep program design(s) in their state. Five program designs were provided on the survey with respondents listing other programs designs in their state. Three State Tech Prep directors identified all Tech Prep programs in their state as 4 + 2 program design (high school to community college) and three State Tech Prep directors identified all Tech Prep programs in their state as 2 + 2 program design (high school to community college). In addition to the five program designs listed on the survey, four other program designs were added and included: (a) 4 + 2 + 2 + 2 (high school to community college to 4-year to apprenticeship), (b) 4 + 2 (high school to apprenticeship), (c) all students are in a Tech Prep program, and (d) students enter workforce/apprenticeship direct from high school. Table 3 reports the percentage of program design by respondent (states are identified by number only).

The fifth research objective determined if CTE programs have assisted with Tech Prep implementation. Fifty-four percent of the respondents indicated CTE programs have helped the image of Tech Prep, 21% responded they had not, 18% were not sure, and 7% did not respond to the question. Additional comments by respondents included:

Tech Prep is having a positive result on the CTE programs in that their offerings are not limited to CTE centers. Tech Prep is helping to raise the awareness of the high skill/high wage opportunities via Tech Prep and/or CTE. This has enabled us to move Tech Prep into academic high schools that now reflect industry skills and standards.

The changes in CTE programs have improved the image of Tech Prep…emphasis is on achieving a combination of high tech skills and academic proficiency. Due to statewide emphasis on student achievement in academic/basic skills, local schools are held much more accountable than in the past. In some areas, this has hurt the CTE programs, as they are often viewed as elective programs of study, and not as

Table 3

Tech Prep Program Design by State

	Percentage of Program Design								
State Respondent	4+2[a]	4+2+2[b]	2+2[c]	2+2+2[d]	2+2+2[e]	4+2+2+2[f]	2+2[g]	All Students[h]	Workforce/ Apprenticeship[i]
1			100						
2		10				90			
3		80	20						
4	60	5	30	3	2				
5	15		85						
6	100								
7			100						
8	40		58	1.5			.5		
9			90	10					
10								100	
11	50	25		23	2				
12	60	10	15	10			5		
13		5	55	40					
14			98	1		1			
15	98	1			1				
16			100						
17	95	5							
18	19		75	5	1				
19				40	60				
20	50	10	25	5	10				
21	5	5	80	5	5				
22		70	30						
23	20	3	70	5	2				
24[j]			85	5					5

Table 3 (continued)

Tech Prep Program Design by State

	Percentage of Program Design								
State Respondent	4+2[a]	4+2+2[b]	2+2[c]	2+2+2[d]	2+2+2[e]	4+2+2+2[f]	2+2[g]	All Students[h]	Workforce/ Apprenticeship[i]
25	100								
26			70	28	2				
27			50	50					
28	100								

Note. [a]High school to community college. [b]High school to community college to 4–year. [c]High school to community college. [d]High school to community college to 4–year. [e]High school to community college. [f]High school to community college to 4–year to apprenticeship. [g]High school to apprenticeship. [h]All students. [i]Workforce/apprenticeship direct from high school. [j]Percentage does not equal 100%.

> rigorous as traditional education programs. Tech Prep has proven to be very helpful in helping students reach the required competencies, however, in some instances Tech Prep is still viewed as only a technical training pathway. Tech Prep funded consortia initiatives have increased the access to high quality CTE/academic programs.

State Tech Prep directors responding that CTE programs have hindered the image of Tech Prep provided few comments to explain their choice. One State Tech Prep director commented, "Tech Prep and CTE are clearly separated by the cluster/major curriculum format." Another commented, "There has not been much change in how CTE programs are delivered…this has hurt the image of Tech Prep."

Tech Prep Student Data

The sixth research objective identified the challenges to reporting Tech Prep student data. The greatest challenge reported by 34% of the State Tech Prep directors were secondary and postsecondary data information systems and a common definition of secondary and postsecondary Tech Prep students. Even though states may have definitions the challenge may be that not all schools use the definitions, and if they do, they may perceive the definitions differently. One State Tech Prep director stated, "if the schools do not enter true Tech Prep student data, then our data does not mean very much." Permission to use social security numbers to determine if a student is a Tech Prep student or CTE student or both was reported as an ongoing challenge at the state level. Regarding the challenge of a student information system, another State Tech Prep director commented "the greatest challenge…is the person at the local school level who is entering the information about a student. Often the student is not flagged correctly as a Tech Prep student." One State Tech Prep director commented:

> Currently there is no electronic student-based database at the secondary level that allows for the easy identification and reporting of Tech Prep students. Also, there exists a continuing need for the assistance of teachers, counselors, and administrators in sharing Tech Prep opportunities with their students.

Another State Tech Prep director summarized the greatest challenge as "the stigma of Tech Prep versus college prep continues to be a barrier. This suggests that students should not be considered Tech Prep, but that courses be identified as Tech Prep encouraging all students to participate."

After identifying the key challenges to reporting Tech Prep student data, the survey then asked State Tech Prep directors to identify possible solutions to assist with the reporting of Tech Prep student data. One State Tech Prep director proposed "better training and emphasis placed upon the importance of proper identification. We might tie a portion of Tech Prep funding to the reported placement figure." Other proposed solutions included: (a) increasing Tech Prep funding, (b) hiring an individual responsible for Tech Prep evaluation, (c) increasing professional development activities, (d) training for input operators and importance of accurate reporting of data, (e) providing guidance and specific data collection rules and regulations from the U.S. Department of Education, (f) identifying common Tech Prep student definitions for compiling and reporting Tech Prep data, (g) revising local and state data collection forms, procedures, and policies to collect student information, (h) designing a common comprehensive data collection system for all education agencies with criteria included that interface with each other, and (i) developing a student identifier to assist with follow-up data collection.

Summary and Implications for Further Research

The results of this study have important implications for both policy and future research. Serious consideration must be given to defining exactly what Tech Prep is. The lack of common Tech Prep secondary and postsecondary student definitions at the state and national levels continue to be a challenge. Is it a technical-education-focused alternative to college prep for all students? If so, what are the parameters for defining secondary and postsecondary Tech Prep students? Or, perhaps a better question would be, should there be parameters for defining secondary and postsecondary Tech Prep students?

Implications of this study indicate that perhaps it would be more realistic to focus away from trying to identify and count Tech Prep students. This process has often resulted in incomplete and inaccurate local, state, and national data. A greater challenge is getting secondary and postsecondary schools to cooperate and report the data. The communication between secondary and postsecondary schools is minimal, and reporting of students is often lost in matriculation. Perhaps the focus should be turned to analysis of the impact of Tech Prep activities on: (1) the level of integration of academic and CTE classes; (2) professional development for teachers, counselors, and administrators; (3) business and industry internship opportunities for teachers, counselors, and students; (4) the availability of articulated secondary and postsecondary courses; (5) meeting economic needs of the local region; and (6) student success.

As an overall education reform initiative, State Tech Prep directors indicated that Tech Prep in their states was perceived as either a major player (29%) or minor player (54%) in education reform. Improvements directly resulting from Tech Prep included secondary and postsecondary collaboration (68%); articulation, including dual credit (64%); contextual or applied teaching and learning (36%); sequencing of 2+2 curriculum (32%); secondary faculty professional development (18%); and student career development (18%). It is these critical education reforms by which grassroots educators, employers, parents, and students identify Tech Prep. It would, therefore, seem appropriate to measure the impact of these efforts for all students; not just those who meet the rather elusive Tech Prep student definition and Tech Prep program criteria.

State Tech Prep directors identified several factors to support Tech Prep as a part of education reform. These factors included: (a) statewide articulation agreements, (b) meaningful role for business advisory councils, (c) Tech Prep state and local leadership, and (d) professional development activities. These factors are inherent in providing quality education for all students. In order to meet that demand, it will require increased support from parents, local business and industry leaders, faculty and school counselors, and state department of education personnel to support full-time administration and leadership positions to coordinate Tech Prep efforts.

Based upon the results of this study, it is recommended that this study be replicated in five years. Results from further research would add to the Tech Prep body of knowledge and would reflect the realities of Tech Prep and its role in education reform. With increased efforts to evaluate Tech Prep programs and provide student data, data collected from this study would provide a better understanding of Tech Prep's response to the needs of high school students and improving overall student academic achievement.

Telephone interviews should be conducted to follow-up with State Tech Prep directors to obtain clarification and rational for identifying Tech Prep as a minor player (54%) or a major player (29%) in education reform. The perception of Tech Prep programs appears to be a factor in the role Tech Prep has played in education reform.

Evaluation systems need to be in place for assessing the employability of Tech Prep students entering the job market. Are Tech Prep students meeting the Secretary's Commission on Achieving Necessary Skills (SCANS) requirements of business and industry (United States Department of Labor, 1991)? According to the SCANS competencies, have Tech Prep students met the foundation competencies of basic skills, thinking skills, and personal qualities as well as workplace competencies of managing resources, managing information, inter-personal skills, systems, and technology? Feedback from the business and industry sector is necessary for continuous improvement of Tech Prep programs.

Systematic evaluation and common definitions are needed to assess the impact Tech Prep has had on student academic achievement. After a decade of Tech Prep implementation, few states have developed a Tech Prep evaluation plan (Bragg, 2001), and Tech Prep state directors reported in this study (34%) the need for common definitions of secondary and postsecondary Tech Prep students.

Further research needs to be conducted to assess the High Schools That Work (HSTW) initiative and the effect of Tech Prep on student academic achievement. HSTW, CTE, and Tech Prep report similar goals of raising the academic achievement of high school students. It will be interesting to read how Tech Prep consortiums face the challenge of motivating students to build their competence in mathematics, science, reading, and writing.

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