What Will Be the Impact of Programs of Study? A Preliminary Assessment Based on Similar Previous Initiatives, State Plans for Implementation, and Career Development Theory

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OCTOBER 2008

NRCCTE
National Research Center for Career and Technical Education

UNIVERSITY OF LOUISVILLE

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Funding Information

Project Title:	National Research Center for Career and Technical Education
Grant Number:	VO51A070003
Act under Which Funds Administered:	Carl D. Perkins Career and Technical Education Act of 2006
Source of Grant:	Office of Vocational and Adult Education U.S. Department of Education Washington, DC 20202
Grantees:	University of Louisville National Research Center for Career and Technical Education 354 College of Education and Human Development Louisville, KY 40292
Project Director:	James R. Stone, III
Percent of Total Grant Financed by Federal Money:	100%
Dollar Amount of Federal Funds for Grant:	$4,500,000
Disclaimer:	The work reported herein was supported under the National Research Center for Career and Technical Education, PR/Award (No. VO51A070003) as administered by the Office of Vocational and Adult Education, U.S. Department of Education. However, the contents do not necessarily represent the positions or policies of the Office of Vocational and Adult Education or the U.S. Department of Education and you should not assume endorsement by the Federal Government.
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FOREWORD

The Carl D. Perkins Career and Technical Education Improvement Act of 2006 requires all recipients of funds authorized by this act to offer at least one Program of Study. This mandate reflects legislative recognition and endorsement of changes that have been taking place in career-technical education (CTE) during the past quarter-century. The educational reforms that began with the publication of *A Nation at Risk* in 1983 have caused CTE to broaden the objectives for secondary-level programs beyond preparation for entry-level employment. The field recognizes that many occupations require more preparation than can be delivered in high school. Programs of Study provide a framework for delivering such preparation.

This publication provides background to inform the implementation of Programs of Study; however, it is not a handbook or how-to guide. Instead, it is a review of the evidence on the effectiveness of previous similar initiatives and an examination of the implications of career development theory for Programs of Study. The authors raise three questions that, in their judgment, must be answered if the design and evaluation of Programs of Study are to be successful. As is always the case with our publications, the views expressed are the authors' and not necessarily those of others associated with the National Research Center or of the sponsor, the Office of Vocational and Adult Education, U.S. Department of Education.

On behalf of the National Center, I want to thank the authors for preparing this paper. I also wish to acknowledge the careful reviews of earlier drafts that were conducted by Corinne Alfeld of the National Institute for Work and Learning at the Academy for Educational Development, and Cathy Hammond of the National Dropout Prevention Center, Clemson University. The paper also benefited from a careful final editing by Kirsten Sundell, University of Louisville.

James R. Stone III, Director
National Research Center for
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Executive Summary

In 2006, Congress reauthorized the federal role in career and technical education (CTE) by passing the fourth version of the legislation carrying the name of Carl D. Perkins. This legislation included the requirement that to be eligible to receive funds, recipients must offer at least one Program of Study (POS), which must include coherent and rigorous content aligned with challenging academic standards and relevant career and technical content. This content must be delivered in a coordinated, nonduplicative progression of courses that align secondary education with postsecondary education and lead to an industry-recognized credential or certificate at the postsecondary level or an associate or baccalaureate degree. In addition, the programs may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits. In this paper, we provide a perspective on POS and the effect they are likely to have on the delivery and outcomes of CTE.

The components of POS cited in the previous paragraph come directly from the Perkins IV legislation. All states have developed these components to some degree through earlier initiatives that attempted to ease the transition from school to careers. In this paper, we examine four precursors of POS: Tech Prep, career clusters/pathways, youth apprenticeships, and dual/concurrent enrollment. However, the evidence on the effectiveness of these precursors is limited. Few studies compare students who participated in these precursor programs to similar students who did not. Most of the limited number of studies that made such comparisons, however, found some advantages for participants in such outcomes as increased likelihood of high school graduation and enrollment in postsecondary education. Participating students also had less need for remediation and higher grade point averages in postsecondary education. Statistically significant differences were not found for all studies; in most cases, the significant differences between participants and nonparticipants were modest, typically about 4% to 5%.

In this paper, we also summarize how states propose to implement POS. We base this summary on a review of 53 state plans (the 50 states plus the District of Columbia, Guam, and the Virgin Islands) for Perkins IV submitted to the Office of Vocational and Adult Education, U.S. Department of Education. The primary strategy to be followed by two-thirds of the states is to develop templates and criteria for local agencies to use as they develop their own POS. A little less than one-third (30.6%) plan to develop POS at the state level for adoption by local education agencies. All of the states will provide technical assistance and professional development to assist local agencies in developing and implementing their POS. Our review of the state plans implies that POS will represent modified, refocused versions of existing systems and methods rather than major changes in how the states deliver CTE.

This paper also reviews the implications of career development theory as it relates to students' decisions about POS. All occupationally specific CTE requires students to make choices about their future career goals. Programs of study, with their secondary-postsecondary articulation, require a four-year commitment. When high school students are making these choices, however, virtually all are in the exploratory stage of their career development. This means students choose their POS to test the match of their interests and abilities to the requirements of the occupations that they study. The match may not be what many expected and some may decide to try a

different career area. From a career development perspective, this is positive growth and should not be considered a failure on the part of either the programs or the students.

The paper concludes by posing three questions concerning the implementation of POS and offering our preliminary answers (in italics):

1. To what degree can secondary and postsecondary instruction be articulated?

   POS should align secondary and postsecondary instruction so that the secondary component addresses the academic deficiencies that are the primary barriers to obtaining college credits for CTE students. Interest in the occupations they study should be used as a means to improve the academic skills of CTE students through curriculum integration.

2. To what degree can rigorous and relevant technical content be aligned with challenging academic standards?

   States should work to align rigorous and relevant technical content with challenging academic standards through local development of POS. CTE and academic teachers at the secondary and postsecondary level should be given the time and support needed to work together to develop POS. The cost and logistics of making such opportunities available are formidable but have a high potential to yield the kinds of POS that are needed. POS that are developed and disseminated without the involvement of those who must implement them will not produce the desired results.

3. What are appropriate measures of the effectiveness of POS?

   The percentage of students obtaining postsecondary degrees or certificates should be one of the indicators used to assess the effectiveness of POS, but the core indicators required for all secondary CTE students (Perkins IV, Sec 113(b)(2)(A)) will provide more useful information. How do students who follow POS compare to similar non-POS students in terms of academic and technical skills; high school graduation; attainment of proficiency credentials; placement in postsecondary education, advanced training, military service, or employment; and participation and completion of programs that lead to nontraditional occupations? We would supplement these core measures with indicators of engagement with school and career development. Because of the exploratory nature of much secondary CTE, postsecondary certificate/degree attainment within the POS started in high school should not be the primary indicator of POS effectiveness.

Our overall conclusion is that POS can enhance the effectiveness of CTE, especially by aligning technical instruction with rigorous academic standards. Given, however, that most high school graduates are in the exploratory stage of career development, we do not expect high percentages to continue in the POS that they followed in high school. This does not mean that the POS have failed. POS that increase student engagement, improve academic skills, and deepen understanding of occupations have succeeded even if graduates decide not to continue their high school POS at the postsecondary level. POS can help to achieve that venerable but elusive goal of making education *through* occupations as explicit as education *for* occupations.

Chapter 1

What are Programs of Study?

On August 14, 2006, President Bush signed into law the Carl D. Perkins Career and Technical Education Improvement Act of 2006 (PL 109-270). This act was the fourth version of federal legislation that carried the name of the Congressman who had been the field's strongest supporter from his election in 1948 until his death.[1] This act, immediately referred to as "Perkins IV," introduced a new term into the career-technical lexicon, "Programs of Study." Except for those who had been writing and attempting to influence Perkins IV, the term was new to field. While the term was new, the concepts that it incorporated were not. In this paper, we provide background on Programs of Study (POS) and examine issues related to their implementation.

Our objective is to provide a frame of reference for evaluating POS and what they are likely to accomplish. POS emerged from similar efforts that had been in existence for some time. We review these precursors of POS and the best evidence available on their effectiveness. We then summarize how states plan to implement POS and raise questions that must be answered if these plans are to be successful. We raise these questions in the context of career development theory as it relates to the choices students must make to enter POS.

Perkins IV continues and strengthens efforts that began with the first Perkins act (P.L. 98-524) to broaden what was then called vocational-technical education. Perkins I was passed in 1984, shortly after *A Nation at Risk* (National Commission of Excellence in Education, 1983) charged that the "rising tide of mediocrity" in our educational system threatened our economic prosperity. The Commission provided no evidence to support this charge, and in the 1990s, when graduates of this "mediocre" system were entering the workforce, the nation experienced its longest continuous period of economic growth. Nevertheless, its message found wide acceptance. *A Nation at Risk* articulated a pervasive unease with the quality of American education and unleashed a reform movement that continues to this day. The link between education and economic performance has been the foundation of the many efforts to increase rigor, especially in mathematics, science, and technology, so that schools and colleges will teach the skills needed for our nation to compete successfully in a global economy. Friedman's *The World is Flat* (2005) repeated this same theme, and its many months on the bestseller lists reflect the continuing broad acceptance of this argument.

Perkins I included academic achievement among the indicators by which federally assisted vocational education programs were to be evaluated. This was the first time that legislation endorsed one of the key claims of those who had advocated for federal support of vocational education at the beginning of the 20th century. These original advocates argued that learning by doing could contribute to the learning of academic as well as occupational skills. Here is how the

[1] Carl Perkins died in 1984 while still serving in Congress. At the time of his death, the reauthorization of the federal vocational education legislation was close to final passage. To honor his 36 years of support for vocational education, the joint committee that was reconciling House-Senate differences in their separate bills added his name to the title of the legislation.

Report of the Commission on National Aid to Vocational Education (Commission on National Aid to Vocational Education, 1914) made this argument:

> Vocational training is needed for its indirect but positive effect on the aims and methods of general education:
> (a) By developing a better teaching process through which children who do not respond to book instruction alone may be reached and educated through learning by doing.
> (b) By introducing into our educational system the aim of utility to take its place in dignity by the side of culture, and to connect education with life by making it purposeful and useful. (pp. 126-127)

The report quoted was instrumental in the passage of the Smith-Hughes Act of 1917 that first authorized federal support for vocational education, but neither this act nor its many successors prior to Perkins I addressed the learning of academic skills. Perkins I began that process, and each reauthorization increased the emphasis on academics, resulting in the following language in Perkins IV:

The State plan shall . . . include a description of−

(A) the career and technical programs of study, which may be adopted by local educational agencies and postsecondary institutions to be offered as an option to students (and their parents as appropriate) when planning for and completing future coursework for career and technical content areas that−
  - (i) incorporate secondary education and postsecondary education elements;
  - (ii) include coherent and rigorous content aligned with challenging academic standards and relevant career and technical content in a coordinated, nonduplicative progression of courses that align secondary education with postsecondary education to adequately prepare students to succeed in postsecondary education;
  - (iii) may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits; and
  - (iv) lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree (P.L. 109-270. Sec. 122(c)(1))

To be eligible to receive Perkins funds, a recipient must offer at least one POS. No previous legislation was as prescriptive with regard to the structure and content of instructional activities that receive federal funds. The Tech Prep titles of Perkins II and III had similar language, but Tech Prep was optional, whereas at least one POS is mandated under Perkins IV.

Origins of the Term "Programs of Study"[2]

Well before POS were written into federal legislation, a broad consensus had emerged that high school occupational courses should prepare students for meaningful work in a modern global economy undergoing continuous technological change. Increasingly, obtaining the skills to succeed in such an environment requires postsecondary preparation. Perkins II, passed in 1990, included a Tech Prep title to encourage programs that connected secondary and postsecondary instruction. For more than a decade, CTE state directors have supported the development of career clusters and career pathways to articulate high school and postsecondary programs. The Association for Career and Technical Education (ACTE), which represents CTE teachers and administrators, published position papers advocating CTE as a key component of high school reform (*Reinventing the American High School for the 21st Century,* 2006) and for the enhanced articulation of secondary and postsecondary education (*Expanding Opportunities: Postsecondary Career and Technical Education and Preparing Tomorrow's Workforce,* 2007). The field was ready for the POS requirements contained in Perkins IV, but what label should be applied to them?

When the House and Senate considered the separate bills that were reconciled into Perkins IV, both legislative bodies wanted to encourage the integration of academic and technical content in programs that closely linked secondary and postsecondary education. Both bills also sought to increase accountability by specifying measurable outcomes for programs (i.e., attainment of an industry-recognized certificate or credential at the postsecondary level or an associate or baccalaureate degree). The two bills, however, used different terms for such programs. The House used the label "Model Sequences of Courses," while the Senate used "Career Pathways." The House resisted any use of the word "careers." In fact, the House bill that went to the joint committee retained the words "vocational-technical" throughout, rather than "career-technical." To some House members, "careers" implied that schools have undue influence on the occupational plans of students. This perception is a carryover of criticisms raised about the School-to-Work Opportunities Act. Critics of this act claimed that it was an attempt to produce docile workers willing to accept assignments to roles in a planned economy (Schlafly, 1997).

The recollections of those directly involved in shaping and writing the legislation differ as to how the term "Programs of Study" was finally chosen. Three state directors of CTE who testified in support of the reauthorization of the Perkins legislation referred to similar initiatives in their states as POS. A Senate staffer directly involved in the writing of the final act noted that POS is used frequently in higher education; this may have been a consideration. A lobbyist from an association supporting reauthorization recalls preparing a list of possible terms for consideration by the House and Senate staff and POS was on the list. Regardless of how the final choice was made, the House and Senate wanted programs that were integrated, articulated, and accountable, and POS as the term for such programs was acceptable to all involved. The House

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[2] The following is based on conversations with individuals involved in lobbying for Perkins IV and House and Senate staff members who wrote the final act under the direction of the Representatives and Senators whom they served.

representatives also agreed to replace the references to "vocational-technical" with "career-technical" when shown that almost all states were using the new terminology.

Organization of the Paper

With the passage of Perkins IV, CTE was given a new term and a new set of challenges. In this paper, we attempt to provide a perspective on POS by reviewing the best available evidence on the effectiveness of previous initiatives that had many of the same components as POS. We also review the career development theory of Super (1957) and discuss its implications for POS. In Chapter 2, we review the best available evidence on the effectiveness of Tech Prep, career clusters/career pathways, youth apprenticeships, and concurrent/dual enrollment. We limit the studies we discuss to those that provide information on outcomes such as academic achievement and transition to postsecondary education. In Chapter 3, we summarize how the states propose to implement POS. We base this summary on an analysis of the plans for using the funds provided under Perkins IV that all of the states, the District of Columbia, Guam, and the Virgin Islands submitted to the U.S. Department of Education. In Chapter 4, we review Super's theory on career development as it relates to POS with a special focus on the stages he labeled "growth" and "exploration." Super's theory and others agree that virtually all high school students are in the exploratory stage of their careers. This means that in choosing POS, students are exploring career options at least as much as they are preparing to enter defined careers. Chapter 5 concludes the paper by raising questions concerning the articulation of secondary and postsecondary instruction, the alignment of POS with challenging academic standards, and appropriate measures for assessing the effectiveness of POS. For each of these questions, we draw upon the evidence we have reviewed in previous chapters to provide preliminary answers.

Chapter 2

Precursors of Programs of Study

The last quarter of the 20th century saw many attempts to forge stronger links between secondary and postsecondary education and between education and work. Career education in the 1970s (Herr, 1976) and school-to-work in the 1990s (Hughes, Bailey, & Mechur, 2001) were major federal initiatives. Both attempted to improve all of education by emphasizing the relevance and utility of the knowledge and skills studied in school to students' future careers. Neither had the impact on academic education that their proponents had hoped, but these initiatives helped to create the context from which four approaches emerged: Tech Prep, career clusters/career pathways, youth apprenticeships, and dual/concurrent enrollment.

Two decades before federal law required the offering of Programs of Study (POS), Dale Parnell (1985) proposed Tech Prep, articulated programs that teach technical skills by combining the final two years of high school with the first two years of postsecondary education. In the 1990s, career pathways emerged as a guide to the integration of academic and technical content and the articulation of secondary and postsecondary instruction. Youth apprenticeships, similar to Germany's dual system of combining employment and related academic instruction, also received considerable attention. During this same period, dual or concurrent enrollment courses, which originally enrolled only high-achieving students, began to be offered to a wider range of students. In 1974, the first middle college high school was established to provide a different environment for students who were often alienated from the typical high school (Lieberman, 2004). In recent years, the Early College High School Initiative has expanded the middle college concept even further. In this chapter, we provide some background on each of these initiatives and present the best evidence we could find on their effectiveness in improving academic performance and linking secondary and postsecondary instruction.

As an advance organizer for the discussion that follows, we present Table 2.1. This table lists the main features of the four precursors to POS and the best evidence available on their effectiveness. This table reflects the "idealized" version of these precursors to POS; that is, the way they would operate if they incorporated all of the features that those who proposed them intended them to have. Unfortunately, many actual programs did not have all these features. Many of the programs labeled "Tech Prep" and "youth apprenticeships" consisted of little more than occupational exploration and involved no skill training (Hershey, Silverberg, Owens, & Hulsey, 1998; Silverberg, Bergeron, Haimson, & Nagatashi, 1996).

In their idealized versions, the first three initiatives have essentially the same components as POS: aligned academic and technical content, articulation of secondary and postsecondary instruction that leads to a recognized credential or degree, and opportunities to earn postsecondary credits. This similarity is noted in Table 2.1 as "Very similar to POS." The summary of effectiveness is based on the studies that attempted to control threats to internal validity and lists differences that were found in some, but not all, studies.

Table 2.1
Overview of Precursors to Programs of Study

Program	Components and Special Features	Evidence of Effectiveness
Tech Prep	• Very similar to POS • First major initiative to encourage articulation of secondary and postsecondary instruction	Few significant differences between Tech Prep participants and similar nonparticipants
Career Pathways	• Very similar to POS • Comprehensive templates for educational planning • Increased emphasis on the rigor of content in academic and technical content	• Higher rates of postsecondary enrollment • Higher grade point averages in high school • Less remediation at the postsecondary level
Youth Apprenticeships	• Very similar to POS • Technical training delivered by employers • Academic instruction linked to training	• No good evidence of effectiveness • Enroll a very low percentage of secondary students
Concurrent/Dual Enrollment	Postsecondary courses and credits available to secondary students	• Higher rates of postsecondary enrollment • Higher grade point averages at the postsecondary level • Higher rates of persistence in postsecondary education • More postsecondary credits earned

Note. Evidence of effectiveness lists significant differences between participants and nonparticipants that were found in some studies and may be biased by self-selection of students into these programs.

Tech Prep

A good Tech Prep program, one that meets the criteria set forth in the legislation, is a POS. In *The Neglected Majority*, Parnell (1985) proposed Tech Prep programs for students in the middle two quartiles of academic ability—those who complete high school but rarely obtain four-year degrees. The foundation of a Tech Prep program is an articulation agreement between one or more high schools with one or more postsecondary institutions. The agreement sets forth the instruction that will be delivered at the secondary and postsecondary levels and the criteria that students must meet to receive postsecondary credit for the skills and knowledge acquired in high school. This concept was endorsed in the 1990 reauthorization of the federal vocational education legislation (Perkins II, P.L. 101-392), which authorized specific funds to support Tech Prep. This authorization was continued in Perkins III and IV, but under Perkins IV, states have the option of combining the Tech Prep funds with their basic state grant. Even though POS and Tech Prep are virtually identical, the Tech Prep title was retained in Perkins IV because

advocates lobbied that a separate title was needed to maintain the credibility (and funding) for the consortia that had been formed under Perkins II and III.[3]

The "Contents of Tech Prep Programs" described in Perkins IV (Sec. 203(c)) contain the same criteria as those established for POS. The only real differences are that for POS, the word "challenging" is added in reference to academic standards and that all districts receiving federal funding under the basic state grant must offer at least one POS. There is no requirement that Tech Prep be offered. As with Tech Prep, Perkins IV gives states and local districts wide latitude on how they plan to implement POS. For Tech Prep, such latitude has been both a strength and weakness. It allowed states and regional consortia to design programs that they judged to be most responsive to their circumstances, but the variability in the programs that emerged has made it difficult to isolate what is unique about Tech Prep, much less the impact of participating in these programs.

Evidence of Effectiveness

Stone and Aliaga (2003) analyzed data from the National Longitudinal Survey of Youth 1997 to determine the effects of Tech Prep on the academic achievement of young people who were in Grades 9 through 12 during the period from 1997 to 1999. These data are based on a nationally representative sample, but they rely upon students' self-reports of both the kinds of courses they took and their grade point averages (GPA). Regression analyses found no significant relationship between Tech Prep participation and GPA.

Debra Bragg and her colleagues at the University of Illinois have made a sustained effort to assess the effects of participating in Tech Prep (Bragg et al., 2002). Their study was longitudinal and followed students in eight selected consortia from high school to college and into employment between January 1998 and December 2001. With the help of a national panel of experts, Bragg and her colleagues initially identified six consortia in the country as "mature" implementers of Tech Prep. Later, at the request of the sponsor, the Office of Vocational and Adult Education (OVAE), two more designated consortia were added to strengthen the design.

The eight consortia that were studied had begun planning their programs before or shortly after Perkins II and were enrolling students at the secondary and postsecondary level by the mid- to late-1990s. These consortia were located in urban, suburban, and rural areas and demonstrated a strong commitment to Tech Prep as a primary vehicle of educational change that, in the judgment of state personnel and panel members, reflected preferred policies and practices. That is, their programs were of high quality but not so unusual as to be unrepresentative of other consortia. Those selected had begun local evaluation of their efforts and were willing to incorporate aspects of the broader research design of the Bragg et al. study into their future evaluation plans. They also were willing to use the results to improve their programs and to share what was learned with others. Given that all eight met these criteria, the outcomes that they achieved should be among the most favorable likely to be obtained.

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[3] This inference is drawn from the conversations with the advocates and Congressional staff members reported in Chapter 1.

To study their outcomes, Bragg and her colleagues selected a total of almost 4,600 students for follow-up, with roughly equivalent numbers of Tech Prep and non-participants in each group. A systematic random sampling procedure was employed to ensure that the two groups of students were similar, based on high school academic performance as measured by GPA and/or class rank percentile (CRP) at the time of high school graduation. Transcript and demographic data were collected for the selected students and two follow-up surveys were conducted.

While those who participated in Tech Prep programs did not differ substantially from the comparison group of students on GPAs, family income and parental education were somewhat lower among the Tech Prep participants. Four of the consortia also had significantly more males than females enrolled in their Tech Prep programs. This was attributable largely to a preponderance of traditionally male-oriented CTE specializations linked to Tech Prep in those consortia. Tech Prep participants had many of the characteristics that placed them at a higher risk of non-completion at the college level, including first-generation college enrollment and part-time enrollment combined with part-time or full-time work (Tinto, 1996).

In terms of academic courses during high school, four consortia showed group differences in the number of math courses taken. Tech Prep participants at one site took more semesters than non-participants, but non-participants exceeded Tech Prep participants in math course-taking in the other three sites. In examining the level of math course-taking, however, the researchers found Tech Prep participants taking slightly more advanced math courses than their non-participant peers in four consortia. Non-participants took more science courses than participants in five consortia, and at two sites, the reverse was true. As would be expected, Tech Prep participants were much more likely to be classified as vocational concentrators (three or more Carnegie units in one career path or CTE cluster area): 61% compared to 36% of non-participants.

Over 80% of the Tech Prep participants in six consortia enrolled in two-year colleges, and the percentage of non-participants enrolling in two-year colleges was close to or higher than that in five consortia. Enrollment of Tech Prep participants at two-year colleges tended to exceed non-participants, but the differences were small, reaching statistical significance at only two sites. High levels of enrollment at four-year colleges were found among Tech Prep participants from locations where many higher education opportunities were available.

Many students, both Tech Prep and non-participants, enrolled in college-level classes, but few earned sufficient credits to obtain a certificate or degree. Most were required to take developmental, non-credit courses. The study found that 40% to nearly 80% of Tech Prep participants took some college-level coursework, with a slightly wider range (nearly 30% to 76%) among non-participants. Relatively few who enrolled in two-year colleges received associate of arts (AA), associate of science (AS), or associate of applied science (AAS) degrees or certificates, regardless of Tech Prep status. The median percentage of students earning some credential within three to four years (and occasionally five) after high school graduation was only 10.5%. The range of completers reported by the consortia was 8.5% to 19.0%. These results were consistent across sites for both study groups.

As noted above, given the care that was taken in the selection of the consortia studied, it is likely that these findings are among the most favorable that could be obtained. If the consortia studied

are among the best and the programs they offered were similar to the POS that will be offered by states under Perkins IV, these findings raise questions about the potential of POS to achieve the goals set by the legislation.

We have discussed the Bragg et al. study at length because of the care that was taken to select Tech Prep programs that reflected best practices and its collection of data from a comparison group for use in evaluating the outcomes of participation. Another major Congressionally mandated evaluation (Hershey et al., 1998) had a formative rather than summative focus and included case studies of 10 consortia selected because of the reputed quality of their programs. These case studies included follow-up interviews with 486 former Tech Prep students conducted approximately 18 months after they should have graduated from high school. This follow-up, however, did not include similar non-Tech Prep participants against whom the outcomes of the participants could be compared. Enrollment in postsecondary education or other types of formal occupational preparation from these 10 consortia was 61%, but only 15% reported that their programs awarded credits for the articulated courses they had taken in high school. Over one-third (37%) of those attending community colleges had not started programs leading to degrees but instead were taking developmental and general education courses.

These results were not encouraging, but the evaluation found evidence of implementation efforts that led them to provide a strong endorsement for the types of POS mandated by Perkins IV:

> The conclusions presented here are drawn from detailed examination of the *implementation* of Tech-Prep, not of its impact on students. Whether Tech-Prep, in any of its forms, improves student outcomes is a question that still remains to be addressed; this study was not designed to answer that question. However, our five-year evaluation suggests that prospects for Tech-Prep to change educational pathways and success of students in the ways framers of the Tech-Prep legislation anticipated will be enhanced if federal and state education agencies renew their emphasis on developing structured, focused programs of study with a strong career theme, meaningful integration between technical and academic curricula, and a close link between high school and postsecondary stages of the program. (Hershey et al., 1998, p. 130)

Career Pathways

At the same time Tech Prep consortia were being organized, other initiatives to align high school preparation more closely with the needs of the labor force were being designed and implemented. One of these was the development of career clusters and career pathways. The link between Tech Prep and career pathways was highlighted by Dan Hull, the former chief executive officer of CORD[4] and one of the foremost advocates for Tech Prep. Under his leadership, CORD created the National Tech Prep Network to provide resources, professional development, and technical assistance to those establishing and leading consortia. In 2004, he responded to the growing interest in career pathways by publishing *Career Pathways: The Next Generation of Tech Prep*, which presented the following challenge to Tech Prep leaders:

[4] Before it changed its name to its acronym, CORD was the Center for Occupational Research and Development. It was founded in 1979 to provide contracted services for educational improvement focused on careers.

> All of the elements of Career Pathways are being developed and tested in Tech Prep partnerships today. But I have yet to see a Tech Prep partnership that successfully embraces all the elements of Career Pathways—and **I am challenging all Tech Prep partnerships to become the change agents needed to convert traditional CTE programs to Career Pathways**. (Hull, 2004, p. 3, emphasis in the original)

The National Tech Prep Network accepted this challenge and in 2007 changed its name to the National Career Pathways Network. While this network changed its name, Tech Prep continues as a federally funded program. As previously described, however, because POS are so similar to Tech Prep, Title II of Perkins IV, which continues the authorization for Tech Prep funding, gives states the option of consolidating these funds with their basic state grant.

The traditional organization of occupational instruction at the secondary level was created by federal legislation. In 1917, the Smith-Hughes Act limited the kinds of occupations eligible for federal funding to those in agriculture, trade and industry, and home economics, which evolved into family and consumer science. Later legislation expanded these categories to include distributive/marketing, health, and business occupations. For most of the 20th century, secondary vocational education was delivered within this structure and aimed primarily at teaching the skills needed for entry into occupations. In the last two decades of the century, however, changes in the skills needed for success in the labor market caused an increased emphasis on academics and preparing students to continue their occupational preparation at the postsecondary level. This emphasis led to efforts to more closely align academic and technical instruction and secondary and postsecondary education. Career clusters and career pathways emerged from these efforts. Career clusters organize related occupations by the types of products and services these occupations provide to society, such as manufacturing, health services, and architecture and construction. Career pathways provide guidance as to the knowledge and skills—both academic and technical—that must be acquired to prepare for occupations at varying levels within these clusters.

Career clusters have evolved into the primary way of organizing secondary occupational instruction, but their evolution was anything but smooth. Ruffing (2006) wrote a short history based on interviews with individuals who had played key roles in the projects that led to the adoption of the 16 current clusters. As she described these events, in the 1990s, the U.S. Department of Labor and the U.S. Department of Education recognized the overlap in the projects they had funded to develop occupational skill standards and the need for a common system of classification. The two departments agreed to jointly fund the Building Linkages project that contracted with three consortia to conduct pilot projects in retail and banking, health, and manufacturing. In each of these sectors, the consortia examined existing academic and technical standards and attempted to develop integration models. In two of the sectors, health and manufacturing, these efforts were successful and laid the foundation for career pathways that specified the academic foundations and technical skills that must be acquired to enter occupations at different levels within these sectors. The retail and banking sector was terminated after it was determined that the sector was too narrow and did not provide sufficient opportunities for high-wage employment.

After one year, the U.S. Department of Education assumed responsibility for funding and oversight of the efforts that had been started by the Building Linkages project. OVAE selected three additional sectors for development: Information Technology, Transportation, Distribution, and Logistics, and Arts, Audio/Video Technology, and Communication. By 1999, the two clusters that had emerged from the first pilot projects and the development of the three new clusters were deemed sufficient for OVAE to adopt a classification system consisting of the following 16 clusters:[5]

- Agriculture, Food, and Natural Resources
- Architecture and Construction
- Arts, Audio/Video Technology, and Communications
- Business, Management, and Administration
- Education and Training
- Finance
- Government and Public Administration
- Health Sciences
- Hospitality and Tourism
- Human Services
- Information Technology
- Law, Public Safety, Corrections, and Security
- Manufacturing
- Marketing, Sales, and Service
- Science, Technology, Engineering, and Mathematics
- Transportation, Distribution, and Logistics

To develop the remaining 11 clusters, OVAE requested proposals and selected the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) as the successful bidder. When the grant was awarded, states within the consortium volunteered to develop the clusters in which they had particular interest and expertise. The tasks to be carried out by the states were identical across clusters: convene national advisory committees, define their specific cluster, identify the skills and knowledge needed for occupations at various levels with their clusters, create pathways, and validate their work. The project director and four consortium coordinators supported and monitored the work of the separate states to ensure consistency and quality. The NASDCTEc board of directors and a national advisory consortium with representatives from all major stakeholders provided oversight. In September 2002, the tasks listed above had been accomplished and the resources for the 16 clusters were made available for adoption.

The original contract with NASDCTEc called for a second phase in which curriculum, assessments, and certifications would be developed. OVAE decided not to fund this second phase and shifted the funds that had been budgeted to the College Career Transitions Initiative, which will be described below. NASDCTEc decided to continue the work that had started under the second phase by establishing the States' Career Clusters Initiative. With initial funding from the consortium and states, this initiative has become self-sustaining from the sale of its products and revenue from its annual Career Clusters Institute. In 2006, OVAE provided additional funding to improve its products and to develop additional pathways for the 16 clusters.

In the summer of 2007, NASDCTEc (2007) surveyed its members on the implementation of career clusters and POS. Questionnaires were returned by 47 states, the District of Columbia, Puerto Rico, and Guam. Of these 50 respondents, 26 or more provide programs within 15 of the

[5] This list was retrieved from http://www.careerclusters.org/16clusters.cfm on August 29, 2008. It differs slightly from the list that was originally released.

16 career clusters and 36 or more provide programs in the most popular 7 clusters. Many states reported working to ensure that the pathways being offered within these clusters meet the definition of POS set forth in Perkins IV.

Implementation Initiatives

The College and Career Transitions Initiative (CCTI), an OVAE-funded project administered by the League for Innovation in the Community College, works with community colleges to encourage career pathways within career clusters. CCTI began in 2002 by inviting community colleges to submit proposals describing how they would develop partnerships with high schools and employers to design and implement career pathways. The definition of career pathway adopted by CCTI was developed in cooperation with the National Clearinghouse for Career Pathways at CORD and other interested parties:

> A Career Pathway is a coherent, articulated sequence of rigorous academic and career courses, commencing in the ninth grade and leading to an associate degree, and/or an industry-recognized certificate or licensure, and/or a baccalaureate degree and beyond. A Career Pathway is developed, implemented, and maintained in partnership among secondary and postsecondary education, business, and employers. Career Pathways are available to all students, including adult learners, and are designed to lead to rewarding careers.[6]

This definition differed from traditional Tech Prep by starting the pathways in the ninth grade and placing more emphasis on rigor comparable to that in a college preparatory curriculum.

From among the community colleges that responded to its request for proposals, CCTI initially selected 15 to receive funding to create pathways that would serve as models for other institutions. The initial experiences in developing partnerships and enrolling students in the 15 original colleges were sufficiently positive for CCTI to open its network to any community college in North America that wanted to adopt its goals and draw upon its resources. By August 2008, 172 colleges in the United States and Canada had become members.

At the 2008 meeting of colleges in the CCTI network, Warford, Beauman, and Kindell (2008)[7] presented data on the experiences of the original 15 community colleges. In 2004, the 40 high schools that had joined in partnerships with the 15 colleges enrolled 2,853 students in 15 different pathways based on 5 separate career clusters. By 2007, the number of high schools had doubled, the number of students had increased to 22,178, and they were following 176 pathways based on the 16 OVAE clusters.

The original 15 CCTI colleges have provided yearly outcome data on 1,124 students who participated in pathways, graduated from high school in the spring of 2004 through 2007, and

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[6] The definition was retrieved on May 1, 2008 from http://www.league.org/league/projects/ccti/cp/characteristics.html. It is also published in Hull (2004, p. 6).

[7] The project director, Laurance Warford, kindly provided the 2008 CCTI Final Report (Warford, 2008) and a draft copy of the Year 4 quantitative report (Clery & Brooks, 2008). The outcomes summarized here are based on these sources as well as the PowerPoint presentation to the 2008 meeting of the CCTI network that is cited.

enrolled in these colleges in the fall of their graduation years. These data do not include graduates who went on to other community or four-year colleges, or those who did not enroll in the fall following their graduation. Warford et al. (2008) reported the national average for enrollment in community colleges directly from high school at 14% compared to a CCTI average of 27%. This CCTI percentage, it should be noted, is based on graduates who enrolled in the same pathways they had studied in high school and in the community colleges that were the postsecondary partners in those pathways. The national figure cited by Warford et al. is for *any* community college enrollment and is derived from a longitudinal study that started in 1988. More recent data from the Educational Longitudinal Study of 2002 (Bozick & Lauff, 2007) indicate that the enrollment rate during the two-year period following high school is 27%. Drawing upon the data in the Bozick and Lauff report, we estimate the enrollment rate in any community college directly from high school to be 23%. The national re-enrollment rate cited by Warford et al. is 54% and for CCTI participants 53%. Warford et al. reported remediation rates for students following CCTI pathways into the original 15 community colleges were 40% for mathematics and 27% for both English and reading. They also cited sources documenting that nationally about two-thirds of students entering community colleges require remediation in these subjects. These differences imply that the CCTI stress on rigorous academics and career courses does reduce the need for remediation at the postsecondary level.

In addition to CORD and CCTI, the Workforce Strategy Center (WSC) is another advocate of career pathways, but it defines them in a way that grounds them in a context of regional economic development:

> "Career pathways" is our [the WSC's] term for a particular framework or approach by which regions can better align publicly supported systems and programs to build a knowledge economy workforce customized to the needs of local labor markets. A career pathway is a series of connected education and training programs and support services that enable individuals to secure employment within a specific industry or occupational sector, and to advance over time to successively higher levels of education and employment in that sector. (Jenkins, 2006, p. 6)

This definition and the one previously cited from CCTI do not differ in their goals, but they do differ in their emphases. The WSC definition stresses alignment of all systems and programs involved in workforce development within identifiable labor markets (Jenkins & Spence, 2006; Mazzeo, Roberts, Spence, & Strawn, 2006). The CCTI definition focuses primarily on aligning academic and career courses and articulating secondary and postsecondary instruction (Hughes & Mechur Karp, 2006).

Evidence of Effectiveness

We have presented some outcome indicators for CCTI, but we had difficulty finding additional evidence of the impact of career pathways, however defined and implemented, on achievement and transition. An ERIC search using the keywords "career pathways" for documents published in 1990 or later yielded 356 hits, but only a handful presented any evidence on the outcomes of

career pathways.[8] Four that reported some data were conducted by the National Research Center for Career and Technical Education (NRCCTE). We shall discuss each of these and then summarize the two others we identified.

In the discussion of Tech Prep, we noted that Stone and Aliaga (2003) analyzed data from the National Longitudinal Survey of Youth 1997 to identify students who had participated in different types of CTE programs. Regression analyses did not find Tech Prep participation to be related to high school GPA, but career pathways (also referred to as "career majors" in the data collection) were. Students' reports of enrollment in career pathways/majors had a significant positive relationship with final, 12th-grade GPAs, and this relationship remained significant when measures of student characteristics, including their 8th-grade GPAs, were added to the equation. In the full equation, career pathways had a beta weight (the relationship with GPA holding other variables in the equation constant) of .079 compared to a beta of .401 for 8th-grade GPA.

Castellano and her colleagues (2007) studied three selected high schools that were engaged in comprehensive school reform based on one of three models: career academies, High Schools That Work, or career pathways. All students at the third high school followed career pathways, and many whose pathways included CTE courses took them at a regional center that served several districts. The experiences of these students were compared to those of students in a similar comprehensive high school that had not adopted career pathways. Many students at the comparison school studying CTE courses took them at a different skill center than the pathway students.

The career pathways model did not improve graduation rates, but the pathway graduates outperformed their non-pathway counterparts on many measures of transition to postsecondary education. More pathway students had post-high school plans than non-pathway students, and equal numbers were accepted to four-year universities. Pathway graduates who attended the main community college serving their area outperformed their comparison group counterparts. For each academic subject, fewer pathway than non-pathway students were required to take remedial courses; however, 60% still needed remediation. More pathway students participated in Tech Prep than did their counterparts, and at the end of one year of college, pathway students had earned significantly more credits.

A study by Lekes et al. (2007) reversed the sample selection from the secondary to the postsecondary level. This study chose one community college that had been identified by the National Dissemination Center for Career and Technical Education as having exemplary transitional programs, and a second community college that had received a *Star of Education* award from the NASDCTEc. At the first college, two health career pathways (Emergency Medical Technician and Patient Care Assistant) were examined, and at the second, the focus was on pathways for Information Technology/Computer Information Science (IT/CIS). For the secondary component of the study, students following these pathways were matched with similar non-participants from their same schools. The high schools that were studied had been selected so that they varied in the degree to which they were engaged in career pathways. The

[8] The search was conducted April 24, 2008 at http://www.eric.ed.gov/.

postsecondary component relied primarily on analysis of transcript data from the second community college.

Like the Bragg et al. (2002) Tech Prep study, Lekes and her colleagues (2007) studied transition initiatives that were recognized as among the best to be found. Their findings also parallel Bragg et al. (2002) in that few differences were found between the students who had participated in pathways and those in comparison groups who had not. The pathway students were more likely than nonparticipants to have experienced the components recommended for pathways, such as contextualized learning, mentoring, and work-based learning. In most comparisons, however, these experiences were not associated with differences between pathway and non-pathway students in outcomes such as graduation, GPAs, or postsecondary enrollment. The pathway students did have an advantage in postsecondary credits earned, in part because of the dual credit courses they had taken in high school. This advantage appears to have increased their chances of earning a certificate or degree: 21.3% in the IT/CIS pathway earned a credential compared to 17.2% for the non-pathway students.

The third study conducted by the NRCCTE addressed career pathways that implemented the Workforce Strategy Center (WSC) model of attempting to coordinate all major components of workforce development. Outcome data are very limited for these pathways, but we describe in some detail one of the three programs that were studied to show how the WSC emphasis differs from the traditional high school-postsecondary transition.

Bragg and others (2007) studied pathways at three sites that involved adult literacy, adult basic education (ABE), General Educational Development (GED), English language literacy (ELL), pre-collegiate developmental education, postsecondary CTE certificate and associate degree programs, and potentially, baccalaureate degrees. As implied by this wide range of learning opportunities, these pathways were designed to serve low-skilled adults.

Drawing upon guidance from an advisory panel, a literature review, and telephone interviews with state and local educational administrators, the researchers, in collaboration with personnel from OVAE, selected the following three pathway programs for case studies: Carreras en Salud–Instituto del Progreso Latino (IPL), Chicago, Illinois; General Service Technician (GST)–Shoreline Community College, Shoreline, Washington; and Career Pathways Initiative (CPI)–Ouachita Technical College, Ouachita, Arkansas. We describe Carreras en Salud–Instituto del Progreso Latino (English translation: Careers in Health–Institute for Latino Progress) to give a sense of the scope of these pathways.

Carreras-IPL is a fairly new program, starting in April 2005, in response to the need for bilingual health care workers in the Chicago area. Almost all of its participants are low-skilled women with limited English proficiency. The program is administered by IPL, an established Community-Based Organization (CBO) that has served the Latino population since 1977. Among the partners that IPL has involved are employers, another CBO, community colleges, a vocational education center, industry associations, chambers of commerce, religious organizations, labor organizations, and the local Spanish-language media. The employers are represented by the Metropolitan Chicago Healthcare Council, which consists of over 300 hospital and nursing home members. Through this council, IPL obtains assistance in the

development of curriculum, identification and recruitment of instructors, and sites for practicum and job placement.

IPL recruits participants through public service announcements on Spanish-language television and radio stations, presentations in churches, and contact with entry-level workers already in health care who are blocked from advancement because of limited English and academic skills. The participants start their pathways at the point appropriate for their skills as measured by the Test of Adult Basic Education. Regardless of the level at which they start, all receive English language and academic skill instruction in a health context, provided by bilingual instructors. As they progress, participants take courses to prepare them for the examination required to become a Certified Nursing Assistant as well as for the GED and COMPASS, the placement test used by the Chicago community college system. Options are available for students who have difficulty passing the GED or COMPASS, including courses in phlebotomy and electrocardiograms that can lead to employment as a Patient Care Technician.

Students who obtain the GED and improve their English skills sufficiently to pass the COMPASS exam begin taking the courses necessary to enter the Licensed Practical Nurse (LPN) program at the community college. The college holds 20 slots in every entering class available for Carreras-IPL participants, but at the time of the site visit, this number was insufficient. There were 50 participants who were qualified to enter the LPN program for whom no openings were available. Those who complete the LPN training can transfer as second-year students into a two-year program that prepares them for certification as Registered Nurses.

The Carreras-IPL pathway was visited in August 2007, 28 months after it started. Due to the varying starting and ending (or pausing) points of students, it has proved difficult to produce unambiguous indicators of progress. The administrators reported that out of the initial starting groups, over 70% had attained appropriate milestones, passed licensure exams at varying levels, and were employed. Retention of current students was reported at 94%. The administrators of the program recognize the need for more comprehensive outcome data and are seeking funding and expertise to conduct systematic follow-ups with former participants. The two other sites that were studied target different populations, but each attempts to provide learning opportunities that enable low-skilled adults to enter and progress on pathways that lead to employment in jobs paying wages sufficient to sustain a family.

This description of the Carreras-IPL pathways illustrates the ways in which the WSC emphasis differs from the CCTI focus on secondary-postsecondary transition. Although the WSC publications discuss how features of pathways could be implemented in elementary and secondary education, the approach has been applied primarily in adult training and retraining.

In our review, we identified only two other published reports on career pathways that included any information on outcomes. Rudy and Rudy (2001) compared the academic performance of students in Berrien County, Michigan prior to and after pathways in six broad career areas were implemented for all students. Over a five-year period, they found improvement on these measures: high school attendance rates, mean high school GPA, scores on statewide testing, enrollment in dual-credit courses, and the percentage of graduates enrolling in postsecondary

education. These were all county-wide indicators and no data were available from a comparison group for the same period.

The other report was from the Austin (Texas) Independent School District (Oswald, 2002), which offers 29 career pathways in 8 career clusters. This report classified students who took any CTE—about 60% of all high school students in the district—into three groups:

- *Elective,* those who took an incidental CTE course,
- *Coherent*, those who took a sequence of CTE courses focused on developing occupational skills and knowledge within a given career pathway, and
- *Tech Prep*, those who met the coherent definition given above in pathways that include state-approved articulation agreement (college credit) courses.

Comparisons were made across these three groups and with high school students who took no CTE courses. The comparisons are less precise than desired because of difficulties in classifying the CTE students. The plans and the courses students take change as they progress through high school and it may not be possible to classify them until they have completed all their courses. The comparisons that were possible yielded a mixed pattern. Those classified as Coherent had the lowest attendance rates, while those classified as Tech Prep had the highest. Students in all three groups were more likely to pass statewide tests than those without any CTE courses, but those in the Coherent group had to take the test more times than those in other groups in order to pass all sections. Students taking CTE courses were more likely than non-CTE students to earn adequate credits to move to the next grade level. In the ninth grade, however, students classified as Coherent were the least likely of the four groups to earn enough credits to be promoted to the 10th grade.

Obviously, all of these studies have many limitations. To the degree that POS are the same as career pathways, however, the collective results of the six studies raise questions concerning the degree to which POS are likely to impact achievement and transition. We shall examine these questions in a later section in which we discuss the challenges to implementation of POS.

Youth Apprenticeships

The 1990s saw a surge of interest in youth apprenticeships as a means of facilitating the transition between school and work. The German dual system of combining paid employment and academic studies linked to the employment was seen as a model with much potential for the United States. Today, youth apprenticeships have largely faded from the scene. Why did youth apprenticeships generate so much interest, and why did they fade so rapidly?

An ERIC search using the keywords "Youth Apprenticeships" yielded 372 documents.[9] When we reviewed these documents by decade, we found 46 from 1979 or earlier, 59 from the 1980s, 215 from the 1990s, and 52 from 2000 to the present. The search identified any document with both "youth" and "apprenticeship" somewhere in the title, descriptors, or abstract. Few of the earliest or most recent documents had the two words together. In the 1980s, the term "youth apprenticeships" appeared more frequently, and in the 1990s, the majority of documents

[9] The search was conducted July 9, 2008 at http://www.eric.ed.gov/.

concerned programs that were similar to the youth apprenticeships model that had been proposed and tested by the Hamiltons, as described below.

Emergence of Youth Apprenticeships

Stephen Hamilton and his wife, Mary Agnes Hamilton, were key players in generating the interest shown in youth apprenticeships during the 1990s. Stephen Hamilton became a college professor after having taught in a vocational education high school. To overcome the transition problems experienced by students who do not continue their education after high school and the inherent limitations of school-based occupational training, Hamilton (1990) proposed that elements of the German dual system be adopted. He not only proposed a model, he and his wife tested it in Broome County, New York (Hamilton & Hamilton, 1993). The model had all the components of POS. It articulated the last two years of high school with two years of postsecondary education. It had rigorous academic and technical standards and integrated academic and technical content. The goals of the Hamiltons' youth apprenticeships were for students to earn associate degrees and nationally recognized skill certificates once the program became registered with the New York State Department of Labor. The Hamilton model differed from POS, however, in that it placed the responsibility for skill training on employers.

This model did not require that its students be registered apprentices. Registered apprenticeships require written contracts between the apprentices and sponsors (unions or employers), and these contracts are registered with the Bureau of Apprenticeship and Training of the U.S. Department of Labor. Relatively few skilled workers receive their training as registered apprentices. The U.S. Department of Labor (2008) reported that in 2007 there were 468,108 apprentices receiving registered training. In response to the criticism that "apprenticeship" should be reserved to registered apprentices, the Hamiltons responded as follows:

> Our vision of youth apprenticeships is wholly consistent with the Federal Committee on Apprenticeship's definition, but it applies to occupations that are not now apprenticeable and incorporates groups that are underrepresented in traditional programs. It also makes stronger connections between school and work than does traditional U.S. apprenticeship. Completion of most traditional apprenticeships is based on hours served whereas youth apprentices earn their credentials by demonstrating the competencies that they have acquired. (Hamilton & Hamilton, 1993, p. 2)

The Hamilton model aligned well with the political climate of the 1990s. In the year before his election to the presidency, Bill Clinton (1991) wrote an article for the *Vocational Education Journal*, the primary publication of the American Vocational Association (now the Association for Career and Technical Education), in which he described the advantages of apprenticeship and endorsed their expansion. In his initial State of the Union address, Clinton proposed a federal initiative to encourage youth apprenticeships.

As interest in youth apprenticeships grew, the W. T. Grant Foundation asked six leading scholars, including the Hamiltons, to prepare papers that could serve as a conceptual foundation to guide future efforts (Rosenbaum et al., 1992). Earlier, this foundation had convened the Commission on Work, Family and Citizenship to examine the declining employment

opportunities being experienced by young people who did not continue their education beyond high school. The 1988 report of this commission, *The Forgotten Half*, recommended an expansion of apprenticeships and did much to create the climate that was so receptive to youth apprenticeships.

Rosenbaum and his co-authors (1992) saw the potential of youth apprenticeships to address many of the problems related to the transition from education to employment, but they also recognized the difficulties of large-scale adoption. The potential lies in demonstrating to young people the relevance of what they study in school, thereby increasing motivation and the learning of both academic and technical skills. Apprenticeships can also socialize young people to the realities of the workplace by requiring the performance of tasks that have economic consequences. For these benefits to accrue, however, the authors discussed the many challenges that must be met if schools and employers are to work together. The most significant of these is encouraging employers to assume a greatly expanded role in training young people. When such employers are identified, students must be recruited and matched with employers, teachers and workplace mentors must be trained and given time to work together to create and modify curriculum for both for the classroom and the workplace, and school and work schedules must be adjusted.

In 1994, the School-to-Work Opportunities Act was passed to bring about systemic changes that would ease the transition to which its title refers. Its primary strategy was to encourage the involvement of employers in the planning and delivery of instruction. The act called for school-based learning, work-based learning, and connecting activities. Youth apprenticeships were a perfect fit with this legislation, and the act provided funding for many state and local efforts to establish programs.

Youth apprenticeships even reached the level of serious scholarly discussion in *Educational Researcher*, the flagship publication of the American Educational Research Association, and a journal that rarely concerns itself with the role of education in preparing young people for careers. In 1993, however, it devoted most of one issue to an article by Thomas Bailey (1993a), the director of the Institute on Education and the Economy, Columbia University, a rejoinder from Stephen Hamilton (1993), and a response to Hamilton by Bailey (1993b). Bailey (1993a) doubted if youth apprenticeships would ever enroll a significant number of young people. He cited, as among the reasons for his pessimism, the high job mobility of young people. This mobility makes employers reluctant to offer serious training to those in their late adolescence and early twenties.[10] Bailey also questioned the pedagogy of work-based learning. Such learning is often job- and even employer-specific and does not teach skills applicable in a range of settings. His third major concern was the likely inequities in the availability of apprenticeships. There are inequities in the educational opportunities available to minorities and the poor, but these are less severe than the inequities in employment opportunities.

In his rejoinder, Hamilton (1993) argued that while young people in the United States have high rates of job mobility, the same is not true of their counterparts in countries that have extensive apprenticeship systems. In Hamilton's view, the labor market "floundering" experienced by

[10] To anticipate the discussion of career development theory presented in Chapter 4, few employers offer training to young people who are in the exploratory stage of their career development.

young people who do not continue their education after high school is the result of the disconnect between education and employment. Frequent job changes are due to the lack of true career opportunities, not the inability of young people to make career commitments. Hamilton acknowledged that employers train only to the degree that it is in their own self-interest. The changes that are occurring in the nature of the work, Hamilton contended, will redefine self-interest. The need for highly skilled, flexible workers will make employers willing to offer apprenticeships.

Bailey (1993b) concluded the exchange by recommending that work-based learning be incorporated into the broad educational reforms that were started by *A Nation at Risk* (National Commission on Excellence in Education, 1983). This would require greater employer involvement in education, but still keep the primary responsibility with the schools. This approach became federal law with the passage of the School-to-Work Opportunities Act of 1994.

Even with broad political support and start-up funding from the School-to-Work Opportunities Act, however, Bailey's doubts about the widespread adoption of youth apprenticeships proved prescient. Some of the programs begun during the 1990s, including the one started by the Hamiltons, continue, but they enroll few students. During the four years that the Hamiltons directed the program, it enrolled a total of 100 students (Hamilton & Hamilton, 1999). That program continues now as one of the options offered by the Broome-Tioga Counties Bureau of Cooperative Educational Services (BOCES), a career center that provides skill-training programs for 15 school districts. Enrollment in the youth apprenticeships offered by this center for the forthcoming 2008-2009 school year is 32 (S. Watkins, personal communication, dated July 15, 2008).

Evidence of Effectiveness

What is striking about the literature on youth apprenticeships is the absence of any studies that compare the achievement and postsecondary experiences of students who participated in apprenticeships to those who did not. After all the interest and investment following their emergence in the 1990s, youth apprenticeships just seemed to fade away. The closest approximation we found to an outcome evaluation was a study by Schug and Western (1999) in Wisconsin. The results of this study are of special interest because Wisconsin was a national leader in the implementation of youth apprenticeships. Schug and Western found that between 1992 and the 1996-1997 school year, only 1,150 students had participated in apprenticeships and only 347 had completed them. These 347 represented about one-tenth of 1% of the number of students in Wisconsin high schools during the 1994-1995 school year.

While we found no outcome evaluations of youth apprenticeships, we found an extended formative evaluation that identified the main problems involved in establishing youth apprenticeship programs (Silverberg et al., 1996). In 1990, as the interest in youth apprenticeships began to build, the U.S. Department of Labor funded six demonstration projects. In 1992, it extended grants for five of these six and issued 10 more. Data on the implementation of these 15 programs were collected for more than four years. These data showed that the amount of work-based leaning varied widely across the 15 sites. Some provided only job

shadowing, while others provided two full days per week at the work site. Only three came near the goal of evenly dividing the time spent in school-based and work-based learning.

Despite the variability in their work site exposure, most students who participated in youth apprenticeships were positive about their experiences. From interviews and focus groups, the evaluators identified three categories of favorable comments made by the participants: project-based learning, program requirements, and premium workplace experience. Under project-based learning were comments about learning in the context of job requirements, the direct relevance of mathematics, working in groups, and problem solving. All of these were much preferred to the traditional academic classroom. Students saw the requirements for entering and staying in the apprenticeships, keeping a specified minimum GPA, and maintaining high rates of attendance as motivating them to work harder in school. The comments classified as premium workplace experiences included the skills students reported learning, which they perceived as giving them an advantage in the labor market. Those who worked for well-known companies thought this would add value to their resumes. A study of the attitudes of youth apprentices in Wisconsin yielded very similar findings (Scribner & Wakelyn, 1998).

Even though the students who participated in the apprenticeships perceived them favorably, the evaluators reported that the programs had difficulty recruiting both students and employers. These are the five major implementation challenges that the study identified:

- Recruitment of students
- Recruitment of employers
- Changing how students learn at school
- Ensuring students are learning on the job
- Reducing costs (Silverberg et al., 1996, p. 16)

Most programs were unable to meet these challenges to the degree that youth apprenticeships became available for large numbers of students. For all but a few, youth apprenticeships is an initiative whose time came and went. It required too much change both by schools and by employers. It was hard to recruit students and even harder to recruit employers who were willing to go beyond minimal types of work-based learning such as site tours and job shadowing.

Postsecondary Credits

Perkins IV states that POS "may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits" (Sec 122 (c)(1)(A)(iii)). This language encourages but does not require POS to include such opportunities. It reflects a growing interest in expanding dual enrollment beyond its traditional function of providing challenging educational experiences for high-achieving students. Dual enrollment is seen as a means of both (a) increasing the efficiency of education by reducing the time and cost of obtaining postsecondary degrees and (b) increasing the rigor of high school instruction, thereby reducing the need for postsecondary remediation. Reindel (2006) discussed the tensions inherent in this expansion in his summary of a 2006 conference that

addressed the broad issues of "accelerated learning." Krueger (2006) provided a synthesis of the evidence on the extent and effectiveness of dual/concurrent enrollment.

In this section, we focus on only one of the many issues related to dual enrollment: Does acquiring postsecondary credits in high school facilitate secondary to postsecondary transitions? We address only dual, concurrent enrollment courses, not Advanced Placement (AP) and International Baccalaureate (IB) courses. The full IB curriculum and 35 of the 37 AP courses are academic and designed as college-level courses for high school students, not actual college courses. We could find no studies that addressed the participation of CTE students in such courses. We first examine studies of dual enrollment/credits for CTE students, in general, and then the more structured approach of middle/early college high schools in more depth.

Dual Enrollment/Credits

Waits, Setzer, and Lewis (2005) reported that during the 2002-2003 school year, 71% of public high schools offered courses in which students could simultaneously earn both high school and college credit. Almost all (92%) of these schools offered dual credit academic courses and half (51%) offered dual credit CTE courses. While dual credit courses were available in a majority of high schools, students taking these courses represented only 8% of the total high school enrollment during the 2002-2003 school year.[11] Students taking CTE courses made up 36% of all dual credit students or 3.1% of total high school enrollment. These are the most recent national data available, but the growing interest in dual enrollment, as reflected in the conference reported by Reindel (2006), suggests that current figures are probably higher.

Dual credit courses vary on several dimensions beyond their content. Students may take individual (cafeteria-style) courses or defined sequences, which may be taught by high school or college faculty. The courses may be offered in high schools or on college campuses, and may enroll only high school or both high school and college students. The courses may be targeted to high-achieving or underserved students. Questions have been raised concerning the level of the courses: How qualified are the high school instructors who teach most of these courses as adjunct college faculty? Are the courses really at a postsecondary level or are they "adjusted" to accommodate high school students (Dougan, 2005)? With such variability in delivery, it is difficult to estimate the effect of earning dual credits on secondary to postsecondary transition, but there have been attempts to do so. One of the more rigorous of these was conducted by the Community College Research Center with funding from the NRCCTE (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). We present the method and findings of this research in some detail.

Karp et al. (2007) analyzed student records from Florida and from the City University of New York (CUNY). The Florida records were for 299,685 students who should have graduated during the 2000-2001 and 2001-2002 school years. The records included data on courses taken in high

[11] We estimated this percentage by dividing the 1,200,000 enrolled in dual credit courses reported by Waits et al. (2005) by the 14,067,000 enrollment in Grades 9 through 12 in the fall of 2002 reported in Table 2 of the *Digest of Educational Statistics: 2007*, retrieved June 3, 2008 from http://nces.ed.gov/programs/digest/d07/tables/dt07_002.asp?referrer=list. The percentages taking dual credit courses may be slightly inflated because of duplicate counting of students taking more than one such course.

school and college, dual enrollment courses and grades, final high school GPA and semester averages in college, and demographic information including age, gender, race/ethnicity, English language proficiency, and citizenship. The researchers added information on high school and neighborhood characteristics from the U.S. Department of Education Common Core of Data and the 2000 Census. CTE students were defined as those who took three or more courses that provided preparation for employment in a given occupational area. The data in New York were for 2,303 students who graduated from one of the city's 19 vocational high schools and enrolled in any of the CUNY community or four-year colleges in 2001 or 2002. Information on these students included dual enrollment courses and grades, high school grades, credits and grades earned for all CUNY courses attempted, and demographic, high school, and neighborhood characteristics. The manner in which the New York sample was defined excluded records for non-CTE students.

The data from Florida yielded a number of advantages associated with earning dual credits while in high school. Logistic regressions that controlled for measured student, high school, and neighborhood characteristics yielded increased probabilities for dual credit students on the following outcomes:

- Graduating from high school: 4.3% increased likelihood for the full sample, 1% for CTE students
- Enrolling in postsecondary education: 16.8% increased likelihood for the full sample, 18.1% for CTE students
- Enrolling in a four-year college: 7.7% increased likelihood for the full sample, 8.6% for CTE students
- Enrolling full-time: 4.5% for increased likelihood for the full sample, 4.7% for CTE students
- Persisting to the second semester: 4.5% increased likelihood for the full sample, 4.2% for CTE students
- Persisting to the second year: 5.4% increased likelihood for the full sample, 5.2% for CTE students

Ordinary least squares (using the same independent variables as the logistic regressions) was used to estimate the effect of dual enrollment on the continuous variables GPA and total credits earned at the postsecondary level. These analyses yield the following net increases associated with dual enrollment:

- First year GPA: .22 for the full sample, .26 for CTE students.
- Second year GPA: .21 for the full sample, .26 for CTE students.
- Cumulative GPA: .20 the full sample, .24 for CTE students
- Total credits earned: 15.2 for the full sample; 15.2 for CTE students

The results for the full sample are based on more than 127,000 records (students who enrolled in public colleges in Florida) and the results for CTE students are based on more than 18,000. These large numbers reduce the error estimates and thus increase the chances of finding significant relationships in the data.

The CUNY data had far fewer student records, 2,303, and all of these students had enrolled in one of the colleges of the CUNY system. As a result, it was not possible to test the effect of dual

enrollment on high school graduation or postsecondary enrollment. The advantage of the CUNY data is that all of the dual enrollment courses were through College Now, a cooperative program of CUNY and the New York City public schools. College Now has standardized eligibility and application procedures and monitors curriculum and instruction. This coordination across high schools reduces the variability in dual enrollment experiences, thereby enhancing, in the language of research methodology, the "fidelity of the intervention."

Among the CTE graduates who enrolled in one of the CUNY colleges, those who had taken College Now dual enrollment courses differed from those who had not in the following ways:

- 9.7% more likely to pursue a bachelor's degree
- .13 higher GPA in their first semester in college
- 10.65 more credits earned, 3.5 years after enrolling

Although several of the CUNY analyses did not reach statistical significance, the effects estimates were all in the expected directions. If the number of student records had been as large as in Florida, many of these may have reached accepted levels of significance. The CUNY data did not find the relationships with persistence in college or the continuing effect upon GPA as found in Florida, but they did yield intensity effects. CUNY students who took two or more dual enrollment courses had higher first- and fourth-semester GPAs and earned significantly more credits than those who took only one course. The Florida data had also been analyzed for intensity effects, with a variable that ranged from one to five or more courses, but had not yielded significant relationships.

Kotamraju (2005) also analyzed state-level data to determine the relationship between participating in the Minnesota dual enrollment program and GPA at the postsecondary level. Kotamraju selected students who met the following criteria: took dual enrollment courses during the 1999-2000 or 2000-2001 school years, graduated in the spring of 2001, and enrolled as full-time students in the same two-year colleges that had offered the courses in which they had taken their dual enrollment courses anytime between the fall of 2001 and the spring of 2004. All of these colleges were part of the Minnesota State Colleges and Universities system. When these students were identified, they were matched with similar students who had also graduated in 2001 and entered these two-year colleges during the same time period. The matching was based on gender, ethnicity, and high school cumulative GPA. The final sample included 3,639 students, of whom 461 had taken dual enrollment courses. Those who had taken such courses were classified into those who had taken only Liberal and General Study courses (45%); those who had taken only CTE courses (13%); and those who had taken both (43%). The restrictive criteria used by Kotamraju to define his sample resulted in students with similar characteristics who had similar exposure to postsecondary education but entered with or without having experienced dual enrollment.

During the three years of postsecondary experience that Kotamraju examined, students who had taken dual enrollment courses in high school had a cumulative mean GPA of 2.92 compared to 2.53 among those who had no dual enrollment. Students who took any CTE courses at the

postsecondary level were classified as participants, concentrators, and completers.[12] Only among participants was there a statistically significant difference in GPA between those who had taken dual enrollment courses, 2.55, and those who had not, 1.88. Kotamraju concluded that the dual enrollment courses appear to give students a head start on succeeding in college courses, but that this effect declines as postsecondary exposure increases.

The overall results from these two studies, the most rigorous we were able to find, are positive. Using the best methods, short of random assignment of students, to assess impact, it appears that dual enrollment is achieving many of its objectives. Unfortunately, these methods cannot control for the self-selection of students into dual enrollment courses. These courses are more demanding than typical high school courses and students choosing this extra work are, by definition, different from their classmates. The largest effect associated with dual enrollment in the Florida analyses was for entry into postsecondary education: 16.8% for the full sample, 18.1% for CTE students. These effect estimates are three to four times as large as any of the others, except enrollment in a four-year college. These results strongly imply that students who had firm plans for continuing their education were more likely to take dual enrollment courses. The researchers who conducted these studies were fully aware of these problems, as reflected in the following caution:

> It is important to recognize that other unmeasured factors, such as student motivation or parental encouragement and support, are likely correlated with participation in dual enrollment and are also likely to generate a positive effect. By not controlling for important factors affecting a student's decision to participate in dual enrollment, it is possible that our models may generate what appear to be positive impacts when in fact there are no such impacts or there are negative impacts. (Karp et al., 2007, p. 20)

Self-selection and admission practices are also inherent problems when attempting to estimate the effects of middle/early colleges, to which we now turn.

Middle/Early College High School

Middle/early colleges are, at their core, intensive dual enrollment programs targeted to students who are underserved and often deemed "at-risk" in the traditional high school. Is there a difference between a middle college and an early college? Middle college is by far the older term. The New York City Board of Education and LaGuardia Community College established the first middle college as a charter high school located on the college's campus in 1974 (Lieberman, 2004). This first school inspired many others, all of which have the goal of providing challenging educational experiences combined with a supportive environment. College-level courses are taught either by faculty of the college or high school teachers. In these courses, students both satisfy high school graduation requirements and earn college credit.

[12] Participants were students who had selected a CTE major or taken one CTE course. Concentrators had completed one-third of the credits required by their programs. Completers had received certificates, diplomas, or AA or AAS degrees.

The original middle college served as a model for many others that were established across the country. In 2002, the concept provided the foundation for the Early College High School Initiative. This initiative is funded by several major foundations, including Bill & Melinda Gates, Ford, Carnegie Corporation, and W. K. Kellogg, and is coordinated and supported by Jobs for the Future. The use of "early" rather than "middle" to label this initiative appears to reflect an intention to indicate that it differs from its predecessors.

Our reading of the literature about the two types indicates that early colleges differ from middle colleges primarily in where they are located and their expectations regarding credits to be earned. Early colleges may not be located on a college campus, but middle colleges must be. The first principle of the Middle College National Consortium[13] is that middle colleges must be on a college campus. Janet Lieberman, a professor at LaGuardia Community College, is credited with being the originator of the first middle college. In a paper she prepared for the Early College High School Initiative, she stated, "the early college high school design sees non-integrated space as a temporary accommodation, with the eventual hope of situating the high school on the college campus" (Lieberman, 2004, p. 3). The second difference is the extent of articulation between the high school and postsecondary curriculum and the goal for students in early colleges to earn 60 postsecondary credits (an associate degree or two years of transferable credits to a four-year institution) by the time they graduate from high school. Middle colleges typically do not have as articulated a curriculum or such specific credit goals. The emphases on providing challenging content in a supportive environment to underserved students are common to both.

When accessed on May 30, 2008, the Early College High School Initiative reported on its Web site[14] that its partners "have started or redesigned almost 160 schools in 24 states and the District of Columbia. . . . Through the initiative's continued efforts, the partners will ultimately open about 250 small schools, serving over 100,000 students annually." The implementation of Early College High Schools is being evaluated by the American Institutes for Research (AIR) and SRI International. These organizations jointly issued three annual reports (AIR/SRI, 2005, 2006, 2007) that assessed how the various parties involved in implementation have carried out their roles and the extent to which their performance reflects the initiative's core principles.

The implementation findings of the AIR/SRI reports are sobering for anyone concerned about improving education, especially for underserved populations. The Early College High Schools Initiative appears to have all the components necessary to have a significant impact on student performance. Most educators would endorse the approach that the initiative has adopted, especially the emphasis on the new "3 Rs": rigor, relevance, and relationships. The initiative also provides high levels of support through intermediary organizations. These organizations are intermediary in the sense that they act for the funding foundations to foster early college high schools within the geographic areas they serve. These intermediaries provide support far beyond anything a typical LEA could provide.

Despite the soundness of the approach and the support being provided, it is clear from the three evaluation reports that implementing the core principles of the initiative is difficult. Assisting students who are typically underrepresented in postsecondary education to do college-level work

[13] See http://www.mcnc.us.
[14] See http://www.earlycolleges.org.

while in high school is a formidable task. There is a continuing debate among schools in the initiative about how selective they should be. Officials of some schools contend that it does little good to admit students unable to meet the demands of rigorous curriculum; as a result, these schools have established selection criteria. Others respond that such criteria are antithetical to the goals of early college. Few of the early colleges have been able to implement the second core principle of graduating students with an associate degree or 60 credits transferable to a four-year institution. They have modified this principle in various ways, including lowering the number of credits to be earned, giving high school credit for grades below B and college credit for B and above, and in at least one case, substituting the goal of preparing students to be college-ready for that of earning actual college credits (AIR/SRI, 2007, p. 17).

The 2007 AIR/SRI report and a few other studies have examined the academic performance and transition of middle/early college students. These typically show advantages over comparison groups (e.g., Lieberman, 1986; Resources for Learning, 2007), but we found only one of these studies (Dynarski, Gleason, Rangarajan, & Wood, 1998) that used a matching or control group design. In the other studies we have examined, including the 2007 AIR/SRI report, middle/early college participants are compared to all other students in the schools or districts from which the participants are drawn. Without some attempt to control for the differences between students who choose to participate in early/middle colleges and those who do not, such comparisons have little meaning.

The Dynarski et al. study, in contrast, was a random assignment experiment that met the What Works Clearinghouse criteria for scientific rigor. This study was part of a larger evaluation that examined the effectiveness of 16 middle school and high school dropout prevention programs. The middle college study included 395 students who applied to attend an alternative high school operated by Seattle Public Schools in cooperation with Seattle Central Community College. At the time it was evaluated, the high school enrolled about 300 students and its core academic curriculum focused on two modules—math/science and integrated humanities. Study participants were generally older students who were overage for grade (the average was just under 18) or had previously dropped out of school. Because more students applied to the middle college than could be admitted, a lottery was used for admission. Students not admitted (i.e., those assigned to the control group) were free to participate in other regular and alternative education programs in the community, and most did.

The original study sample of 516 students was comprised of two cohorts. Cohort 1, drawn from students who applied to the middle college at the beginning of the 1992-1993 school year, included 199 students who were admitted and 123 students in the control group. Cohort 2, drawn from those who applied for the 1993-1994 school year, consisted of 123 students who were admitted and 71 students in the control group. A follow-up survey was administered two years after random assignment; 244 intervention group students and 150 control group students responded, response rates of 76% and 77%, respectively. Results were reported for each cohort and for both cohorts combined.

Because this experiment was part of a larger dropout prevention evaluation, the outcome measures were limited to dropping out, graduating, or earning a GED. For Cohort 1, the only significant finding was that more control students earned a GED by the end of the third year than

middle college students (37% vs. 24%) resulting in an effect size computed by WWC of -.38. When both cohorts were combined, 36% of students in the middle college group had dropped out of school, compared with 33% of control group students. The researchers also found that 40% of students in the middle college group had earned a high school diploma or GED certificate two years after random assignment, compared with 38% of control group students. Neither difference was statistically significant or substantively important. Even conceding that the Dynarski et al. study is from only one city and over a decade old, its methodological rigor requires that its findings be considered carefully. At a minimum, these findings underscore the need for evaluations of middle college and other dual enrollment programs to control for difference between participants and nonparticipants.

In Summary

To the degree that POS are similar to the precursors we have reviewed, the evidence provided in this chapter cautions that they are unlikely to produce marked improvements in achievement and transition to postsecondary education. The evidence on Tech Prep and career pathways comes from programs that were studied because they were widely regarded as among the best that could be found. When comparisons could be made between participants and similar nonparticipants, few statistically significant differences emerged, and those that did were usually only a few percentage points. The evidence on the effectiveness of dual enrollment shows some positive effects, but the analyses yielding these findings may not fully control for the self-selection of students into dual enrollment courses. While we could find no rigorous studies of the effects of youth apprenticeships, the unwillingness of significant numbers of employers to provide skill training makes the issue largely moot. An inference that can be drawn from the short history of youth apprenticeships is that initiatives that require major change in traditional practices have limited chance for wide-scale adoption. In contrast, the evidence on how the states plan to implement POS that is presented in the next chapter implies that POS represent incremental changes that build upon existing structures and offerings.

Chapter 3

State Plans for Implementing Programs of Study

In this chapter, we discuss the approaches that states have indicated they will follow to implement Programs of Study (POS). When Perkins IV was passed, states were given the option of submitting a one-year transition plan followed by a five-year plan or a six-year plan describing how they would implement the new legislation. By the late spring of 2008, all states were required to have submitted their five- or six-year plans. To determine how the states intended to implement POS, we obtained the relevant sections of the plans for all 50 states, the District of Columbia, Guam, and the Virgin Islands.

All state plans were written following the directions in the "Guide for Submission of State Plans" issued by OVAE. This guide contained the following instructions:

> 2. You must describe the career and technical education activities to be assisted that are designed to meet or exceed the State adjusted levels of performance, including a description of—
> (a) The career and technical education programs of study, that may be adopted by local educational agencies and postsecondary institutions to be offered as an option to students (and their parents as appropriate) when planning for and completing future coursework, for career and technical content areas that—
> i. Incorporate secondary education and postsecondary education elements;
> ii. Include coherent and rigorous content, aligned with challenging academic standards, and relevant career and technical content in a coordinated, non-duplicative progression of courses that align secondary education with postsecondary education to adequately prepare students to succeed in postsecondary education;
> iii. May include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits; and
> iv. Lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree;
> (b) How you, in consultation with eligible recipients, will develop and implement the career and technical programs of study described in (a) above;
> (c) How you will support eligible recipients in developing and implementing articulation agreements between secondary education and postsecondary education institutions;
> (d) How programs at the secondary level will make available information about career and technical programs of study offered by eligible recipients. (OVAE, 2007, pp. 12-13)

A coding system was developed to summarize the manner in which the states responded to these instructions. The codes that we used are presented in Appendix A. Three implementation

activities that will be conducted by all states—approval of local plans, technical assistance, and professional development—were *not* coded.

To assess the reliability of the coding, nine states were coded independently by two coders and their coding compared. Identical codes were assigned for 94.8% of the total codes. Almost all disagreements involved the codes that had been developed to classify strategies for implementing POS and methods for disseminating information about them. One coder did the remaining 44 states[15] and created a file that contained the language from the state plans that discussed strategies and methods. These strategies and methods were reviewed by a third coder to determine if they supported the codes that had been assigned. The third coder disagreed on 20 out of a total of 522 codes, for an agreement rate of 96.2%. Where there was disagreement, the codes applied by the final coder were used in the analysis.

In this chapter, we summarize the data that emerged from our coding. These data allowed us to make inferences about whether the states or local districts will have the primary responsibility for the development of POS, the strategies to be followed, and the methods that will be used to inform different stakeholders about the POS that local districts offer.

Implementing POS

Our coding of the state plans indicates that in two-thirds (66%) of the 53 states, local districts will have the primary responsibility for the development of POS. In 15 states, the state office responsible for CTE will have the primary responsibility, and in 3 states, Arkansas, Connecticut, and Wisconsin, we could not find enough information in their plans to make a judgment. States that are developing or proposing to develop POS for local districts to adopt we coded as assuming the primary responsibility. State-developed POS are typically described as core content that must be delivered, with local education agencies having the discretion to add material appropriate for local circumstances.

A preliminary review of five state plans identified four primary strategies that these states are planning for implementation of POS. These four strategies and an "other" category were used to code the 53 state plans. A tally of these codes yielded the results presented in Table 3.1. This table does not include the three approaches that all states will use: approval of local plans, technical assistance, and professional development.

Providing criteria, templates, models, frameworks, etc., for local districts to use is, by a large margin, the most frequent strategy employed in state plans. The states in which the local districts will have the primary responsibility for the development of POS are largely the same as the states using the criteria/template strategy. Of the 35 states where we coded local districts as having the primary responsibility, 31 of their plans propose providing criteria/templates for local districts to use as at least one of their strategies.

[15] All references hereafter to "states" include the District of Columbia, Guam, and the Virgin Islands.

Table 3.1
Strategies for Implementing Programs of Study Identified in State Plans

Strategy	*N*	%
Provide local districts with criteria, templates, models, etc.	35	71.4
Statewide articulation agreements	15	30.6
Develop POS to be adopted by local districts	15	30.6
Continue/expand existing Tech Prep, career pathways	15	30.6
Other	9	18.4
Total	89	181.6

Note. The percentages in the table are based on 49 states' plans. No strategies beyond approval of local plans, technical assistance, and professional development could be identified in the remaining four states. The totals exceed 49 and 100% because an average of 1.8 strategies was coded for each state plan.

Statewide articulation agreements were coded if a plan indicated that the state either had such agreements or was actively working to develop them. Even with this rather liberal criterion, a little less than one-third (31%) of the state plans referred to statewide articulation. The identical percentage referred to expanding or strengthening existing Tech Prep consortia. In Michigan, for example, the Tech Prep consortia areas are aligned with the 25 Michigan Works Agencies that implement federal Workforce Investment Act programs to facilitate increased coordination of efforts. The strategies coded in the "Other" category included the following:

- Strengthen transition from two-year to four-year institutions (Iowa and South Dakota)
- Identify exemplary locally developed POS and disseminate information about them (California)
- Require each eligible recipient of Perkins funds at the secondary and postsecondary levels to designate a position that will be responsible for facilitating, documenting, monitoring, and reporting on articulation agreements (Maine)
- Establish a state-wide POS that leads to an associate degree that will be accepted by the three state universities as the first two years for a bachelor's program (Arizona)
- Establish a statewide consortium to provide leadership and direction for the alignment of secondary/postsecondary curriculum, development of statewide articulation agreements, and expansion of dual credit opportunities (Nebraska)

Of the 53 plans we examined, three-fourths (40) described using career clusters as the basis for organizing their POS. Of these 40, 22 made specific references to the 16 career clusters that have been adopted by OVAE. The remaining 18 referred to other clusters. It appeared that some of these were just a different grouping of the 16. If the plan referred to career clusters, but did not explicitly cite the 16, the state was coded as using a different set. Eight states indicated that they planned to use the career pathways that have been developed by the Career College Transitions Initiative in developing their POS. In 13 states, we found no reference to career clusters.

Only 15 of the state plans specify the grades to be included in POS. The narrowest range was found in Minnesota, Grades 11 to 14, the last two years of high school and the first two years of postsecondary education. The Minnesota plan encourages but does not require a wider range. Nine states specify or encourage POS that start below Grade 11 and extend to 14, and five more extend the upper grade to 16, a bachelor's degree.

Twenty-nine of the state plans specify that one POS must be offered by each recipient of Perkins funds during the first year of the plan, and Arkansas and Texas require three. The other 21 plans that were reviewed do not address the number to be offered. Of the 26 requiring one POS in the first year, 7 specify higher numbers in subsequent years, and 4 anticipate, but do not specify, higher numbers in subsequent years. Three states, Connecticut, Ohio, and the Virgin Islands, set a goal of eventually delivering all CTE through POS. Here is the language regarding this goal from these plans:

> *Connecticut:* Key to Connecticut's 2008-13 Five-Year State Plan is the ongoing development and implementation of the Career Pathways Initiative and the continued adoption of the Student Success Plan (Programs of Study) model for every Connecticut CTE student. (Connecticut State Department of Education, 2008, p. 13)
>
> *Ohio:* The State will develop a phase-in plan that will ensure that existing programs transition to POS and that 100 percent of State-approved secondary career-technical education (CTE) programs have a State-approved Program of Study in FY2014. Postsecondary recipients will be required to develop/review/revise POS in collaboration with their secondary partner(s) following the same schedule as the secondary recipient. (Ohio Department of Education, 2008, pp. 15-16)
>
> *Virgin Islands:* Through the local application process, eligible recipients will be required to implement programs of study that are aligned with the Career Clusters for at least 25% of all CTE programs offered each year of Perkins IV resulting in 100% implementation of all CTE programs by 2012-13. (Virgin Islands Department of Education, 2008, p. 27)

Providing Information about Programs of Study

Perkins IV requires recipients of its funds to describe how they will make available information about the POS they will offer. All but one of the 53 plans that we reviewed described several methods of providing such information. We could find no discussion of this topic in Wisconsin's plan. Most of the methods to be employed rely upon channels that are currently in place. The following paragraphs from the Iowa plan are similar to many others:

> Information about programs of study at the secondary level will be disseminated using diverse methods, resources and media. IDE [Iowa Department of Education] career and technical education consultants provide technical assistance to eligible recipients concerning technical knowledge and skills as well as infused academic and career skills and knowledge. Professional development opportunities, utilizing the Iowa Professional

> Development Model (IPDM) for eligible recipients, will be conducted to provide information on effective practices for integrated career and technical education programs.
>
> Examples of resources include Iowa Choices (Iowa's Career Information Delivery System), electronic bulletins and updates, student course handbooks, secondary school curriculum guides, community college handbooks, and publications such as Iowa's Community College Program Guide as well as the Iowa Career Resource Guide. (Iowa Department of Education, 2008, p.17)

Twelve state plans noted that they would use their career information system Web sites to provide information about POS. In the past, these Web sites typically received at least some of their funding under Section 118 of Perkins III. Perkins IV continued this authorization, but since July 2007, funds have not been appropriated to carry out this section of the act. These 12 states are continuing their career information Web sites without these funds.

Including information about POS as part of the development of individualized educational plans was noted by 13 states. These individualized plans have various labels including Career Action Plan (Arkansas), Student Success Plan (Connecticut), Student Core Curriculum Plan (Iowa), Graduation Plan (Indiana, South Carolina, and Wyoming), Next Step Plan (New Mexico), and Student Education Occupation Plan (Utah).

In Summary

As would be expected, the state plans we examined propose using systems and methods already in place to develop POS and to inform interested parties of their availability. Almost all of the plans describe how POS will draw upon other high school improvement initiatives in the states. Overall, the plans imply that POS will be implemented as modified, refocused versions of existing methods rather than as major changes in how the states deliver CTE. Because the changes are incremental and work within existing structures, the probability of successful implementation is increased. As noted in our discussion of youth apprenticeships, initiatives that require major changes in traditional practices reduce their chances for success.

In the next chapter, we discuss the implications of career development theory for the implementation of POS. We think it will be helpful to review what is known about how young people make choices about the occupations they are interested in pursuing. This process is basic to the choice of a POS, and career development theory has direct implications for assessing what POS are likely to accomplish.

Chapter 4

Growth and Exploration: Career Development Theory and Programs of Study

The importance of one's work cannot be overstated. Philosophers and scholars throughout the ages have recognized the importance of work and attested that finding a vocation is one of life's most challenging tasks. The significance of one's work might have been best described by Sigmund Freud, who is purported to have said, "Love and work are the cornerstones of our humanness" (Schouten, 2004, p. 1). Our work in many ways signifies who we are—defining our personalities, our habits, and our lifestyles. Finding the right career can lead to a lifetime of satisfaction, but not finding the right career can lead to poor self-esteem, lowered self-efficacy, a lack of life satisfaction, and even depression (Csikszentmihalyi & Le Fevre, 1989; Haworth & Hill, 1992; Wang, Lesage, Schmitz, & Drapeau, 2008; Warr, 2007).

Frank Parsons, the founding father of career counseling, recognized the importance of finding the "right" work. In *Choosing a Vocation*, published in 1909, Parsons wrote:

> An occupation out of harmony with the worker's aptitudes and capacities means inefficiency, unenthusiastic and perhaps distasteful labor, and low pay; while an occupation in harmony with the nature of the man means enthusiasm, love of work, and high economic values—superior product, efficient service, and good pay. (p. 3)

Research has demonstrated the effects of what Parsons was referring to, in that people who find satisfaction in their work exhibit higher levels of commitment, competency, and productivity and report higher levels of life adjustment (Auty, Goodman, & Foss, 1987; Henderson, 2000; Mueller, 2003; Stott, 1970).

Developing a career is a process, not just a destination. Unfortunately, not enough attention is paid to the developmental process that is required to engage in thoughtful, thorough career development. One of the issues facing schools is that students are confronted with substantial career and life decisions at an early age with limited opportunities for career exploration In the typical high school, students are expected to choose and follow a program of study that will prepare them to exit high school with the skills necessary to continue their education or to enter the workforce. Career-technical education (CTE) students must choose specific occupational areas even though most do not continue the same career emphasis upon completing high school (Bishop, 1989; Levesque et al., 2008). Too often, students are offered few opportunities to engage in career exploration and given little useful information on postsecondary options (Dykeman, Wood, Ingram, Pehrsson, et al., 2003). The result is that career development is often a by-product of the educational curriculum, with a "figure it out as you go along" mentality prevalent among educators and students regarding career exploration.

Our purpose in this chapter is to apply career development theory in the context of career and technical education (CTE) programs of study (POS) and traditional high school programs. We present an overview of career development using the framework of Super's (1957) life-span, life-space theory with special emphasis on the growth and exploration stages of development. We

also review research relevant to the need for improved career development services for K-12 students.

The Life-Span, Life-Space Perspective of Career Development

From among the several competing theories of career development, we chose Super's (1957) life-span, life-space theory because it is a general theory with a perspective that addresses career development at different stages. Although other theories could have been presented, Super's theory seemed appropriate due to its capacity to address student needs at different stages and because it recognizes the need for intentional efforts toward career development. After its original publication, the theory has evolved in response to research and social changes, resulting in its most recent formulation in Super, Savickas, and Super (1996).

Career theories are the framework that counselors, psychologists, and educators use to understand the career development process and provide career guidance. Career theory has a long and complex history and includes many perspectives on how to understand the career development process. Theories include trait-and-factor, stage, and social learning, to name just a few (Osipow & Fitzgerald, 1996). In addition, the development of career theory has not proceeded down a linear path. Like any complex field of study, career theories have grown out of one another, merged, and branched off in other directions, thus weaving an intricate path with the goal of understanding the hows and whys of the career process. The core of most career theories, however, is the same: an effort to explain the "evolving sequence of a person's work experiences over time" (Arthur, Hall, & Lawrence, 1989, p. 8).

The career development process is unique to every person. Factors like gender, ethnicity, ability, personality, socioeconomic status, family, geography, and opportunity, among others, all play a part in the development of one's career path, to varying degrees. Super's life-span, life-space theory takes into account many of these aspects. According to Herr (1997), Super's theory incorporates the notion of multiple-role environments that include work, family, educational, and community roles, each with varying demands and levels of significance that occur at different developmental stages in life.

In addition to the traditional trait-and-factor approach of career development theory (the process of matching an individual to a career according to his or her personality, ability, and interests) Super's theory incorporated life stages, self-concept, and social context as three areas of influence in the career development process. At the foundation of Super's theory lie life stages, vocational tasks, and self-concept (Patton & McMahon, 2006).

Super's theory was established on a life-span perspective and recognized that career development does not end in young adulthood but continues throughout life (Patton & McMahon, 2006). Furthermore, the work of Super and his colleagues "changed the focus of career choice from that of a static point-in-time event to that of a dynamic process where career development was viewed as an evolving process of life (Patton & McMahon, 2006, p. 53). Super recognized the complexity of the career development process and worked to develop a comprehensive theory to transcend other theories that did not address the complexity of human

development and environmental influences. Super, however, recognized that his own theory lacked comprehension and integration, identifying his as "a loosely unified set of theories dealing with specific aspects of career development taken from developmental, differential, social and phenomenological psychology and held together by self-concept or personal-construct theory" (Super, 1984, p. 194).

Super's theory posits that people progress through five stages during the career development process, including growth, exploration, establishment, maintenance, and disengagement. It should be noted that Super's theory is not a rigid stage theory in which an individual's age dictates his or her progression from stage to stage, a process referred to as maxicycling. In fact, Super contended that movement through the five stages could be a flexible process through which people could recycle through certain stages. Super referred to this process as minicycling. We provide a brief description of each of the stages with our central focus on the growth and exploration stages. We then explore relevant research pertaining to career development and applications to CTE POS.

The growth stage is the process through which individuals, typically children and adolescents, are introduced to a variety of occupations and the time in which they begin to develop their self-concept (Super, 1957). Self-concept, in the context of career, is "the constellation of self attributes considered by the individual to be vocationally relevant" (Super, 1963, p. 20). According to Giannantonio and Hurley-Hanson (2006), self-concept includes "one's abilities, personality traits, values, self-esteem, and self-efficacy" (p. 320). It is during this growth stage that individuals are exposed to occupations through family, school, community, and the media, among other sources. Through their experiences in home, school, and community, young people develop a sense of autonomy and industry, begin to develop work-related skills and habits, and identify relevant role models, all while developing a better understanding of their own interests along with a burgeoning awareness of their own abilities (Patton & McMahon, 2006; Super et al., 1996).

During the exploratory stage, individuals set out to engage in experiences that aid in developing their vocational identity by investigating careers, engaging in educational training and apprenticeships, and other work-related experiences. During this exploratory process, they learn more about themselves, their interests, and abilities, furthering the development of their self-concept. In addition, according to Super (1957), individuals apply what they learn through the exploratory process by matching their interests and abilities to occupations and applying their self-concept to both work and life roles. Moreover, exploration is believed to be intrinsically motivated by natural curiosity (Blustein, 1988, 1997).

The establishment stage is a period of employment in which the individual is focused on establishing a stable work environment and working toward career advancement. The major goal during this stage is for the individual to stabilize his or her role within a career context. Some individuals may work toward promotion and advancement in their careers, thus increasing their job-related responsibilities (Patton & McMahon, 2006).

Maintenance is the fourth stage in which "individuals are concerned with maintaining their self-concept and their present job status" (Giannantonio & Hurley-Hanson, 2006, p. 323).

Nevertheless, some may decide to make career changes during the maintenance phase (e.g., moving to other organizations or positions or changing occupations). According to Super's theory, this results in the individual recycling through the exploration and establishment stages—referred to as a minicycle. The central focus for the individual, however, is toward preserving or maintaining his or her position within an established career (Patton & McMahon, 2006).

The final stage, disengagement, is the process of disengaging from the world of work, which usually comes in the form of retirement. During this stage, the individual engages in the process of planning for retirement, begins to reduce his or her workload, and finally leaves the work setting.

The stages described here are only a part of Super's theory. As stated earlier, Super's theory is elaborate and includes other significant constructs. For example, Super developed a Life-Career Rainbow that provides a graphic representation of the life-span, life-space theory, including the stages of career development and life-roles (Super, 1984). Super also developed the Archway Model, a graphic representation of the personal and social constructs that affect career development.

One of the lessons to be learned from the life-span, life-space theory is the timing of career development. This theory contends that career development begins early in life and continues throughout one's life: During this process, one's self-concept is formed and cemented through one's experiences. In the following sections, we address this process during the growth and exploration stages, including a discussion of relevant research. Finally, we examine the role that POS may play in the career development process.

The Growth Stage of Career Development

As stated earlier, career development is a process that happens over an individual's lifetime. Most educators and counselors, however, focus their career development efforts during adolescence and young adulthood. Placing the focus solely on these later stages ignores the growth stage, which is the foundation for the subsequent stage of exploration. The growth stage is characterized as the starting point of self-concept development and the beginning stage of vocational identity development.

According to the life-span, life-space theory, the growth stage begins in childhood and extends into middle adolescence (4 to 13 years of age; Stead & Schultheiss, 2003). This stage is characterized by exploration through learning, play, and fantasy (Patton & McMahon, 2006; Wood & Kaszuowski, 2008). Engagement in these activities sets the stage for self-concept development by helping children gain better knowledge about their strengths and weaknesses and likes and dislikes.

Super (1963) identified three constructs related to self-concept of vocational development: formation, translation, and implementation. Schultheiss and Stead (2004) provided an explanation for the development of self-concept, beginning with the formation process, which occurs in childhood and persists throughout development. Formation requires identification with

key figures in the child's life and includes role playing and reality testing. Translation is the process of transforming the self-concept into occupational terms that "occurs through identification, experience, and awareness of one's own attributes" (p. 115). Finally, implementation emerges during adolescence and young adulthood and consists of individuals implementing or applying their self-concepts within the context of their chosen calling (e.g., training for their first jobs).

Super (1990) outlined nine dimensions associated with the career development of children in the growth stage of development, including: (a) curiosity—the desire to learn more about the world; (b) exploration—engaging in activities that lead to information about self and others in an effort to meet curiosity needs; (c) information—seeking and applying career information; (d) interests—awareness of likes and dislikes; (e) locus of control—maintaining a sense of control over the environment; (f) key figures—the recognition of role models or those who influence one's life and decisions; (g) time perspective—an understanding of time in planning for events; (h) self-concept—one's identity, encompassing one's roles and behaviors in the context of relationships; and (i) planfulness—an understanding of the importance of planning and preparation (as cited in Stead & Schultheiss, 2003; Wood & Kaszubowski, 2008). These dimensions are part of the everyday learning and growth experiences of children and have been corroborated by research to some extent. Schultheiss, Palma, and Manzi (2002) investigated the application of Super's dimensions in fourth- and fifth-grade students and found eight of the nine dimensions to be present in childhood career development with some slight modifications to Super's theory (as cited in Schultheiss & Stead, 2004). In addition, Super's dimensions relate well with Erikson's (1963) theory of psychosocial development in that these dimensions are characteristic of the three stages of early, middle, and late childhood development in which children exercise their autonomy, express their natural inclination toward taking initiative, and engage in industrious activities.

Research on the Growth Stage

Theories need research to help legitimize their application. Unfortunately, little research exists demonstrating the authority of Super's theory as applied to children. In general, career development research is not concentrated on the career development of children; instead, research has historically focused on adolescence and adulthood (Auger, Blackhurst, & Wahl, 2005; Stead & Schultheiss, 2003; Wood & Kaszubowski, 2008). However, research does support the theory that children think about careers and identify with vocational constructs. For example, research conducted on children as young as 5 has found that they display realistic and stable career goals across time (Trice & King, 1991). Moreover, they tend to be influenced by their parents, in that their vocational aspirations correlate with their parent's occupations (Trice & Knapp, 1992). Children also demonstrate an awareness of careers as they relate to gender, often engaging in gender-typing of careers at young ages and, over time, broadening their definitions of gender and career. In addition, children display a coherent structure in their occupational choices (Trice, Hughes, Odom, & Woods, 1995).

The findings from these studies corroborate several of the dimensions related to the growth stage. For instance, exploration, information, and curiosity are involved in the contemplation of

careers. The concept of key figures is applicable to children's identification with their parents' occupations. The dimensions of information and curiosity also play a role in children's understanding of gender and career and the eventual loosening of gender and career stereotypes.

Several studies have examined the longitudinal aspects of career as they relate to childhood. Trice (1991a) demonstrated that, in general, children maintain the same career goals over the course of a school year. Trice (1991b) examined the first realistic career aspirations of middle-aged adults and found that 59% of them had identified their first career aspiration before the age of 13. Furthermore, it was found that 41% of the sample's childhood career aspirations matched their adult occupations, and 46% of the sample's adolescent career aspirations matched their adult occupations. Finally, Trice and McClellan (1993), using data from a 1926 study on gifted individuals, found strong concordance rates between childhood career aspirations and early adult attainment. More research is needed to examine Super's theory as it applies to the growth stage and Super's later stages of career establishment and maintenance.

Increasing Career Development Efforts During the Growth Stage

Although limited in scope, research is available that demonstrates the need for career exposure and interventions earlier in childhood development. Rojewski and Kim (2003) examined the occupational aspirations, vocational preparation, and work experiences of work-bound and college-bound individuals through longitudinal data gathered while the participants were in the 8th and 10th grades. They compared their findings with the sample's post-school transition activities (e.g., college or employment) and found that the work-bound individuals had exhibited poorer academic performance, had a higher sense of external locus of control, and had adopted lower level academic and occupational aspirations than their college-bound counterparts. The authors assert that these characteristics are "firmly established by grade 8" (p. 103). Furthermore, the gap between the college-bound group and the work-bound group widened through the 10th grade. The importance of these data, as explained by the researchers, is that students are "pretty well 'locked in' to a particular orientation toward occupations and adult life early in their lives" (p. 104). Targeted career development interventions during the growth stage could widen the range of occupations compatible with children's emerging vocational self-concepts.

No one would advocate for occupational preparation in elementary schools. However, preliminary research has demonstrated that career-infused curriculum in Grades K-8 improves student career maturity (Cassidy, 2007). Efforts such as this may set the stage for preparing students to make informed decisions with regard to choosing their POS upon entering high school—thus enhancing the growth stage of career development. Overall, the limited research on childhood career development demonstrates the need for increased application of career interventions during childhood and more research into the career development process of children.

The Exploration Stage of Career Development

Super believed that children developed certain traits during the growth stage, readying them for the exploration stage of career development. These traits consist of the nine dimensions

previously outlined in the growth stage (Super, 1990). According to Savickas and Super (1993), these constructs develop in childhood, strengthen in adolescence, and function as determinants of adolescent career maturity. Furthermore, it is during adolescence that the exploration stage begins (lasting into young adulthood, 14 to 24 years of age) and the advancement of career maturity and further development of the self-concept occurs.

The exploration stage is characterized by the tasks of adolescence and young adulthood. Individuals within this age range are typically seeking opportunities to explore careers through education and work experiences. Individuals in this stage begin to narrow their career desires and options and seek training or education in their fields of interest, aiding in the development of a vocational identity (Patton & McMahon, 2006) or vocational self-concept. Vocational self-concept has been defined as "the constellation of self attributes considered by the individual to be vocationally relevant, whether or not they have been translated into a vocational preference" (Super, 1963, p. 20). Jordaan (1963) further explained that "vocational exploration is the process of clarifying the self-concept and translating it into occupational terms, of acquiring the understanding of occupations necessary for this translation, and of trying out this vocational self-concept in vocationally relevant activities" (p. 54).

The exploration stage consists of substages or tasks, including crystallization, specification, and implementation. It should be noted that the exploratory process was first considered by Ginzberg, Ginsburg, Axelrad, and Herma (1951) and integrated in Super's life-span, life-space theory. According to Jordaan (1963), the exploratory stage is a period of realistic choices in which the individual seeks knowledge about himself or herself and the world, experiments, and searches for new experiences and perspectives in an effort to "increase his understanding of reality" (p. 50). Jordaan went on to explain that through the exploration process, the individual *crystallizes* his or her career interests by narrowing choices, then *specifies* a vocational choice, which may come in the form of work, training, or education, and then *implements* a vocational choice and makes it a reality via training or education.

The exploration stage is critical to students developing a sense of vocational identity and an overall sense of self, and identity development is a crucial stage in overall adolescent development. Erikson (1963) considered identity development as the primary task of adolescence. Identity development and vocational decision-making are closely linked, in that individuals who possess well-developed career interests also display an overall stronger sense of self (e.g., Blustein, Devenis, & Kidney, 1989; Vondracek, Schulenberg, Skorikov, Gillespie, & Wahlheim, 1995; Weyhing, Bartlett, & Howard, 1984). Additionally, Erikson (1959) considered one's occupational identity as key to overall identity development: "In general it is primarily the inability to settle on an occupational identity which disturbs young people" (Erikson, 1959, p. 92). The work of Super and Erikson demonstrates the bidirectional influence of career exploration and vocational identity. In essence, one strengthens the other, creating the groundwork for movement into the establishment stage of development.

Research Findings: Vocational Identity and Exploration

Research efforts have established a link between identity formation, self-concept, and career development and decision-making. Gushue, Scanlan, Pantzer, and Clarke (2006) examined the

career development of African American students and found that higher levels of career decision-making self-efficacy were related to a more differentiated vocational self-concept and more engagement in career exploration. In a similar study with Latino students, Gushue, Clarke, Pantzer, and Scanlan (2006) found that students with higher levels of career decision-making self-efficacy possessed a more differentiated identity and were more engaged in the career exploration process. Shoffner and Newsome (2001) conducted a study with gifted adolescent females in an effort to examine career exploration, commitment, and life-role salience. They found that vocational exploration and commitment contributed strongly to the identity development of this population. These studies demonstrate the influence of exploration on vocational identity development, demonstrating that engagement in exploratory activities enhances the career development process.

Age and gender also appear to influence exploration and career decision-making, with older students engaging in more exploration than younger students. Specifically, Wallace-Broscious, Serafica, and Osipow (1994) found that 12th-grade students engaged in more career planning and exploration than 9th-grade students. Additionally, they found that 12th-grade students reported higher levels of career decidedness, females engaged in more planning and exploration than males, and females had higher levels of career decidedness than males. Furthermore, the researchers found that students' identity status played a role in predicting their levels of career certainty, indecision, exploration, and planning. This study was based on Super and Erikson's theoretical constructs of exploration and identity development and supported these constructs as fundamental to the career development process.

External efforts also appear to foster career development and aid in the development of vocational identity. Lapan, Aoyagi, and Kayson (2007) found that career development efforts can have long-term effects in aiding students in transitioning from adolescence to young adulthood. Enhanced career development efforts in high school resulted in the participants making greater progress toward career awareness, exploration, and planning. The participants reported greater success in transitioning into life roles, had a better sense of direction in their work, and expressed a greater sense of life satisfaction.

Exploration in K-12 Settings and CTE Programs of Study

Evidence supports the importance of growth and exploration in helping individuals develop their vocational identities and engage in thoughtful career decision-making. What efforts then, do schools take in helping students engage in career exploration? Is there a difference in the career exploration outcomes of students who are enrolled in traditional educational programs versus those who are enrolled in the CTE programs that preceded POS?

Career development efforts in high school settings have been portrayed as hit and miss, in that students do not typically receive comprehensive guidance services and do not engage in career planning activities to help them achieve their career goals (Hollenbeck & DebBurman, 2000; Hughes & Karp, 2004). This lack of focus on career development in K-12 programming was delineated by Bloch (1996) in a multistate survey of high school principals and counselors that revealed a lack of commitment to the career development of students, in particular for those

considered at-risk for dropping out. Helwig (2004) examined the career development issues experienced by a group of students over a 10-year period in which data were gathered six times throughout their K-12 educational experiences. The students in this sample reported mediocre satisfaction with their school's role in helping them engage in career development activities, such as (a) making a connection between school subject and occupational direction, (b) feeling supported by their school in searching for a career direction, and (c) feeling supported by their school with career preparation.

Other large-sample studies echo the finding that students are not receiving the career development experiences and information they need to develop their vocational identities and help them progress through the growth and exploratory stages of career development. Wimberly and Noeth (2005) reported on a large-scale study conducted by ACT in which 2,942 8th-, 9th, and 10th-grade students completed the Educational Planning Survey. The survey examined issues related to high school programs, class selection, and the helpfulness of school, family, and friends in educational planning and decision-making. Over 77% of the students reported that they planned to attend college; however, only two-thirds of these students described their high school program as a college preparatory program—indicating a possible discrepancy between career guidance and program choice. In regards to exploration, 78% of the sample indicated that they had begun the exploration process by considering types of education, training, and work options upon graduation from high school, while 22% of the sample had not explored post-graduation education and/or training program or work options. Furthermore, although most of the sample had set educational or career goals, they were not engaged in planning activities. When comparing these data with the constructs of Super's theory, the majority of the sample had crystallized their vocational goals but had not engaged in the specification and implementation steps needed to make their goals a reality. Wimberly and Noeth (2005) illuminated the potential problem with this lack of comprehensive exploration:

> When these students eventually approach postsecondary planning, they likely will find that they have missed such key steps as taking appropriate courses, participating in pre-college programs, and obtaining key postsecondary planning information from teachers and counselors. By failing to plan early, they may be closing the door on viable and potential postsecondary education, training, and employment options for their futures. (p. 14)

In general, the authors indicated that middle and high school students are not taking a college preparatory curriculum that would help them to prepare for postsecondary education.

The cited research on traditional educational experiences indicates that there is a general lack of focus on career development practices in traditional high school settings. In addition, few comprehensive studies examine the effectiveness of career development interventions. Dykeman, Wood, Ingram, Gitelman, et al. (2003) described career development studies as "singular and isolated, often without consideration or measure of students' level of career development" (p. 18). On a positive note, the limited research that is available on CTE precursors of POS (e.g., career pathways, school-to-work, Tech Prep, career magnets) shows more promise in engaging students in career development activities—if not directly, then at least peripherally, indicating that career development may be a by-product of engagement in CTE programs.

Programs of Study

POS, as specified by Perkins IV, require students to make decisions that, at a minimum, impact the last two years of high school and the first two years of postsecondary education. Our review of the state plans indicates that many states extend such educational and career planning to earlier grades. The theory and research we have reviewed suggest that virtually all high school students making these decisions are still in the exploratory stage of career development. Perkins IV emphasizes the need for career guidance, academic counseling, and professional development for educators in an effort to arm them with the knowledge and skills needed to assist students in the career exploration process.

Although Perkins IV recognizes the role of career development in aiding students in making career-related decisions, the legislation does not emphasize the importance of helping students to engage in the identity development and career exploration needed to make informed decisions. Instead, the legislation focuses on the development of rigorous POS. These programs, in turn, seek to educate students on the knowledge and skills needed to engage in meaningful careers. However, the question remains, is this enough to allow students to proceed successfully through the exploration stage and into the establishment stage of development in which they can sustain long-term careers?

Few studies have explicitly examined the effect of participating in CTE courses on career development. There were, however, a few efforts to examine career development in the context of school-to-work (STW) programs. For example, in 1999, the *Career Development Quarterly* produced a special issue on the role of career development theory in STW transition. Lent and Worthington (1999) acknowledged that although career development experts contributed to STW policy, research, and practice, those who are actually knowledgeable about career development process and theories (e.g., vocational and school counselors) have themselves had little impact on STW policy and implementation. In addition, Blustein (1999), citing Worthington and Juntunen (1997), explained that the STW literature is rich in many ways, but "tends to downplay the experience of the individual" (p. 349), which is contradictory to career development. Hansen (1999) explained that, "In the zeal to prepare students for the workforce, the human dimension—student development—has been forgotten" (p. 357). This statement emphasizes the need for a stronger emphasis on the growth and exploration stages of career development, which would include fostering the natural inclination of children and adolescents to learn more about themselves in the context of vocation.

In Chapter 2, we examined students' career-related behavior upon completion of CTE programs that were the direct precursors of POS. This included looking at rates of enrollment and persistence in postsecondary education and training programs. For example, Lekes et al. (2007) examined the matriculation of CTE secondary students into community college programs and found that in some career pathways, the CTE students rated themselves more college-ready than did non-CTE students. In comparison to their non-CTE counterparts, the students who completed CTE programs reported (a) feeling more prepared to transition to college, (b) believing that their high school program of study had prepared them with necessary information about college programs and courses, and (c) having clear career goals and plans for achieving their goals. The

study by Bragg et al. (2002) looked at postsecondary outcomes of 4,600 Tech Prep students. This study found that roughly 65% of the sample enrolled in some form of postsecondary education. Additionally, these participants were more likely to be working than non-Tech Prep students.

Crain et al. (1999) examined outcomes of students graduating from career magnet programs. These researchers found that students in the career magnet programs took more college courses, felt more supported by their parents to go to college, and socialized more with career-minded students. Furthermore, they were less likely to engage in risky behaviors (e.g., alcohol, drugs, unsafe sex). The authors postulated that:

> Career magnet schools promote positive behaviors by creating a school culture that supports hard work, dedication, and continuity of purpose. A shared commitment to a general career area leads to a culture that promotes career discussion, career and college planning, and realism about the future, instilling a "career identity" in the students and helping them with their adolescent development. (p. 3)

Another study focusing on career magnet students conducted by Flaxman, Guerrero, and Gretchen (1999) found that career magnet graduates took more career-related courses than the comparison group, which was comprised of comprehensive high school graduates. They expressed a stronger understanding of the factors that impacted their growth and development, indicated stronger feelings of self-efficacy, and were more trusting of their own abilities and skills. Post-high school outcomes for the career magnet students revealed they were more likely to have declared a college major, to be taking more college credits than the comprehensive high school graduates, and to be pursuing professional careers.

Similar findings have been extended to career academies. Kemple and Willner (2008) examined the long-term impact of career academies on educational attainment and transition. The results of this study are based on data from students who were selected at random to attend the academies and others who applied but were not admitted. The random nature of the assignment provides strong evidence of the independent effects of the academy experience. Several advantages for students enrolled in career academies were detected, such as: (a) academy students were more likely to take career-related courses and be exposed to career awareness and career development activities; (b) academy students were more likely to work in jobs that were connected to their school work; (c) and participation in career academies increased the likelihood of staying in school, improved attendance, and increased earned credits. In addition, approximately 80% of academy students earned a high school diploma and approximately 50% earned a postsecondary credential, which was comparable to non-academy students.

The accomplishments of CTE programs such as Tech Prep, magnet programs, and career academies in educational and career outcomes may in part be due to an increased emphasis on career development through improved career guidance services. In a study on Tech Prep, Hershey et al. (1998) reported that schools engaging in Tech Prep put a greater emphasis on career guidance and development in addition to using a variety of methods to familiarize students with career options through career exploration software, career development courses and curriculum, career fairs, employer presentations, workplace site visits, job shadowing, and

school-based career counseling centers. Additionally, learning experiences alone have been shown to affect vocational self-efficacy, which in turn influences career interest and decision-making (Tang, Pan, & Newmeyer, 2008; Turner & Lapan, 2002).

On the whole, the studies presented here indicate that participation in CTE contributes to the career development process. It appears to make this contribution even if students do not continue their educations or obtain employment in the occupational areas they study. For most high school students, the decision to study certain occupations is as much exploration as it is preparation for employment. The relevance of their courses may produce increased educational involvement even if experiences in these courses eventually lead to decisions to seek different occupational goals.

Comparison studies should be conducted in an effort to determine which parts of CTE programs aid students with the career development process. For example, does the concentration of career-related courses in CTE programs help students form a stronger sense of vocational identity? What role do CTE educators play in aiding students with career development? Moreover, are students who choose CTE programs inherently different from students who do not (e.g., are they more self-directed, are they more focused in their career interests)? These are just a few of the questions that need to be addressed.

The relationship between career development interventions and student achievement has also been investigated. Dykeman, Wood, Ingram, Pehrsson, et al. (2003) and Dykeman, Wood, Ingram, Gitelman, et al. (2003) undertook a two-part study, in which, in the first study, they conducted a taxonomy of career development interventions in an effort to develop an organizational system for identifying and categorizing interventions. After an exhaustive search, 44 types of interventions were identified. These were then clustered into four career development categories, including work-based interventions, advising interventions, introductory interventions, and curriculum-based interventions. In second subsequent study, they examined the impact of the four types of career development interventions (taxa, or taxonomic units) on CTE students' academic self-efficacy and motivation. Although several limitations were noted in the study (e.g., convenience sampling, retrospective measures), the researchers found minimal linkages between the career development taxa and self-efficacy and motivation. This research suggests that motivation and self-efficacy act as moderator variables to influence academic achievement. Despite their best efforts, however, the researchers were unable to definitively draw a relationship between career development and academic achievement.

One last issue to be discussed is that of persistence. Persistence, in this context, has two meanings: (a) the engagement in postsecondary education/training or work pursuits along with (b) the continuous engagement in one's high school area of study (or major) in one's postsecondary or work pursuits. Dual-enrollment studies have examined persistence to a limited degree. Karp et al. (2007) found that students who engaged in dual enrollment opportunities were more likely to remain enrolled in college two years after graduating from high school. This is supported by Bragg and Ruud (2007), who reported that dual credit aids in "accelerated progress and success at earning college certificates and degrees, and therefore suggests dual credit in association with academics and CTE may be an incentive to college persistence and completion" (p. 4). These studies, however, do not address whether these students continue with their high

school program of study major into college or training programs. The information on this topic is limited.

In 1989, Bishop reviewed the existing research on the outcomes of secondary vocational education. He concluded that young people who obtained employment in the occupations for which they were trained earned 7 to 8 % more per month than those who did not obtain such employment. Unfortunately, the research also indicated that less than half entered training-related occupations. A more recent study by Levesque et al. (2008) synthesized findings from 11 different surveys conducted by the National Center for Education Statistics. They authors concluded that there was no systematic relationship between the occupational credits that students earned in high school and the occupations in which they were employed when surveyed. Witte and Kallenberg (1994) in Germany and Smith and Green (2005) in Australia both reported about half of the graduates they contacted two years or more after high school were employed in the fields they had studied in high school.

Miller and Gray (2002) found that postsecondary education and training was high (91%) for students who completed a high school Tech Prep program. However, only 45% of these students persisted in majors that related to their high school Tech Prep program. Zavattieri, D'Anna, and O'Sullivan-Maillet (2007) measured the impact of a high school-based health science career program on student retention and careers. They found that 97% of the participants continued their education after high school. In addition, 49% of those entering two-year colleges and 57% of those entering four-year colleges pursued health-related careers.

There appears to be some consistency across studies in the persistence of students in continuing their postsecondary education; however, persistence in the same occupational areas is not as high. Clearly more studies are needed in order to determine if these findings are consistent across programs, settings, and populations. In addition, research is needed to determine if improved and more intentional career development efforts would increase students' persistence in sustaining a career focus from high school to postsecondary.

In Summary

In 1909, Frank Parsons wrote:

> We guide our boys and girls to some extent through school, then drop them into this complex world to sink or swim as the case may be. Yet there is no part of life where the need for guidance is more emphatic than in the transition from school to work—the choice of a vocation, adequate preparation for it, and the attainment of efficiency and success. (p. 4)

Some students and educators may wonder, after reading this passage, if much has changed in the 99 years since Parsons wrote these words. Although great efforts have been made to engage students in the educational process and prepare them for the world of work, there is much still to do. Namely, career development should become an intentional process in the education of students. In addition, career development needs to occur earlier, during the growth stage of

development, while children are engaging in the processes of learning, play, and fantasy. These experiences, according to Super and other theorists, provide children with the tools to develop and clarify their career aspirations and thereby prepare them for the exploration phase of development that occurs during adolescence and young adulthood.

Furthermore, career development needs to occur as a deliberate process within both traditional secondary school settings and settings that provide POS. Based on student outcomes, there is evidence of career development occurring in the CTE programs that preceded POS. In many cases, however, the evidence appears to be a byproduct of the curriculum and not necessarily the result of intentional career development efforts. There is either a need for more intentional efforts toward career development or for better studies to evaluate career development efforts in CTE programs of study. The need for both is also possible.

Chapter 5

Questions and Our Preliminary Answers

The typical pragmatic CTE educator may view the discussion of career development theory in the previous chapter as a diversion from the main theme of this paper. It our view, this discussion is anything but a diversion, because career development should be the foundation on which Programs of Study are built. The choice of a POS intensifies the dilemma of all secondary-level occupational programs in that decisions about future occupational goals are made when virtually all students are at the exploratory stage of career development. They select the programs they wish to study to as a way of exploring occupations as much as to prepare for them. Many learn, however, that the occupations that initially interested them are not what they expected or do not fit their personalities and goals. As a result, many reconsider their choices and may engage in further exploration by studying different programs. This should not be considered as a failure on the part of the student, but as an inherent aspect of the career development process that results in the formation of one's vocational identity.

If students are not ready to make firm choices about their interests and future careers, why should they be asked to do so? Would it not be more appropriate to provide opportunities for exploration rather than skill training? Our response to these questions is that the kinds of exploration that schools can offer (e.g., individual guidance, career courses, job shadowing, career fairs) typically take place in middle school and the early years of high school and are inherently limited. For young people to internalize the information from these experiences, they need to make initial choices and be given opportunities to encounter occupations in depth. In order to truly test the fit between what they like to do and what occupations require, students must learn to perform the tasks required by the occupations that interest them. Our review of youth apprenticeships found, however, that few employers are willing to provide skill training for young people. For many high school students, therefore, CTE courses serve as a means of exploring possible career paths as well as preparing to enter those paths, thus fostering career development.

Obviously, well before students choose POS, schools can provide many opportunities for students to increase their knowledge of occupations. It is beyond the scope of this paper to describe the diverse ways that students can learn about occupations in school, but many resources are readily available. A Google search with the words "career exploration lesson plans" yielded 367,000 hits. In Appendix B, we provide a listing of a few of the most widely used resources.

Even if students come to learn that their initial occupational goals are not appropriate for them, we contend that the study of occupations can still make learning relevant and is vital to the exploration stage of career development. There is an emerging consensus that interest in occupations can increase students' motivation and engagement. Stone (2004) described the specific ways in which CTE can increase engagement. The Center for Comprehensive School Reform and Improvement (2007) summarized instructional methods schools can make to enhance engagement and achievement. Many of these methods, such as long-term projects, hands-on activities, and differentiated instruction, are inherent to CTE. The U.S. Department of

Education's Institute of Education Sciences issued a practice guide on dropout prevention that stated: "Career and technical education (CTE) implemented to allow all students 'multiple pathways' toward careers and higher education is a way to engage the student" (Dynarski et al., 2008, p. 34). The Institute rated the scientific evidence supporting this statement as "moderate." If there is engagement, teachers can ask more of students and challenge them to learn the rigorous and relevant content required of POS. We discuss this in more detail below.

In this chapter, we address the effect that POS are likely to have on the delivery of CTE and the performance of students. We do so by posing and attempting to answer three questions that lie at the core of POS implementation. These are the questions that form the framework of this chapter:

1. To what degree can secondary and postsecondary instruction be articulated?
2. To what degree can rigorous and relevant technical content be aligned with challenging academic standards?
3. What are appropriate measures of the effectiveness of POS?

The sources we draw upon to answer these questions have been presented in previous chapters. Our answers represent a synthesis of what we judge to be the best available evidence.

Question 1: To What Degree Can Secondary and Postsecondary Instruction Be Articulated?

Articulation occurs along a rough continuum from dual/concurrent enrollment courses through articulation agreements to early/middle college high schools.[16] Dual enrollments can range from individual, cafeteria-style courses taken because of availability or interest to specific sequences based on educational or occupational goals. Articulation agreements are negotiated by secondary and postsecondary institutions and set forth the conditions under which instruction given at the secondary level will qualify for postsecondary credits. Typically, students who earn credits under such agreements must enroll in the postsecondary institutions that have signed the agreements to have the credits awarded. Statewide agreements allow students from all high schools in a state to earn credits from any postsecondary institutions in that state that sign the agreements. Early college high schools are the most articulated. Many of the courses students take are taught at the college level and award dual credit. One of the original principles of the Early College High School Initiative was for students to graduate high school with an associate degree or the credits for the first two years of a baccalaureate degree.

Dual enrollments are the easiest type of articulation to achieve. Krueger (2006) reported that 47 of the states had policies enabling high school students to take college courses, and Waits et al. (2005) reported that 71% of high schools offer dual enrollment courses. While both of these reports were published in 2005, they drew upon data from prior school years. The Krueger paper was based on policy information assembled by the Education Commission of the States. The

[16] In the following discussion we drop the "/" designations and refer only to dual enrollments and early college high schools.

Waits et al. report was based upon a survey conducted in the 2002-2003 school year. The availability of dual enrollment courses has almost certainly increased since 2002-2003.

The Karp et al. (2007) and Kotamraju (2005) studies found that there are positive effects associated with taking dual enrollment courses. Both of these studies compared students who took dual enrollment courses of any type to similar students who did not. These studies controlled for measured characteristics of the students, but not for the type or quality of the dual enrollment courses that they took. Even with a "treatment" that was highly variable, advantages were found for dual enrollment students. These advantages included increased likelihood of high school graduation and entry into postsecondary education. At the postsecondary level, the advantages continued and included higher GPAs, more earned credits, and persistence to the second semester and second year. Most of these advantages for dual enrollment students were found using regression methods that yielded estimated differences of 4% or 5%, except for entry into postsecondary, in which dual enrollment students were 17% more likely to enroll. This large difference implies that even before taking dual enrollment courses, those who took them were more inclined to continue their education beyond high school than students who did not. In other words, even if they had not taken dual enrollment courses, the students who took them would have enrolled in postsecondary education at higher rates than the students who did not take these courses.

When the degree of articulation moves beyond high school students taking selected college courses, implementation becomes more difficult. Articulation agreements ensure a more structured alignment between secondary and postsecondary instruction, but they are more difficult to achieve than dual enrollment. The foundation of a Tech Prep consortium is an articulation agreement between high schools and one or more postsecondary institutions. These agreements may be one high school to one postsecondary institution, several high schools to one postsecondary institution, or many high schools to many postsecondary institutions. Whatever the numbers, articulation requires that faculty in the same occupational areas from the two levels must come to agreement on the content to be taught at their respective levels and on the competencies that high school students must demonstrate to receive college credits. In most agreements, the credits that students earn in high school are not awarded until the student (a) enrolls in the postsecondary institution that signed the agreement and (b) makes specified progress in the same occupational area studied in high school.

Credits earned in high school give Tech Prep participants a head start in college, but the evidence is equivocal on whether these credits lead to postsecondary degrees or other credentials. As noted in Chapter 2, Bragg et al. (2002) conducted a longitudinal study of students who had participated in eight "high-fidelity" Tech Prep consortia. These consortia, in the judgment of an expert panel, had all of the characteristics that good Tech Prep programs should have. Over half of the high school graduates from these consortia (54%) continued their educations at the lead postsecondary institution in their consortia. In six of the consortia, over 80% continued their educations at some postsecondary institution. Despite these high rates, only 1 in 10 who enrolled obtained an associate degree or other certificate three to four years after high school. Even in the best-performing consortium, only 19% obtained a credential. Bragg and her colleagues compared these results to a matched group of non-Tech Prep participants and found no significant differences in credential attainment between the groups.

The study of career pathways by Lekes and others (2007), also discussed in Chapter 2, found that students who earned dual credits while in high school increased their chances of earning a certificate or degree. As in the Bragg et al. (2002) study, these data were from a community college that had received a national award for the quality of its transition pathways. Lekes and her colleagues used regression methods to control for measured differences between students who had followed high school pathways to this community college and students who had not. The percentages in the two groups that received degrees or certificates were 21.3% for those who had followed pathways and 17.2% for those who had not. This difference is of similar size to most of those found by Karp et al. (2007) and Kotamraju (2005) on other outcome measures.

Early college high schools achieve the highest degree of secondary-postsecondary articulation, but the heavy emphasis on college-level instruction in high school does not appear feasible for most POS. Many of the students in CTE courses are similar to the students recruited for early college high schools. Both often come from economically disadvantaged families and perform poorly in academic classes. The big difference between them is self-selection into early college high schools.

Students who enter early college high schools commit themselves to studying much harder than the average student. Even with this commitment, however, the formative evaluation of the Early College High School Initiative (AIR/SRI, 2007) indicated that the initiative has had to modify one of its core principles. This principle originally stated that each student will complete high school with an associate degree or the credits for the first two years of a baccalaureate degree. The principle now states that students will earn *up to* two years of college credit. This modification reflects the difficulty of bringing students who are performing poorly at the high school level to the point that they can master college-level content. Like students in early college high schools, many CTE students do not have the academic skills of the average high school student. Often they elect or are guided to CTE for this very reason. But CTE students, unlike early college students, have not made the commitment to study hard. Their interest in the occupational areas they enter may provide more motivation to learn than the typical academic class, but it is unlikely to bring them to college-level performance.

Our Preliminary Answer

POS should align secondary and postsecondary instruction so that the secondary component addresses the academic deficiencies that are the primary barriers to obtaining college credits for CTE students. Interest in the occupations they study should be used as a means to improve the academic skills of CTE students through curriculum integration. Approaches for increasing the academic content of POS are discussed in the next section.

Question 2: To What Degree Can Rigorous and Relevant Technical Content Be Aligned with Challenging Academic Standards?

This question we can answer immediately, and our answer is: “A lot.” We believe that enhancing academic instruction in CTE courses should be the primary agenda for secondary CTE in the

coming decade, and POS can be the primary vehicle for carrying out this agenda. Strengthening the academic components of secondary POS will realize the hopes for CTE that were expressed in the 1914 *Report* from the Commission on National Aid to Vocational Education and repeated in the 1984 report, *The Unfinished Agenda* (National Commission on Secondary Vocational Education, 1984). Both of these reports carried the message that CTE is pedagogy as much as content. CTE is inherently contextualized and can reach many students for whom the abstract nature of the typical academic classroom can be simultaneously intimidating and boring.

We agree with those who argue that for most students, secondary occupational preparation will not provide sufficient skills to enable them to compete for the more rewarding jobs in the labor market. They will need additional training and, for most, that training will be acquired at the postsecondary level. The barriers to acquiring additional training for many students who complete high school CTE programs are deficiencies in academic skills. These deficiencies require them to take remedial courses rather than the occupational courses they want to study. For too many, these remedial courses prevent them from attaining the credentials that provide access to stable employment and higher earnings.

We know that enhancing the academic content of CTE courses will require major changes in the field, but we think that the hardest part has already been accomplished. Virtually all CTE leaders have accepted that their programs must reinforce academic skills. The best evidence to support this statement is ACTE's 2006 position paper, *Reinventing the American High School for the 21st Century*. The question is no longer *whether* we should reinforce academics, but *how* we can we reinforce academics. In our judgment, the way *not* to do it is to try to resurrect career education or school-to-work. Since the early 1960s, when the federal government assumed a more active role in the development of the nation's human resources, there have been two major efforts to forge stronger links between schools and the workplace, the career education movement of the 1970s (Herr, 1976) and school-to-work in the 1990s (Hughes et al., 2001). Both of these initiatives primarily impacted CTE and were peripheral to most of secondary education. Our review of the short history of youth apprenticeships implies that efforts that require major change in the basic institutions of our society have little chance for widespread adoption.

In our judgment, it is unlikely that POS will have any significant impact upon academic education, but that is not to say that POS cannot enhance academic instruction in CTE. If this premise is accepted, what can CTE do to align its offerings with challenging academic standards? Once again our answer is: "A lot." CTE instructors can identify the academic concepts that are embedded in their curricula and develop lessons to explicitly teach these concepts. They can, and should, work with their academic colleagues to ensure they understand the concepts and the best ways to teach them. But they should not attempt to become academic teachers. If they try to do so, they will devalue the technical component of their courses and, in all likelihood, lose their students' interest and engagement.

If what we describe sounds unrealistic, it is not. The NRCCTE carried out an experimental study that did just what we have described to enhance the teaching of mathematics (Stone, Alfeld, Pearson, Lewis, & Jensen, 2006). This study found that teaching enhanced mathematics in five separate occupational contexts yielded differences in academic performance between the experimental and control groups on two standardized tests of 8% and 9%, respectively. These

improvements were achieved by spending an average of just 11% of the instructional time in a one-hour, year-long class. And the time spent on these lessons was not all on the mathematics; occupational content was also taught. The occupational content was essential to demonstrate the relevance of the mathematics.

Such curriculum integration can be done, but it requires a major investment of teacher time. Teachers cannot be handed a set of math-enhanced lessons and told to teach them. We conducted a follow-up survey of the teachers who participated in the Stone et al. study in the school year following the experiment (Lewis & Pearson, 2007). After the experiment ended, the control teachers had been sent the lessons that had been developed for the experiment and some had tried to teach them. When we interviewed the control teachers about their experiences, they reported considerable difficulty understanding, much less teaching, the lessons. They had not participated in the workshops that identified the mathematics in their curricula or collaborated with math teachers to develop the lessons. These experiences were crucial to an understanding of the mathematics and the pedagogic model upon which the lessons were based.

Extrapolating from our experience in the Stone et al. study, we would *not* recommend that POS that are aligned with challenging academics standards be developed and distributed to teachers to implement. We would recommend that CTE teachers be given opportunities to work with their academic colleagues to examine CTE curricula to identify embedded academic content and to develop their own POS. Providing such opportunities encourages the emergence of communities of practice (Wenger, 1998) among teachers. These communities, in turn, develop a sense of ownership in their POS and a commitment to their implementation. Obviously, these communities will need criteria, templates, professional development, and technical assistance. Our review of the state plans for implementation of POS indicates that virtually all states will be providing these kinds of support. The critical component, in our judgment, is to involve the teachers who will have the final responsibility for delivering the POS in their development.

Evidence has accumulated that one of the essential components of educational improvement is professional development that promotes a sense of community among teachers (Hord, 2004; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Louis, Kruse, & Marks, 1996; Newmann and Associates, 1996). Such communities incorporate what is probably the most enduring finding from decades of small group and organizational research: Individuals are more likely to accept change if they are involved in deciding what that change will be and how it will be implemented. Over 40 years ago, Berelson and Steiner (1964) summarized this finding as follows:

> Active discussion by a small group to determine goals, to choose methods of work, to reshape operations, or to solve other problems is more effective in changing group practice than is separate instruction of the individual members, external requests, or the imposition of new practices by superior authority—more effective, that is, in bringing about better motivation and support for the change and better implementation and productivity of the new practice. (p. 353)

In the years since this conclusion was published, several continuous improvement models, including Total Quality Management (Deming, 1986) and Six Sigma (Pande, Neuman, & Cavanagh, 2000), emerged in manufacturing and spread to all types of organizations. The

Baldrige National Quality Program (2008) is the most visible example of applications of such improvement models within education. All of these models incorporate methods to involve those who will be affected by decisions in the making of those decisions. We think that the degree to which POS aligned with challenging academic standards will be accepted and implemented by CTE teachers will be determined by the degree to which the teachers are involved in their development. Maximum involvement will yield maximum implementation, and minimum involvement will yield minimum implementation.

Our Preliminary Answer

States should work to align rigorous and relevant technical content with challenging academic standards through local development of POS. CTE and academic teachers at the secondary and postsecondary level should be provided with the time and support needed to work together to develop the POS. The cost and logistics of making such opportunities available are formidable, but have a high potential to yield the kinds of POS that are needed. POS that are developed and disseminated without the involvement of those who must implement them will not produce the results that are desired. It is to these desired results that we now turn.

Question 3: What Are Appropriate Measures of the Effectiveness of Programs of Study?

One of the reasons POS were specified in Perkins IV is that Congress wanted to increase the accountability of CTE programs receiving federal funds. The goal for a POS is explicitly stated in the legislation: the attainment of "an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree" (Sec. 122(c)(1)(iv)). The percentage achieving this goal will be a measure by which the effectiveness of POS will be evaluated. What constitutes success on this measure, however, will have to be evaluated with care.

In this paper, we have reviewed Super's theory on career development and its relevance to POS. We have also presented evidence on the outcomes of highly regarded Tech Prep and career pathway programs. Neither the theory nor the evidence gives any reason to believe that large percentages of students who begin POS are likely to attain certificates or degrees in the occupational areas they originally study. The theory indicates that high school graduates who enroll directly in postsecondary education are still in the exploratory stage of career development. They are testing their interests and abilities against the realities of the occupations they are considering entering. For many, their high school experiences in their chosen POS may indicate that the match is not satisfactory and they should seek alternatives. Such changes are normal during late adolescence and emerging adulthood. If this is the case and a postsecondary certificate or degree in the POS started in high school is used as an indicator, what percentage would be considered success? The evidence from Tech Prep and career pathway programs is that, at best, less than one-fourth of their students attain *any* certificates or associate degrees. Is it likely that POS will yield higher percentages, and if so, how high should they be?

While we do not think that large percentages will earn postsecondary certificates or degrees in the POS they start in high school, our pessimism does not extend to POS as a means of giving

structure and meaning to instruction. For the reasons discussed above in connection with alignment with challenging academic standards, POS can make a contribution regardless of the numbers who obtain certificates or degrees. Students want to see the relevance of what they are asked to study. POS can provide that relevance by linking education with explicit occupational goals, thereby increasing students' engagement and attachment to school. As students pursue their POS, they may reconsider their initial decisions, but this should not be considered failure. Student who make changes have learned much about themselves and the occupations in which they were originally interested.

Our Preliminary Answer

The percentage of students obtaining postsecondary degrees or certificates should be one of the indicators used to assess the effectiveness of POS, but we think the core indicators of performance required for all secondary CTE students (Perkins IV, Sec 113(b)(2)(A)) will provide more useful information. How do students who follow POS compare to similar non-POS students in terms of academic and technical skills; high school graduation; attainment of proficiency credentials; placement in postsecondary education, advanced training, military service, or employment; and participation and completion of programs that lead to occupations that are not traditional for their gender? We would supplement these core measures with indicators of engagement with school and career development. Because of the exploratory nature of much secondary CTE, postsecondary certificate or degree attainment within the POS started in high school should not be the primary indicator of POS effectiveness.

In Summary

Our overall conclusion is that POS can enhance the effectiveness of CTE especially by aligning technical instruction with rigorous academic standards. Given, however, that most high school graduates are in the exploratory stage of career development, we do not expect high percentages to continue in the POS they followed in high school. This does not mean that the POS have failed. POS that increase student engagement, improve academic skills, and deepen student understanding of occupations have succeeded even if graduates decide not to continue their high school POS at the postsecondary level. POS can help to achieve that venerable but elusive goal of making education *through* occupations as explicit as education *for* occupations.

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APPENDIX A
Coding for State Plans

The codes listed below were used with the sections of the state plans that responded to the following directions from the *Guide for the Submission of State Plans* issued by the Office of Vocational and Adult Education, U.S. Department of Education (2007).

2. You must describe the career and technical education activities to be assisted that are designed to meet or exceed the State adjusted levels of performance, including a description of—
   (a) The career and technical education programs of study, that may be adopted by local educational agencies and postsecondary institutions to be offered as an option to students (and their parents as appropriate) when planning for and completing future coursework, for career and technical content areas that—
      i. Incorporate secondary education and postsecondary education elements;
      ii. Include coherent and rigorous content, aligned with challenging academic standards, and relevant career and technical content in a coordinated, non-duplicative progression of courses that align secondary education with postsecondary education to adequately prepare students to succeed in postsecondary education;
      iii. May include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits; and
      iv. Lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree;
   (b) How you, in consultation with eligible recipients, will develop and implement the career and technical programs of study described in (a) above;
   (c) How you will support eligible recipients in developing and implementing articulation agreements between secondary education and postsecondary education institutions;
   (d) How programs at the secondary level will make available information about career and technical programs of study offered by eligible recipients;

Column	Code
1	Two-letter state abbreviation
2	POS will become primary way of delivering CTE 1 - Yes, explicitly stated in plan 9 – Not explicitly stated in plan
3	Minimum number of POS a recipient of Perkins funds must initially offer 1 – One 2 – Two 3 – Three 4 – Four or more 9 – Not stated in plan
4	Higher minimum number specified or anticipated in subsequent years 1 – Specified 2 – Anticipated

9 – No

Strategies to implement POS (Five columns are provided to code strategies discussed. If there are less than five, skip the columns assigned. Summarize strategies in Word document, "Methods to Implement Strategy." Number summarized strategies using the code below.)

5 Strategy 1
- 1 – Provide criteria/template
- 2 – Develop state POS to be adopted by locals
- 3 – Continue/expand existing career pathways/tech prep
- 4 – Statewide articulation agreements
- 5 – Other (identify as "Other" in summary of Methods to Implement Strategy)

6 Strategy 2, same code as above

7 Strategy 3, same code as above

8 Strategy 4, same code as above

9 Strategy 5, same code as above

10 Does the state use the 16 career clusters?
- 1 – Yes, 16 OVAE clusters specified
- 2 – No, different set of clusters specified
- 9 – No reference to clusters

11 Does the state plan make reference to CCTI?
- 1 – Yes,
- 9 – No

12 Grade levels specified for POS
- 1 – 11-14
- 2 – Below 11 to 14
- 3 – 11 to 16
- 4 – Below 11 to 16
- 9 – Not stated in plan

13 Is a grade range wider than that specified encouraged?
- 1 – Yes,
- 9 – No

14 Primary responsibility for developing POS
- 1 – State
- 2 – Local
- 9 – Not enough information to code

Methods of providing information about POS (Three columns are provided)

15 Method 1
- 1 – Traditional methods (School-provided information, general Web site, meetings, part of compliance monitoring, etc.)
- 2 – State office for America's Career Resources Network (May refer to Sec. 118)
- 3 – State career information Web site
- 4 – Other methods (identify as "Other" under Methods to Implement Strategy)

16 Method 2, same code as above

17 Method 3, same code as above

APPENDIX B
Career Development Resources

America's Career Resource Network: The national career development guidelines
http://www.acrnetwork.org/ncdg.htm
Provides educators and counselors with tools for developing and evaluating career development programs.

Bridges: Explore, Plan, Achieve
https://access.bridges.com
Provides parents and teachers with career exploration activities.

CareerOneStop: Pathways to Career Success
http://www.acinet.org/
Provides occupational, industry, and state career-related information and career exploration tools.

Career Voyages
http://www.careervoyages.gov/
Provides users with information on high-demand and high-growth careers.

Kuder Career Planning System
http://www.kuder.com/index.html
Presents information for students, parents, and educators. Engages uses through Internet-based tools and resources to help with exploration and planning.

Minnesota Careers
http://www.iseek.org/mncareers/index.html
Provides resources for students, parents, and educators, along with exploration activities.

Missouri Center for Career Education
http://missouricareereducation.org/curr/cmd/guidanceplacementG/lessons/index.php
Provides career development lesson plans.

National Career Development Association
http://www.ncda.org/
Promotes life span career development and resources.

New York Career Zone
http://www.nycareerzone.org/flash/index.jsp
Vocational exploration based on Holland's career interest areas.

Next Steps
http://www.nextsteps.org/
A full-featured employment, career development, and job finding resource for youth.

O*net Online

http://online.onetcenter.org/

Provides detailed information on a large variety of occupations.

School to Careers

http://www.careers.iptv.org/

Provides information via video and web-based activities about careers. Allows students to communicate with career professionals.

The Career Key

http://www.careerkey.org/

Offers students expert help in making career choices, including career changes, career planning, job skills, and choosing a college major or educational training program.

The Real Game

http://www.realgame.org/

Engages students in career development activities through guided instruction and activities.

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