

# EARNING INDUSTRY-RECOGNIZED CREDENTIALS IN HIGH SCHOOL: EXPLORING RESEARCH AND POLICY ISSUES

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## ABSTRACT

*As states develop accountability systems for their high school career and technical education (CTE) programs, the number of students who earn industry-recognized credentials is being considered as a measure of student success and program quality. Using data from a longitudinal study we explored the value of industry-recognized credentials for high school students, and the utility of these credentials as a measure of secondary CTE program quality. We found that teachers and administrators were concerned about the costs of maintaining these programs, and about the cost to students to take the certification exams. We found that few students were earning industry-recognized credentials at these schools, but those who were tended to have a solid career plan. However, the most important finding was the difficulty collecting data, because high schools were not required to record data on students earning industry-recognized credentials. As such, this study is an initial exploration into issues that arise when conducting research or considering policy on industry certification in high school. Recommendations for future research and for CTE accountability policy are provided.*

The era of school accountability is upon us. In order to address past inequities and to ensure future achievement of minimum standards, the federal *Improving America's Schools Act of 1994* expected states to establish academic content and performance standards, and to implement assessments that measured student achievement against these standards. By the time the U.S. Congress passed the *No Child Left Behind Act of 2001*, which called for comprehensive accountability systems in public schools, all of the

50 states already had some sort of assessment system for their K-12 schools (Goertz, Duffy, & Carlson Le Floch, 2001).

The accountability systems developed in the 1990s focused on academic competencies such as writing paragraphs or solving algebraic equations. However, career and technical education (CTE) students receive an education with a different focus. While CTE students are required to meet academic standards, the additional work-related competencies that they acquire in high school have often not been assessed with the same rigor. Moreover, without an accountability system for CTE, there is no way to assess or compare the quality of CTE programs. As a result, the trend has been toward developing secondary CTE assessment systems that parallel the academic systems. As states and localities began to develop CTE competencies, standards, curriculum frameworks, and assessments, they recognized that some industries had already produced standards and assessments as part of their efforts to ensure that applicants were certified in the requisite skills for that industry. Many schools, school districts, and states thus adopted industry-recognized credentials (IRC) as a component of their CTE accountability systems.

At first glance, standards and assessments developed by industry seem a perfect match for a related career and technical program in high school: CTE instructors and administrators can be sure that all the skills required by industry are part of the program, and students who earn certification (we use the terms IRC, credential, or certification interchangeably) are theoretically a step ahead of other applicants for employment in that industry. However, there are reasons why IRC are problematic measures of high school CTE student outcomes or program quality, such as the cost of maintaining state-of-the-art facilities, the cost of the certification exam itself, and the lack of certification in program areas common to high school CTE. Some of these barriers can be addressed, while others may be insurmountable in the quest for secondary CTE accountability systems. The purpose of this study is to explore the issues around the use of IRC in high school.

## **CONCEPTUAL FRAMEWORK**

Previous research has shown that CTE engages and motivates students (Gentry, Rizza, Peters, & Hu, 2005; National Research Council, 2004; Scherer, 2002). The framework for this study encompasses a broad conceptualization of CTE as an important tool for engaging secondary students as well as an important program area with significant outcomes—preparation for the world of work that nearly all students will eventually enter. Hopkins (1999) advocated for this expansive view of CTE in which students are exposed to the workplace through three non-exclusive approaches: education for work, education about work, and education through work. Education for work refers to job-specific training. Some argue that such training is best concentrated in the postsecondary phase of students' education. However, others believe that this is an appropriate role for secondary education (Rosenbaum, 2001). Either way, education for work must be premised upon actual workplace needs, and the curriculum must satisfy the broader educational needs of workers, including general education components and education for participation in a democratic society.

Education about work describes a curriculum that assumes that knowledge about the world of work is valid school knowledge. All students need to learn about democratic rights in the workplace, career ladders, and labor markets. Finally, education through work refers to strategies in which students learn school subjects within a work context, or work-based learning. Education about and through work can be infused into academic as well as vocational classes in high school. Teachers can work across subject matter disciplines to integrate their curricula so that students experience real-world uses for curriculum content, such as mathematical equations. Students can participate in internships that use what they have learned in school.

High school CTE programs that offer opportunities to earn IRC adhere to an education for work approach, since they are preparing students for the workplace. Students have the opportunity to learn skills that are assessed by measures external to the high school. IRC bring “real-world” standards and expectations into high school, presumably increasing student engagement in and completion of CTE programs and course sequences that culminate in such credentials. By teaching students about the certification process and its benefits, students are receiving education about work as well: how job tasks and skills are delineated and assessed, and how hiring and promotion are related to obtaining those skills. To the extent that these credential programs include internships and other work-based learning opportunities, they are also an example of education through work. Thus earning IRC seems to fit into the new, more expansive view of secondary CTE.

### **The Demand for Skill Standards**

The decade of the 1990s saw an increase in the development of industry skill standards considered necessary for entry and success in various industries. *America’s choice: High skills or low wages!* (Commission on the Skills of the American Workforce, 1990) decried the preparation and quality of American workers. This commission report called upon business, labor, and education representatives to decide upon certification standards for a broad range of occupations. Through the federal *School to Work Opportunities Act of 1994*, the federal government provided seed money for workforce development boards to develop these standards.

The National Skill Standards Board (NSSB) was created in 1994 to build a voluntary national system of skill standards, assessments, and certifications. Skill standards are “statements of knowledge, skills, and abilities required to complete a task, a critical function, or a complex range of multiple tasks and functions” (Manufacturing Industries Career Alliance, 2001). According to the NSSB, nationally-recognized, industry-based skill standards and occupational certifications are beneficial to the certified individuals and to the communities in which they live. For the individual worker, certification provides portable credentials that will be recognized across the country. For cities and communities, “a well-credentialed workforce attracts new businesses/industries seeking to hire and retain trained workers with immediately-transferable skills. Therefore it is a powerful economic development tool” (Workforce Excellence Network, 2002).

During its existence, the NSSB produced skill standards for only a modest number of industries (Silverberg, Warner, Fong, & Goodwin, 2004). However, some industries had

organized well before the 1990s to standardize and certify training nationwide (e.g., the American Welding Society, n.d.). The *America's choice* report, as well as a series of federal legislation in the 1990s and internal industry pressures, increased the trend of industry associations developing their own systems of skill standards, assessments, and certifications. Despite this progress, skill standards systems remain incomplete. In some industries, skill standards have not yet been developed. Conversely, in other fields, there may be multiple skill standards and certifications available, leading to employer disagreement about which standards to use (Gray, Pellock, & Bae, under review). In still other fields, such as automotive repair and information technology, earning an industry-recognized credential is almost indispensable in order to be employed in that field.

## **Types of Standards and Certifications**

Skill standards and certifications do not have a common structure or origin. We describe here the most typical approaches. NATEF (National Automotive Technicians Education Foundation) was founded in 1983 to develop standards for certifying automotive training programs in order to improve the quality of entry-level technicians. NATEF modeled its standards after licensed occupations such as certified nurse assistant (Shoemaker, n.d.), which include a minimum instructional time on task for each of the major divisions of an occupation. NATEF certifies programs and instructors to teach the standards in various auto repair divisions such as suspension and steering or brakes. The auto body industry soon followed suit with their I-CAR (Inter-Industry Conference On Auto Collision Repair) certifications in various collision repair areas such as steel straightening and wheel alignment.

In the information technology (IT) industry, the Computing Technology Industry Association, known as CompTIA, has been developing IT standards, training, and certification programs since the 1980s. It is the largest developer of vendor-neutral IT certification exams, such as A+ for computer service technicians and Network+ for careers in network support or administration. Cisco Systems and Microsoft offer vendor-specific certification programs for networking (CCNA: Cisco Certified Network Associate) and software applications (MOUS: Microsoft Office User Specialist), respectively. Like the automotive exams, IT certification exams were derived from job task analyses and require a minimum number of hours' experience to qualify to take the exam.

At the other end of the spectrum, the American Welding Society offers the opportunity to become certified without requiring instruction by a certified instructor or any minimum time on task. The certificate is "open to anyone with a talent for welding" (American Welding Society, n.d.). To become certified, welders take a performance-based test of procedures used in the various welding industries. Further work experience and seminars are necessary to pursue advanced certification in welding.

A final type of certification relevant to this study is licensure by the state to practice a given occupation. In careers such as cosmetology or nurse assistant, certification is granted after accruing a set number of instructional and applied hours, and after passing written and performance-based exams of proficiency. The state intervenes in these

occupations because the state is responsible for protecting public health and safety, and people in these careers come into close contact with the public.

In addition to these nationwide industry-led efforts and the special case of state licensure, states and localities have developed skill standards and assessments with local business and industry, reflecting regional variations. Some were developed in order to meet accountability requirements set out in the legislation authorizing federal funding for vocational education, the *Carl D. Perkins Vocational and Applied Technology Education Act of 1990* and its 1998 amendment. This legislation set out four core indicators of performance, two of which involved standards, assessment, and certification: student attainment of challenging, state-established academic, vocational, and technical skill proficiencies; and student attainment of diplomas, degrees, and credentials.

Just as states have developed curriculum frameworks, standards, and assessments for academic subjects, some states have also developed CTE curriculum frameworks, standards, and assessments. Kentucky's General Program Standards for Secondary Career and Technical Education (Kentucky Department of Education, 2004) reflect a common way of incorporating industry-recognized credentials into secondary education: state departments of education encourage but do not require high schools to adopt the frameworks, standards, and assessments (Silverberg, et al., 2004). Some states have gone further and required that IRC be an integral part of their career and technical education plans. In 2002, ten states had policies stipulating that high school CTE programs must use these industry-recognized credentials as program drivers, and programs must develop their courses of study based on the industry-based knowledge and skill requirements (Workforce Excellence Network, 2002). However, as noted above, skill standards systems are not fully developed across all industries, and there are competing assessments and certifications available. Aligning secondary CTE programs with industry standards sounds like a reasonable goal, but given the present state of those standards systems, it may complicate the development of secondary CTE accountability systems rather than assist that development (Gray et al., under review).

### **Research on Industry-Recognized Credentials**

Many of the industry-developed skill standards were originally developed for in-service and internal industry use. These training and certification programs were often delivered by community colleges. Thus much of the literature on the use of industry-recognized standards discusses industry and postsecondary contexts (Aragon, Woo, & Marvel, 2004; Bartlett, 2004; Zinser & Lawrenz, 2004). This research concluded that collaboration between industry and postsecondary education has been fruitful in various occupational areas.

Bartlett (2004) wrote that one of the main purposes of occupational certification was to signal to employers of entry-level workers that applicants were ready for employment. He found that automotive repair industry employers valued applicants with certification and a two-year degree most highly, while employers in information technology preferred a two-year degree with work experience. Both positive and negative attitudes towards

certification were found among employers in the industries he examined, but the trend was for employers preferring some postsecondary education over the certification.

There have been no nationwide studies reporting the number of high school students earning IRC. The most recent National Assessment of Vocational Education (NAVE, Silverberg, et al., 2004) suggests a fourfold explanation as to why such information is difficult to collect and why what does exist is of questionable validity. First, the local implementation of state CTE frameworks, standards, and assessments is for the most part voluntary. Second, participation in CTE itself is voluntary for students. Third, not all CTE areas have industry-defined standards. Finally, many states do not have the resources to invest in constant equipment upgrade and instructor professional development.

One recent study examined IT certification programs in both high schools and two-year colleges (Haimson & VanNoy, 2004). This study reported that 13% of all U.S. high schools included a Cisco certification program, the most common IT certification program in high school. IT certification programs are time-intensive, which makes them difficult to offer in high school given graduation requirements and other competing activities. The IT certification program staff surveyed for this study cited a need for more hands-on activities and internships to help students master key skills. One third of the high schools surveyed in this study did not offer all of the classes needed to prepare students for Cisco certification; such certification was expected to be completed at the community college. The study also noted the substantial investments that schools had to make in computer equipment and teacher training. Finally, the authors recommended developing systematic follow-up information on student outcomes.

Standards and their certifying assessments exist or are being developed in many industries. These standards have obvious resonance with secondary CTE educators because they provide industry-based criteria upon which to build and evaluate CTE programs, and because the certification process provides opportunities for their students. But little research has been done on the benefits and challenges of having industry-recognized credential programs in high schools. This article describes student participation in such programs in six high schools located in various communities across the country. Although small in scale, the perspectives presented here reflect the importance of the debate on the use and value of IRC in high schools.

### **OBJECTIVE OF THE STUDY**

The objective of this article is to increase our understanding of the use of industry-recognized credentials in high school, including student participation and the use of these credentials as a measure of secondary CTE program quality. The larger study of which this article is a part examined student outcomes in high schools that blended CTE-based reforms with comprehensive school reform (Castellano et al., under review; Castellano, Stone, Stringfield, Farley, & Wayman, 2004; Castellano, Stringfield, & Stone, 2002; Castellano, Stringfield, Stone, & Wayman, 2003). The goal of the larger study was to ascertain whether students in schools that had incorporated career themes and preparation along with rigorous academics performed better than students in schools without these

sets of reforms. Student outcomes in that study included more than academic achievement; the outcomes also included such CTE measures as earning IRC.

Three research questions are addressed in this study:

1. What were the state and local policies in 2002 for the use of industry-recognized credentials at the high schools participating in the study?
2. Did students from high schools that incorporated career themes and preparation along with rigorous academics earn more industry-recognized credentials than students in schools without these sets of reforms?
3. Did teachers, administrators, students, and employers at these sites find industry-recognized credentials to be valuable, either as a measure of program success or as a means of preparing students for the workplace?

### **STUDY DESIGN AND SAMPLE**

The larger study examined student outcomes in high schools engaged in both innovative CTE programs and comprehensive school reform. By comprehensive school reform, we refer to research-based reform designs of the type funded by the federal Comprehensive School Reform Program (U.S. Department of Education, 2005). As part of a focus on careers and career preparation, staff at three high schools created career-themed academies, pathways, and concentrated vocational programs, respectively. We employed a mixed-method, longitudinal design in order to examine both the reform implementation process and student achievement outcomes. These outcomes were compared to the outcomes at demographically similar comparison schools that were not engaged in reforms. Although it could be argued that virtually all schools are perpetually involved in one or more change efforts (Lee & Smith, 2001), the comparison high schools were not involved in focused, comprehensive school reform efforts of the type and scope present at the study schools.

We sought three sets of feeder patterns (middle school, high school, community college) in which the high schools were implementing CTE-based comprehensive school reforms and demographically similar comparison high schools that were not implementing such reforms. All sites had to serve large percentages of high poverty or minority students who were considered to be at risk of failing to graduate from high school. A more detailed description of the sampling procedure and school selection can be found in Castellano, Stringfield, & Stone (2002).

We deliberately selected high schools that represented four common organizational structures that offer CTE: career academies, comprehensive high schools, regional skills centers, and vocational high schools. The number of high schools organized around career academies grew from 1,500 in the year 2000 to more than 2,500 in 2004, an increase of 67% (Kemple & Snipes, 2000; Kemple, 2004). Comprehensive, Grade 9-12 high schools are the most common organizational structure at about 15,000 nationwide (Lynch, 2000). Many comprehensive high schools collaborate with a regional skills center to provide focused, half-day CTE programs for their students. Nationwide, there are approximately 1,100 regional skills centers serving consortia of high schools (Lynch,

2000). Finally, there are about 250 vocational high schools in the United States, which provide concentrated vocational programs (Lynch, 2000).

Each of the three high schools we selected (one of which came with its regional skills center) helped us choose a comparison school nearby that was similar demographically but was not engaged in CTE-based reforms. At each study school and comparison school, we collected data on three grade cohorts over four years (2001-2004): students who were in 7th, 9th, and 11th grades in 2000-2001. We selected the eldest cohort to serve as the sample for the present analysis, because this was the sample used in the larger study for all outcomes relating to the transition from high school to work and/or postsecondary education (Castellano et al., under review). Most members of this cohort graduated in 2002. A description of all participating high schools follows, using pseudonyms to protect confidentiality.

**Academy High School and Comparison-AHS (C-AHS)**

Academy High School is located in City A, a large urban center in the West. City A is a hub for trade with Pacific Rim countries. The service, government, and retail trade sectors are the leading employers, although there is also a large manufacturing base. City A’s population continues to grow, fueled in large part by immigration from Asia and Latin America (see Table 1).

Table 1. *Academy High School Sample: Descriptive Data*

Study Sites	Total	Ethnicity				Free/ Reduced- Price Lunch	Limited English Proficiency	Special Education
		Latino	African American	White	All others			
	N	%						
City A	> 2 million	46	11	30	13	n/a	n/a	n/a
AHS <sup>a</sup>	600	71	28	<1	1	94	27	3
Class of 2002	102	80	19	1	0	88	55	1
C-AHS <sup>b</sup>	3,500	79	20	<1	<1	71	37	1
Class of 2002	465	80	20	0	<1	85	76	17

*Note.* All city data are derived from the U.S. 2000 census (U.S. Census Bureau, 2001). The percentages may not add up to 100 due to rounding and/or because individuals self-identified as belonging to more than one group. Unless otherwise noted, all school-level data are from the 1999-2000 school year. All Class of 2002 data are from the 2000-2001 school year.

<sup>a</sup>Data are reported for entire K-12 school. However, the demographics presented reflect those of the high school. AHS = Academy High School. <sup>b</sup>C-AHS = Comparison-Academy High School

Academy High School (AHS) adopted the Urban Learning Centers reform design, which creates articulated communities across all grade levels, K-12, usually housed in one facility. There are three components to this reform design: a) integrating high standards into a thematic, interdisciplinary curriculum; b) including all stakeholders in the decision-

making process; and c) providing learning supports such as social services (Johnson & McDonald, 1996).

AHS was part of a large urban district with over 60 high schools. As an Urban Learning Center, AHS was co-located in a single facility with an elementary school and a middle school. The small number of high school students listed in Table 1 masks the fact that AHS was a K-12 school of almost 3400 students. Only students from the Learning Center middle school could apply to attend AHS. Part of the application required students to commit to applying to colleges and universities in their senior year, as the mission of AHS was to prepare the inner-city youth of this area for postsecondary education.

The comparison school, C-AHS, was a much larger high school in the same neighborhood. In fact, many students from the Learning Center middle school attended C-AHS. This school exhibited elements that commonly lead adolescents to drop out in urban, high-poverty contexts: poor academic preparation, lack of sufficient resources, and distractions such as gang activity that kept students from attending class and studying.

### **Pathways High School, Comparison-PHS (C-PHS), and Their Regional Skills Centers**

Pathways High School (PHS) is located in City P, in an agricultural region of the Pacific Northwest, with the primary local crops being potatoes and wheat. According to the area chamber of commerce, most local jobs involve production agriculture, food processing, and agribusiness. There are also some industrial and manufacturing firms that were developed to support nearby federal facilities. Due to its location, City P is a transportation hub for the Pacific Northwest, with links through air, rail, truck, and barge. City C-P, where the comparison school C-PHS is located, is approximately 75 miles from City P. The economy of City C-P is more strongly agricultural. Table 2 provides U.S. 2000 census data on the population statistics by race and ethnicity for City P and City C-P.

PHS implemented career pathways across the curriculum in 1998. This design included grade-level projects for each grade, all of which involved participation from business and community partners. A student's career pathway at PHS was expressed through electives: an Arts and Communications pathway student might take journalism or drama, while a Health Careers pathway student might opt to take a focused, half-day nurse assistant program at the nearby regional skills center. Because the skills center offered opportunities to earn industry-recognized credentials, they have been included in the present analysis. PHS is the only high school in its small-town district.

C-PHS is also the only high school in its district. Like PHS, C-PHS had collaborated with other small districts in its area to support a regional skills center where students could receive focused CTE instruction. We were able to collect data on the C-PHS Class of 2002 outcomes at the skills center as well as at C-PHS itself.

Table 2. *Pathways High School Sample: Descriptive Data*

Study Sites	Total	Latino	African American	White	All others	Free/Reduced-Price Lunch	Limited English Proficiency	Special Education
	N						%	
City P	35,000	56	3	37	7	n/a	n/a	n/a
PHS <sup>a</sup>	2,500	54	4	38	4	50	10	11
Class of 2002	342	40	4	52	4	38	14	9
City C-P	15,000	53	<1	43	1	n/a	n/a	n/a
C-PHS	1,500	68	<1	31	<1	50	24 <sup>b</sup>	13 <sup>b</sup>
Class of 2002	346	70	<1	28	1	36	13	9

*Note.* All city data are derived from the U.S. 2000 census (U.S. Census Bureau, 2001). The percentages may not add up to 100 due to rounding and/or because individuals self-identified as belonging to more than one group. Unless otherwise noted, all school-level data are from the 1999-2000 school year. All Class of 2002 data are from the 2000-2001 school year.

<sup>a</sup>PHS = Pathways High School. <sup>b</sup>Limited English Proficiency and Special Education percentages for C-PHS were only available for the entire district in 1999-2000. C-PHS = Comparison – Pathways High School.

Table 3. *Vocational High School Sample: Descriptive Data*

Study Sites	Total	Ethnicity				Free/Reduced-Price Lunch	Limited English Proficiency	Special Education
	N	Latino American	African American	White	All others	%		
City V	200,000	27	20	49	3	n/a	n/a	n/a
VHS <sup>a</sup>	1,500	53	28	17	2	68	10	35
Class of 2002	206	47	32	18	0	27	3	26
City C-V	600,000	14	25	55	8	n/a	n/a	n/a
C-VHS	1,500	29	60	8	3	60	38	30 <sup>b</sup>
Class of 2002	283	27	66	5	0	53	33	21

*Note.* All city data are derived from the U.S. 2000 census (U.S. Census Bureau, 2001). The percentages may not add up to 100 due to rounding and/or because individuals self-identified as belonging to more than one group. Unless otherwise noted, all school-level data are from the 1999-2000 school year. All Class of 2002 data are from the 2000-2001 school year.

<sup>a</sup>VHS = Vocational High School. <sup>b</sup>Special Education percentage for C-VHS is from 2003-2004, the earliest year for which data were available. C-VHS = Comparison-Vocational High School.

### Vocational High School and Comparison-VHS (C-VHS)

Vocational High School is located in City V, a medium-sized city in the northeastern United States. City V has a history as a manufacturing center for textiles and metal. As with many industrial cities in the region, the 1980s brought recession and the offshore

flight of industry and manufacturing. Most jobs in City V are in the service sector, in wholesale and retail trade, and in government. C-VHS, the comparison school, is located in City C-V, which is in a different region of the same state. City C-V is a large northeastern city. City C-V enjoys a diversified economy with well-regarded financial, information technology, and health care sectors. Table 3 provides general population statistics by race and ethnicity for City V and City C-V, based on the U.S. 2000 census.

Vocational High School (VHS) is a member of the High Schools That Work national reform network. The goal of this reform design is to improve the academic achievement of high school CTE students by ensuring that they receive rigorous college preparatory subjects along with their CTE programs. The High Schools That Work design calls for common planning time for teachers to collaborate on curriculum integration, and it sets high standards and expectations for all students (Bottoms & Presson, 1995).

VHS was one of four high schools that made up the only district in City V. Students were offered open enrollment to their choice of high school. Three of the high schools were college preparatory in nature, and VHS was the district's vocational technical high school. Renovation of City V's high schools was underway, but VHS was last in line, continuing to operate with outdated equipment and neglected facilities. Demographic data on VHS and its Class of 2002 are found in Table 3. During the time period of this study, VHS was declared a school in crisis by its state department of education, because student academic achievement on the state standardized tests was low and had not shown significant improvement over several years.

C-VHS, the comparison school, is also a vocational technical school located in an urban setting. It offered approximately the same CTE programs as VHS did, in somewhat more modern facilities. C-VHS was also a high school of choice, in that middle school students in this large urban district could apply to attend the district's vocational high school. Such separate high schools for secondary vocational education are common in this region, although as noted above, vocational high schools are increasingly rare in the United States. Historically, VHS and C-VHS had not offered college preparatory-level academic classes, but did so during the time this study was conducted. Figure 1 provides a schematic of the entire study sample.

## **METHOD**

Each research question required different data collection and analysis plans. The first question, regarding state and district policy around IRC, was answered by examining the three state department of education websites and the five district websites that correspond to the schools. In addition, document analysis was performed on the various course catalogs, reports, grant proposals, and other documents gathered during the four years of data collection at the sites. This analysis specifically sought information pertaining to state and district policy about IRC.

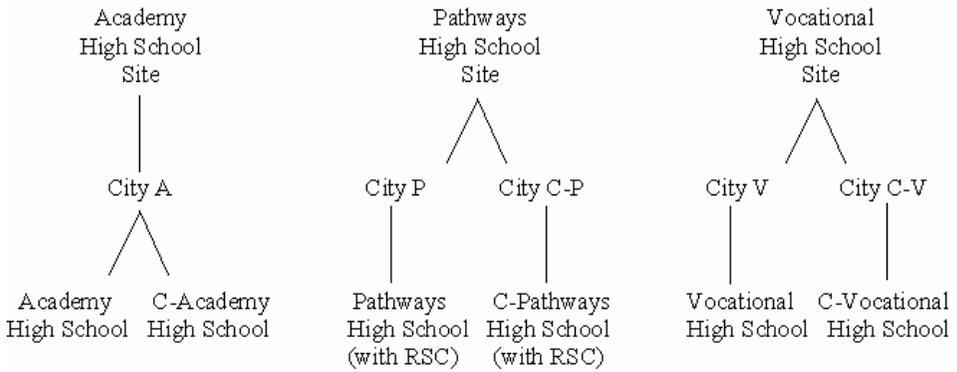


Figure 1. *Schematic of Study Sample. Cities are not named to protect the anonymity of the sites. RSC = regional skills center.*

The second research question concerns the number of students in the class of 2002 who earned IRC at the six high schools (and two skills centers). When we discovered that student credentials earned were not a part of the transcript data supplied to us by any of the five districts, we turned to the schools themselves to provide the data. At the two vocational high schools, the data had been formally collected and recorded as part of student transcripts. However, we were surprised to learn that at the other four of the six high schools, the information had not been collected in a formal manner. At these sites, the vocational director or counselor assisted us by gathering information from each relevant academy leader or department chair, and reporting back to us. Data collected in this manner have inherent flaws, such as the unreliability of memory or casual recording procedures, the self-reported nature of the data, and the inability to know if the data have been collected in their entirety. As an example, of the 23 CTE programs for which we received records on the number of students earning certification, 8 were unable to provide a denominator; that is, they were unable to report the total number of seniors who had been in the program and were eligible to take the certification exam. Therefore the results for those eight programs, shown in the tables below, lack an entry for the total percent of eligible seniors who earned the credential. Such limitations in this analysis are discussed further below.

The final research question addresses the value of students earning IRC in high school from the point of view of the various stakeholders. Over 300 teachers, administrators, and students were interviewed across all of the sites over the five years of data collection. Not all of these participants were asked about the use or value of IRC, so the responses elicited here are not representative of the entire sample of people interviewed. A total of 106 study participants, or approximately 31%, mentioned IRC. Although 31% does not represent a large part of the total interview sample, this relatively low number is not surprising, since earning IRC was only one of many student outcomes examined in the larger longitudinal study.

All interviews were recorded and transcribed. The transcripts were first separated by type (CTE teachers, academic teachers, school and district administrators, counselors,

students, and community members), then coded, and finally analyzed following the case study methods of Yin (1994) and the grounded theory approach of Strauss and Corbin (1990). Coding refers to marking the sections of transcript that correspond to a topic or concept related to the research questions. Interviewee responses could be coded with more than one code. Codes were developed from the interview questions, which in turn derived from the research questions. Following is a relevant question from a teacher interview protocol:

Is this program nationally certified to grant industry-recognized credentials to students (e.g., Cisco, A+)? Are the students able to meet the standards? What are the benefits to students of this certification? About how many students get certified per year? Out of how many who try?

Often, the topic of IRC arose in the interviews not from such a direct question, but through other questions, such as whether a CTE program had a local business advisory council, or if there were other means of assessing students besides school tests and grades.

The larger research questions of the longitudinal study examined many types of student outcomes at these schools, and the analysis of the entire qualitative dataset utilized 184 codes. For this analysis of IRC, we used two codes primarily: “student credentials” and “local labor market.” The coded interview transcripts were entered into a qualitative data analysis software package called HyperResearch®. The resulting database could be queried by code across all interview types, yielding various reports of stakeholder perspectives on IRC. In addition to providing these perspectives on the use and value of IRC, the interviews also served as triangulation for, or a check on, the results of the other two research questions: the web-based policy examination, and the outcomes at these high schools.

### **Limitations**

The data on students earning industry-recognized credentials were gathered two years after the class of 2002 graduated. At four of the six high schools, the data were collected and totaled at the time of our request in 2004 rather than in 2002. Such a method of data collection leaves some doubt as to the accuracy of the outcomes. The reliability of self-report data is questionable, especially when those data were inconsistently or incompletely recorded some time in the past. Despite their limitations, we believe the data are reliable estimates. High school staff with whom we had collaborated over four years worked diligently to collect all records, and teachers did have the information in rollbooks or other sources. In addition, the outcome data are consistent with what we know about the state, district, and school contexts from our other data sources.

Another limitation of this study has to do with changing policy contexts. During the tenure of this study, the three states developed or modified their CTE accountability systems, making the state contexts described here somewhat dated. However, what is a limitation for this analysis can be seen as a potential benefit for practice. States and localities are having to decide what role industry certification will play in their schools. If

these credentials become part of the CTE accountability system, this study shows that record keeping will have to improve, thus addressing the other limitation of this study. In fact, two of the high schools in this study had to begin to keep such records near the end of the study in order to meet new state requirements. In those cases, the results of this study serve as a useful baseline of information.

## **RESULTS**

The three states involved in our study reflect the range of education policy with respect to industry-recognized credentials. For each site, we discuss the state policy on these credentials, and then present the findings on the number of students in the class of 2002 who earned IRC at these schools. Interview data from teachers, students, and administrators provide information on the value placed on these credentials, as well as detailing the context for the results displayed in the tables. In general, teachers and administrators believed that the credentials were valuable to students, but they expressed some concerns about the use of these credentials in high school. While only 11 of the 77 high school students we interviewed mentioned IRC, those who did were very familiar with the credentials and how they could be valuable to them after high school.

In examining the data returned to us by the schools, we found that these high schools had developed various in-house certificates of competency or completion. While these were of some interest, we decided to focus on IRC and did not include in-house credentials in the reported outcomes. Another issue arose around the American Red Cross' First Aid/CPR certificate. At four of the high schools, "all" students in a program or a class cohort were expected to earn a First Aid/CPR certificate. This made it very difficult to determine the exact number of students who actually earned one. In addition, the First Aid/CPR certificate is a general certificate available to all members of the community, not only those who are bound for careers in the health professions. For these reasons, we have not included the numbers of students who earned the First Aid/CPR certificate in the results.

### **Industry-Recognized Credentials at the AHS Site**

The state where Academy High School (AHS) and C-AHS are located has not formally incorporated IRC as an element in its secondary career and technical education system. At the time of our study, the state began an initiative to develop an integrated workforce development system. This undertaking recognized the importance of linking CTE curricula to industry standards, and of giving students the opportunity to earn credentials as a means of assessing student mastery of the standards. However, IRC are not an explicit component of the proposed workforce development system, and were not an accountability component of the previous state plan for vocational education (i.e., high schools were not required to report the number of students earning credentials).

### **Student Participation and Perceived Value**

The three academies at AHS were finance, information technology, and health careers. Many high schools offer certificates in the latter two of these academies, such as A+ or

certified nurse assistant, as described above. However, at AHS, the oft-stated goal was to prepare students to enter four-year colleges and universities. One of the academy leaders reported that their business advisory committees were not interested in technical skill certification at the high school level. These business partners were more interested in so-called “soft skills” training, such as the ability to show up on time and work in teams. According to this academy leader, “They don’t care if [students] are certified in insurance.” Given employer ambivalence and the postsecondary focus of the school, there was little motivation to include IRC opportunities in the career academies. As this study was coming to a close, however, the teachers in the information technology academy were re-examining that curriculum, and were considering including preparation for industry certification. One issue that surfaced among the decision makers was how to help students pay to take such exams.

At C-AHS, there were no opportunities for students to earn IRC in 2002. A major reason for this was the lack of the continuous funding necessary to keep both the equipment and the teaching staff up to industry-approved standards. C-AHS did not appear to have the personnel, time, or resources needed to pursue programs and opportunities for students such as IRC. This is not an unusual state of affairs in urban secondary education.

### **Industry-Recognized Credentials at the PHS Site**

The state where Pathways High School (PHS), C-PHS, and their respective skills centers are located has taken an aggressive approach to IRC. If there are industry certifications that students can earn while in high school, the vocational office of the state department of education has encouraged high schools to develop their programs to incorporate those certifications. During the tenure of our study, this state began requiring districts to report the number of IRC earned by students. The state has provided financial incentives to schools offering vocational classes that lead to industry-recognized certification or that articulate to postsecondary programs. At PHS, the vocational directors agreed with this focus in principle, but noted that the reality could be more complicated. For instance, one program coordinator felt that schools should not be required to meet industry-level requirements if it would cause their districts financial hardship. He felt that industry standards should not be the sole criterion of high school vocational program quality. Despite a program or district’s inability to reach that standard, a program might nonetheless be sufficient to prepare students for work and to be able to meet industry requirements in a postsecondary setting.

### **Student Participation and Perceived Value**

In 2002, students at PHS could earn IRC in information technology. At the end of a blocked sequence of computer engineering courses, students were eligible to take the A+, Network+, and the OCP (Oracle Certified Professional) exams. Only one student took the A+ certification exams in 2002, and he passed. One of the computer teachers said earnestly that the skills of his students were equivalent to those of the people who took and passed such exams. But his students, coming as they did from low-income backgrounds, could not afford to take the exams. The price of these exams, sometimes as much as two hundred dollars, was a major deterrence. The teachers were looking for

scholarships to pay for the exams, so that their students could benefit from the certification, and, one said, “to kind of validate what we’re doing.”

There were several reasons why PHS did not offer more opportunities for students to earn certificates. Some of the CTE programs at PHS simply did not have industry-recognized skill standards (e.g., commercial photography), and other programs were in areas that required postsecondary education for certification (e.g., floriculture/nursery operator). We heard complaints about the cost of maintaining industry-approved programs. School districts bore the significant costs of upgrading equipment and facilities, especially in the automotive and information technology areas. Given that many students could not afford to sit for the certification exams, school officials did not feel that it was a wise use of scarce funds to continue to keep up with such rapidly changing technology.

Perhaps the primary reason for the paucity of IRC available at PHS, however, was the presence of a regional skills center where students could go if they wanted to concentrate on a specific CTE area. PHS and other area high schools were members of a cooperative that provided focused, half-day CTE programs to students. Of the 17 CTE programs offered by Pathways Regional Skills Center (PRSC) in 2002, 8 offered the opportunity to earn an industry-recognized credential. The number of seniors in 2002 who earned such credentials at either PHS or the regional skills center is shown in Table 4.

As can be seen in Table 4, at PRSC, programs offering state licensure were most prevalent, such as safe food handling and wildfire management. Although the skills center offered opportunities to earn IRC in computer technology, automotive repair, and nurse assistant programs, no seniors from PHS earned these certificates in 2002. The director of the skills center reported that due to increased student demand, more high schools had begun offering A+ certification opportunities on their own campuses. And indeed, PHS offered a computer engineering block of courses leading to certification. This meant that fewer students were likely to choose the skills center program, because they could take it at their home high school.

One student (not from the class of 2002) related to us in his junior year that he planned to get all three IT certifications that were offered at PRSC (see Table 4). He was quite knowledgeable about these certifications. In his junior year, he explained, “I’m going to get A+ certified, and then do those other two, because A+ is like the base of all certifications. So you want to get that one first and out of your way.” When we spoke with him the following year, we probed for his sense of the value of these credentials:

Researcher: And what are you going to do to show future employers and colleges what you can really do? Or are you just going to use the certifications?

PHS junior, male: Yeah. Because that shows that you know the information and you know what to do and you’ve had training in it.

This student was confident that the credentials he earned would signal to employers that he had the skills they required. A PHS counselor supported this confidence in the following comment: “[Students are] earning certificates right here in the high school that they can go out into the area with and make some fairly decent money right out of high

school.” And indeed, employers in the area were beginning to turn to industry certification as a criterion for employment:

Researcher: Do employers look for those certifications and hire them, and the other kids are just out of luck? What impact does that certification have?

Auto Mech Teacher: More and more it’s a big deal. In the dealerships, the nicer independent shops, you know, the ones students drive by [and think], “Oh that looks like a nice place,” kind of a professional look to it. Usually that’s a requirement.

Table 4. *Industry-Recognized Credentials Earned by Pathways High School Seniors, 2002*

CTE Program	Type of Credential	Ratio of Seniors Earning Credential To Total Number of Seniors in Program	Percent of Seniors in Program Earning Credential
<b>At PHS</b>			
Computer engineering	A+	1/7	14%
<b>At PRSC (regional skills center)</b>			
Auto body tech	ICAR <sup>a</sup> Passport	0/5	--
Catering & restaurant management	Food handlers card, HACCP <sup>b</sup> training	7/7	100%
Computer systems tech	A+, Network+, Cisco CCNA <sup>c</sup>	0	--
Cosmetology	State license	0/13 <sup>d</sup>	--
Fire science/ Emergency medical technician (EMT)	NWCG <sup>e</sup> wildland and wildland-urban interface firefighting	2/2	100%
Nurse assistant (CNA)	State certification exam preparation	0/7	--
Welding tech	AWS <sup>f</sup>	0/3	--
Total certificates earned: 10			

<sup>a</sup>Inter-Industry Conference on Auto Collision Repair. <sup>b</sup>Hazard Analysis Critical Control Point system of safe food handling. <sup>c</sup>Cisco Certified Network Associate. <sup>d</sup>The number of hours of training required to take the licensing exam exceeded what the skills center program offered. <sup>e</sup>National Wildfire Coordinating Group. <sup>f</sup>American Welding Society.

However, the PHS auto mechanics teacher noted that there was too much content in the NATEF certification program for a high school to be able to present. As a result, he picked from the available units, and expected that students would get more training at the community college. The director of the regional skills center also reported encouraging

students to go on for further training, in order to improve their long-term prospects: “Because when you’re 22 or 23, the money that looked good when you were 18 is not as good anymore.”

At C-PHS, two CTE programs offered opportunities to earn IRC: auto mechanics and nurse assistant (see Table 5). Unfortunately, the data reported to us by C-PHS did not include the total number of seniors in these programs, making the program performance impossible to interpret. Like PHS, C-PHS also had a regional skills center in its area. It offered 15 CTE programs, 3 of which included preparation for an industry-recognized credential. However, no C-PHS students earned certification in any of the skills center programs. Table 5 shows the number and percent of C-PHS seniors in 2002 who earned IRC.

### **Industry-Recognized Credentials at the VHS Site**

The state where Vocational High School (VHS) and C-VHS are located has a traditionally-structured secondary education system with separate parallel vocational and academic streams. CTE programs are offered at vocational high schools, which are either part of a district or regional in nature. The vocational high schools in the state had been formally recording the number of students earning IRC prior to when we began the study.

Table 5. *Industry-Recognized Credentials Earned by Comparison-Pathways High School Seniors, 2002*

CTE Program	Type of Credential	Ratio of Seniors Earning Credential To Total Number of Seniors in Program	Percent of Seniors in Program Earning Credential
<b>At C-PHS</b>			
Automotive tech	NATEF <sup>a</sup>	0	--
Nurse assistant (CNA)	State certification exam	10	unknown
<b>At C-PRSC (regional skills center)</b>			
Automotive tech	NATEF	0/2	--
Cosmetology	State license	0/11 <sup>b</sup>	--
Nurse assistant (CNA)	State certification exam	0	--
Total certificates earned: 10			

<sup>a</sup>National Automotive Technicians Education Foundation. <sup>b</sup>The number of hours of training required to take the licensing exam exceeded what the skills center program offered.

Along the model of its academic curriculum frameworks and exams, the state began to develop CTE curriculum frameworks and assessments for each program. Students who passed the assessment in their CTE program area would receive a Certificate of Technical

Mastery (CTM), certifying a standard of achievement in that area. Where possible, the CTM assessment was to be aligned with nationally-recognized industry standards. The CTM requirements had not yet been implemented in any CTE program area at the time of the graduation of most of the students in our eldest cohort (i.e., 2002). However, many CTE programs had been offering the opportunity to earn credentials long before the state CTM process began.

### Student Participation and Perceived Value

VHS students choose their CTE program early in their freshman year, after exploring all of the programs. The class of 2002, most members of which were freshmen in 1998-99, chose from among 18 vocational programs, 3 of which offered opportunities to earn IRC. The number of students who earned such credentials is shown in Table 6.

Table 6. *Industry-Recognized Credentials Earned by Vocational High School Seniors, 2002*

CTE Program	Type of Credential	Ratio of Seniors Earning Credential To Total Number of Seniors in Program	Percent of Seniors in Program Earning Credential
Electrician	C-Tech network cabling specialist	7/7	100%
Cosmetology	State license	14/24	58%
Nurse assistant (CNA)	State certification exam	28/37	76%
Nurse assistant (HHA) <sup>a</sup>	State certification exam	31/37	84%
Total certificates earned: 80			

<sup>a</sup>Home Health Aide.

C-VHS, another vocational high school, had approximately 26 CTE programs in 1998-1999. Seven of these programs offered IRC. The number of students earning these credentials is shown in Table 7. The business and automotive programs did not provide information on the total number of seniors in these programs, making outcomes for those programs impossible to determine. However, the health programs provided more complete information. As with VHS, C-VHS had high percentages of students receiving state certification for nurse assistant and home health aide.

VHS and C-VHS are traditional vocational high schools that have historically received their district's non-college bound student populations and prepared them directly for work. As such, opportunities to earn IRC were better-developed at these schools than at the others. At VHS, we interviewed 25 students, 3 of whom mentioned IRC. These students seemed very aware of the role that these credentials could play in their work life. One cosmetology student, when asked what she planned to do after high school, replied:

VHS junior #1, female: When I get in twelfth grade, I'm going to take my state boards and then I'll get my license if I pass. You have to get your license. And then pretty much I can do whatever from there. But I want to have my own business so I've got to go to college and take business management courses for that.

Table 7. *Industry-Recognized Credentials Earned by Comparison-Vocational High School Seniors, 2002*

CTE Program	Type of Credential	Ratio of Seniors Earning Credential To Total Number of Seniors in Program	Percent of Seniors in Program Earning Credential
Business systems networking	Cisco CCNA <sup>a</sup>	0	--
Microsoft office user specialist (MOUS)	MOUS	0	--
Automotive tech	NATEF <sup>b</sup>	0	--
Power mechanics	OPEC <sup>c</sup>	0	--
Cosmetology	State license	6/19	32%
Dental assistant	Radiography	1/5	20%
Nurse assistant (CNA)	State certification exam	14/15	93%
Nurse assistant (HHA) <sup>d</sup>	State certification exam	10/15	67%
Total certificates earned: 31			

<sup>a</sup>Cisco Certified Network Associate. <sup>b</sup>National Automotive Technicians Education Foundation. <sup>c</sup>Outdoor Power Equipment Certification. <sup>d</sup>Home Health Aide.

A nursing student was asked the same question, leading to the following exchange:

VHS junior #2, female: By the time I finish high school I want to have my license but I would like-, there's a two-year program at the community college, so I'll probably keep studying.

Researcher: To become a registered nurse or something?

Junior #2: You can get your license here for registered nurse, in twelfth grade. And you can have a job while you're in twelfth grade. But if you want to keep going, you could go further and so probably after I get out of here, I'll go for another two-year program.

Many of the same issues that kept the other schools from increasing the number of students earning IRC were also a factor at VHS and C-VHS. For instance, although the automotive program and the instructors were NATEF certified, the exam for student certification was too costly for many students. We learned that the fee to take the state cosmetology license exam had increased, which discouraged students from taking it. Like other schools in the study, these vocational high schools were looking for grant money to offset certification exam fees.

Another factor limiting students' ability to earn IRC was the required reduction in vocational instructional time in order to focus on academic state test preparation. This situation became especially difficult at VHS after the school was declared "in crisis" by its department of education, due to a lack of improvement on state test scores. Given the new academic focus that the declaration required, students at VHS were in danger of not receiving enough vocational instructional time to qualify to take certification exams. While CTE teachers recognized the importance of meeting academic standards, they feared the loss of the school's mission:

Auto Mech Teacher: The NATEF says that they have to do so many of [the competencies]. But what's happening now is as they take away the time, that aperture kind of starts closing, if you will, because the opportunity, the time, isn't there.

Electrical Teacher: The part that changed is there's more emphasis on test preparation. We've lost about 45 to 50 percent of our shop time. It makes it much more difficult to get everything we have to accomplish when we're also teaching to the test.

A final consideration in the examination of VHS students earning IRC has to do with the local labor market in City V. The specific CTE programs offered at VHS changed along with changes in this labor market. School staff regularly reviewed regional planning board information to learn about job projections in the area. In 2003, the health care and computer industries had the largest projected job growth in City V. There was a high demand for clinical skills, and the VHS nursing program provided certified workers to fill the demand. In terms of auto mechanics, the high school auto teacher felt that students would be best off with more preparation:

Auto Mech Teacher: Yeah, there's a lot of work out there. I wish I could say that on the high school level, when they come out, they're ready, you know? I mean, they're ready for entry level is what they're ready for. They really need a little more training. Postsecondary.

Another CTE teacher agreed with the assessment that postsecondary credentials were important in the hiring process as well:

Drafting Teacher: One of the problems is that we have the community college right down the street, which, if someone's going to hire someone, they're going to hire someone that's 21 or 22 coming out of a technical community college as opposed to someone coming out of this high school.

The local economy in City V was not robust. This was perhaps the worst aspect of the employment situation for VHS students, regardless of the number of credentials they held. As one counselor put it, employers in this city simply were "not hiring."

## SUMMARY

The purpose of this article was a twofold examination of the use of industry-recognized credentials. We first described the state policy contexts with respect to IRC in the states where the participating high schools were located, and second, we explored the use and value of these credentials to stakeholders at these schools.

The findings from the policy examinations of the three states in this study reflect the importance of IRC as one element in the development of secondary CTE accountability systems. All three states encourage the use of such credentials as one possible measure of program success. The trend in all three states is toward further specificity of CTE standards, frameworks, or assessments, all of which could incorporate greater use of IRC. However, at this point, IRC are not a mandatory element of these states' CTE accountability systems.

At the high school level, the findings show that the more traditionally “vocational” the high school, the more likely its students were to earn IRC. For instance, at AHS, where the goal was to prepare students for four-year colleges and universities, credential opportunities were non-existent. At the other end of the spectrum, VHS, C-VHS, and the regional skills center for PHS (i.e., PRSC) each reported solid numbers of IRC earned by students in the class of 2002. The dichotomy of vocationally-oriented vs. academically-oriented high school had a greater influence on whether students earned these credentials than did the dichotomy of the larger study, which was CTE-based comprehensive reform high schools vs. high schools with no such reforms.

The value of IRC was not fully agreed upon by all stakeholders. At the local level, teachers and administrators interviewed were concerned about the costs of maintaining facilities and programs, and about the costs to students of taking such certification exams. Teachers and administrators recognized the value of these credentials as signals to employers that their students had the requisite skills for entry-level jobs, but many with whom we spoke also felt that further education remained valuable in the long term. Of the 77 high school students we interviewed, only 11 mentioned IRC when we asked about their current plans and preparation for a career. However, those students who were working towards any of these credentials were also quite knowledgeable about their next steps after high school and appeared to have a plan that included using an industry-recognized credential to signal their qualifications to employers.

## CONCLUSIONS AND RECOMMENDATIONS

Given the findings summarized above, we conclude that state departments of education need to examine the conditions under which opportunities to earn industry-recognized credentials are provided in the high schools in their state. There may be systematic differences between high schools that can and cannot provide these opportunities. These differences must be understood before including industry certification as a performance indicator for secondary CTE programs. For example, as the findings here show, schools that are more traditionally vocational tend to provide more opportunities to earn industry-recognized certification than high schools more oriented towards preparation for

baccalaureate and higher degrees. CTE programs in these latter high schools would be less likely to be able to meet accountability requirements that included a high percentage of CTE students earning industry-recognized credentials.

But as also shown in this study, even high schools that have historically been strongly vocational are having trouble maintaining the instructional time necessary for students to qualify to take the exams for industry certification. As all high schools come under increasing pressure to improve academic scores on state tests, time in the school day for other pursuits has diminished. This is likely to reduce the number of CTE programs that are able to provide opportunities to earn industry-recognized credentials, as resources and time are diverted to academic subject requirements.

Other systematic differences could arise between high schools that are more and less prepared to offer certification programs. It is possible that high schools in inner-city areas would be at a financial disadvantage in creating and maintaining CTE programs with the capacity to provide certification opportunities. Students in such schools would likely be unable to afford to take the exams. These hypotheses could not be tested with this study's design, because all participating high schools in this study were in high-poverty areas. However, more research on these and other systematic differences should be conducted before implementation of any policy using these credentials as a performance indicator.

We also concluded that as a group, the students at these high schools were not especially zealous about earning certification. It did not appear to us that such opportunities were a major factor in students' decisions as to whether and which CTE courses to take. Few students were aware of these opportunities, and fewer still were preparing for certification exams. Those students who were pursuing these certifications seemed quite sophisticated in their understanding of their career direction and how to achieve their goals. This suggests that CTE programs with certification opportunities can keep such students engaged in school. But these students were few and far between.

In reflecting on these conclusions, it must be remembered that direct questions about the use and value of industry-recognized credentials were not asked of all of the participants in this study. Therefore the responses elicited here are not necessarily representative of the entire sample of people interviewed. Although not consistently asked of all participants, the perspectives elicited here are important nonetheless, because we currently know so little about how industry-recognized credentials are used and regarded in high schools.

Indeed, the findings in this article are limited in their usefulness due to a drawback that stemmed from and reflects the paucity of our knowledge about participation in industry-recognized certification programs in high schools. In 2002, four of the six high schools in this study did not keep records of the numbers of students who earned certification. Meaningful data was difficult to collect. While this may raise questions about the exact results in this study, a more important implication arises: without good record keeping, using the number of students attempting and earning industry-recognized credentials as an indicator of CTE program quality would be misleading and irresponsible.

Given the scarcity of recorded, reliable information on industry-recognized credential programs in high school, this study should be regarded as an initial exploration into issues that arise upon doing research in this area. Little research attention has been paid to the use of industry certification in high school, its perceived value by teachers, administrators, and students, and whether it is a useful measure of high school CTE program quality. More research on these and other facets of certification at the high school level is needed. Recommendations for considering the use of these credentials for secondary CTE program quality purposes follow.

*Schools should improve record keeping.* High schools continue to incorporate industry-recognized standards into their CTE programs. The results from this analysis show that if schools, districts, or states wish to consider using industry-recognized credentials as a form of accountability, record keeping and reporting will have to improve. Collecting data for this analysis was difficult because records on such credentials were not systematically kept in 2002. Districts and states must begin to include industry-recognized credentials in their transcripts of student records. In addition to aiding in accountability reporting, recording the receipt of industry-recognized credentials could accomplish several important tasks. First, students who earn these certificates could be recognized at graduation, and their certification would be officially recorded for postsecondary or employer information. Second, recording the number of students earning such credentials would tout additional CTE program outcomes and could help advocate for the continuation of certain CTE programs at the high school level.

*States should conduct a pilot reporting requirement.* Before adopting industry-recognized credentials as an outcome measure for high school CTE programs, states should pilot a reporting requirement in order to gauge the ability of high schools to comply, and to examine the results. States could receive a baseline measure of the use of industry-recognized credentials in high schools and determine whether these credentials fairly measure CTE program quality, or if the budgetary, time, and other constraints make industry-recognized credentials an inadequate measure of secondary CTE program quality.

Until these recommendations are completed, we believe it is premature to use industry-recognized credentials as high school CTE program quality indicators. But we believe that opportunities to earn industry-recognized credentials in high school should not be abandoned. We believe that these opportunities are an important element of Hopkins' (1999) expanded view of career and technical education outlined above. Certification opportunities bring workplace-level skill instruction to high school, and those skills are assessed by measures external to the high school. In some cases, internships or other hands-on opportunities are part of the certification programs. As such, industry-recognized credential programs bring "real-world" standards and expectations into high school, and provide strong education for, about, and through work. What is needed, however, is to be able to account for the efforts and successes that are occurring in high schools that provide these opportunities to earn industry-recognized credentials.

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The work reported herein was supported under the National Research Center for Career and Technical Education Program, PR/Award No. VO51A990006 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.

We would like to thank the people in all of the participating schools for allowing us to learn from them over the years of the study. We also wish to extend our appreciation to the three anonymous reviewers for their careful attention to the work reported here, to Elizabeth Kemper for her indispensable feedback, and to Laura Overman for her untiring quest for correct and attractive displays of data.