THE ROLE OF NATIONAL INDUSTRY-BASED SKILL STANDARDS IN THE DEVELOPMENT, IMPLEMENTATION, AND ASSESSMENT OF COMMUNITY COLLEGE CURRICULUM

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ABSTRACT

Using a descriptive survey design, a nationally representative sample of community college career and technical deans were asked to complete a questionnaire that assessed awareness and implementation of industry-based skill standards. For those institutions implementing industry-based skill standards, the questionnaire sought additional information on assessment and credentialing practices. Data were collected across 10 CTE program areas including agriculture; construction/trade; automotive, commercial mechanic, and commercial driver's license; family and consumer sciences; graphic arts; health occupations; hospitality and hotel management; manufacturing; industrial; and business, administrative, and information technology.

INTRODUCTION

During the 1990s, the United States found itself experiencing changes in its industrial mix, technology, and educational legislation (Carter 2005). As a result, new models of delivering skills and credentials were adopted so that the nation's educational system could better prepare students for a globally competitive workforce. According to Carter (2005), ". . . one major change in the U.S. educational system was the increased reliance on, and prestige of, certification" (p. 51). Employers are increasingly hiring employees with certifications as many of today's occupations require workers with skill levels between a high school diploma and a bachelor's degree.

Industry-based skills standards are seen by many as the way to empower individuals entering or returning to the workforce, while positioning United States business and industry to regain a competitive edge in a changing marketplace. According to the former National Skill Standards Board (NSSB), skill standards identify what people need to know and be able to do to successfully perform work-related functions within an industry sector. Specifically, standards define the work to be performed, how well the work must

be done, and the level of knowledge and skill required. Skills standards, therefore, as used in this study, refer to worker performance specifications that have been developed or are being developed by business and industry-based organizations, educational organizations, individual states, or a combination of these.

Skills standards consist of two components: a) a description of the responsibilities needed for competent performance, and b) a description of knowledge and skills necessary to carry out these responsibilities (National Skill Standards Board, 2000). In educational settings, skill standards define a facet of student performance that is measurable and built on the skills learned as students' progress through the educational system and into the workplace (Rahn, O'Driscoll, & Hudecki, 1999). In industrial settings, skill standards help those involved prepare for changes in both work and the economy (Carnevale & Desrochers, 2001; Faulkner, 2002; Wills, 1995). Naquin and Wilson (2002) state that the process for establishing competency standards, assessing them, and certifying outcomes is a component of effective workforce development.

Skills standards function as a quality-warranty, a goal-indicator, and a change-promoter (Naquin & Wilson, 2002; Silvan, 1993). In the context of education, standards clarify expectations of student performance (Rahn, O'Driscoll, & Hudecki, 1999). According to Silvan (1993), the greatest implication of skills standards has been the evaluation of student performance. Advocates believe that skill standards have the potential to a) improve the United States workforce, b) provide uniform measures for the international marketplace, c) provide portability of employment for United States workers, d) increase accountability, and e) meet the needs of business and industry (Bunn & Stewart, 1998). Speculating on the potential for positive impacts of skills standards on public education, particularly CTE, Bunn and Stewart (1998) described six themes related to impact: a) improved communication between education and business and industry, b) improved relevancy of curriculum content, c) improved teaching and learning processes, d) enhanced connections between school and employment for graduates, e) better prepared entry-level workers, and f) improved accountability.

In this study we explored the relationship between industry-based skill standards and CTE community college curricula.

The Role of the Community College in Skill Standards Implementation

Career and technical education (CTE) (formerly known as vocational–technical education) has been a part of the mission of community colleges since their inception. According to Cohen and Brawer (2003) vocational–technical education has been a component of most states' legislation for community colleges from the earliest days. Vocational education in the community college was designed to teach more complicated skills than high school vocational classes—with the intention of "serving students by preparing them for employment and serving industries by supplying them with trained workers" (Cohen & Brawer, p. 233). Community college personnel work with employers to analyze local employment trends and design programs of study.

Carter (2000) reported that the technical complexity in the workplace will rise, which means that people who fill the jobs will be required to have specialized, current skills. Employers in the United States are no longer looking for applicants who simply have computer knowledge, but now seek individuals with specific skills for a specialized field of work. Degrees are becoming less important to many areas of work, with specialized skills coming to the forefront. Community colleges are challenged to examine their programs and determine if these programs are capable of providing this type of professional development. If not, the colleges must decide what is necessary for students to learn, and overhaul programs to deliver the required outcomes. Course development becomes critical and the time in which to do it is shortened.

With the increasing importance of national skills standards and student certification, institutions must focus on building a reputation for developing students for relevant jobs (Boesel, Rahn, & Diech, 1994). Current and future students would then be able to make educational choices based on the performance of an institution and the placement of its graduates. These placement rates, in turn, serve as clear indicators of successful CTE programs.

STATEMENT OF THE PROBLEM

The utilization of skill standards in curriculum development has become an increasingly prominent aspect of the CTE reform movement over the past 10 years. Standards are seen as a way to achieve better accountability within CTE systems, improving their quality as well as their alignment with workplace requirements. While standards are used increasingly in both secondary and postsecondary CTE programs, little research has been conducted regarding the extent to which standards are used by community colleges as a key component of curriculum development, delivery, and assessment (Aragon, Woo, & Marvel, 2004). If CTE policy makers, education leaders, and community college faculty are to make informed decisions about the best approaches to integrating skill standards into CTE programs, more information is needed about current practices.

PURPOSE AND RESEARCH QUESTIONS

The purpose of this study was to examine the extent to which various industry-based skills standards are integrated into CTE community college curricula. This study was guided by the following research questions:

1. To what extent have industry-based skill standards become part of community college CTE curricula?

2. To what extent are industry-based skill standards part of the assessment process in community college CTE?

3. To what extent do credentials, certificates, and diplomas issued by CTE community college programs reflect industry-based skill standards?

This research builds on previous National Center work in skill standards (Bailey, 1997; Bailey & Merritt, 1995; Hoachlander, 1999; Holmes & Rahn, 1998; Merritt, 1996; Rahn, O'Driscoll, & Hudecki, 1999; Stern, Bailey, & Merritt, 1996). Past studies have focused on the integration of academic and industry standards (Bailey; Bailey & Merritt; Hoachlander), setting standards in relation to accountability (Rahn, O'Driscoll, & Hudecki), developing CTE skill standards resources for CTE teachers (Holmes & Rahn), reporting findings from promising states that are setting skill standards (Rahn, O'Driscoll, & Hudecki), and sharing skill standards (National Dissemination Center for Career and Technical Education, 2001). This project develops a more descriptive picture of the approaches by which skill standards are implemented in community college CTE programs

METHOD

Design

This study utilized a descriptive survey design to analyze the status of industry-based skill standards implementation in postsecondary CTE programs. A nationally representative sample of community colleges deans was asked to answer questions addressing the prevalence of skill standards in postsecondary CTE.

Sample

The target population for this study was defined as postsecondary colleges and technical institutes that are members of the American Association of Community Colleges (AACC). These institutions are typically referred to as community colleges, technical institutes, or junior colleges. The population provided a national representation of institutions, and included all types, sizes, geographic locations, and settings (i.e., urban, suburban, or large town, rural). The population included all institutions that were classified as single-campus colleges, variations of multi-campus colleges (i.e., district offices, multi-college districts, institutional systems), and colleges that were on the campus of a university and had either a separate or shared accreditation with their host institution (labeled as "campus type"). After removing duplicate references in the database, the final target population contained 1,015 member institutions. The frame was cross-referenced with the membership directory of the National Council for Workforce Education (NCWE) to verify accuracy of contact information.

Cochran's (1977) sample size formula was used to determine the delivered sample size needed to make estimates on skill standards from the target population of 1,015 community institutions. To determine the delivered sample size needed, alpha was set at .05, acceptable margin of error was set at 5%, and variance was conservatively estimated at .25. The required delivered sample (n = 384) was then adjusted for exceeding 5% of the target population (Cochran). The desired delivered sample for the project was 285 after the adjustment. Adjusting for a projected response rate of just over 50%, the sample population included 552 community colleges. The number of institutions selected from

each state represented the overall total proportion of community colleges in each state within the United States.

Instrumentation

A thorough review of the literature on national industry-based skill standards implementation within CTE program areas was conducted. Additionally, community college CTE curricula were reviewed to establish specific skill standards for program areas. Based on these two inquiries, a list of 64 industry-based skill standards was created. These 64 standards cover 11 program areas, including: agriculture; automotive; construction/trade; commercial mechanic and commercial driver's license; family and consumer sciences; graphic arts; health occupations; hospitality and hotel management; manufacturing; industrial; and business, administrative, and information technology. A questionnaire was created and organized around each of the 11 CTE program areas and their applicable skill standards. However, due to the overlap in skill standards, the program areas of automotive, commercial mechanic, and commercial driver's license were collapsed into a single category resulting in 10 CTE program areas addressed by the survey.

Experts from universities and community colleges in the areas of measurement, skill standards, and survey research design reviewed the instrument for content validity and format. After the review, items were modified, changed, and deleted. A pilot test of the instrument was conducted with CTE administrators who were not part of the sampling frame. Feedback from the experts and the pilot test was used to revise items for the final instrument. Cronbach's alpha was used where appropriate to assess the internal consistency of the instrument.

For each of the 64 standards, nine questions were asked. The nine items on the questionnaire were built around the following five categories:

1. *Skill Standard Awareness (Item 1):* This item asked respondents if they were aware of the stated skill standard.

2. *Implementation of Skill Standard (Items 2, 3):* These items asked respondents if their respective institutions were implementing the stated skill standard or a similar state-level skill standard.

3. *Approaches to Implementation (Item 4):* This item solicited the ways the institution was implementing the stated skill standard. Respondents could select one or more of the following: a) developing curriculum, b) modifying instructional practices, c) marketing the program to business and industry, d) assessing program, e) assessing students, f) developing learning objectives, g) marketing program to students, h) selecting faculty, and i) other.

4. *Approaches to Assessment (Items 5, 6):* These items were developed to identify the methods the institution used to assess student achievement of the stated skill standard

and to identify if the assessments were developed by the skill standard organization. Respondents could select one or more of the following: a) traditional knowledge-based assessment (paper-and-pencil or computer-based), b) performance-based/authentic assessment, c) no student achievement assessment of the skill standard, and d) other.

5. *Certification/Credentialing (Items 7, 8, 9):* These items addressed certification/ credentialing activities associated with the stated skill standard. Item 7 asked respondents to identify any certificates/credentials awarded to students for achievement of the stated skill standard. Requirements for awarding certificates/credentials were then solicited through item 8. Participants could choose from the following list: a) completing a degree/diploma,(b) completing courses with passing a certification exam, c) completing courses without passing a certification exam, d) passing certification exam with no course requirements, and e) other. Item 9 focused specifically on any certification/credentialing exams used at the institution. Choices included the exam is a) a traditional knowledge-based assessment (paper-and-pencil or computer-based), b) performance-based/authentic assessment, c) developed by the skill standard agency, and d) administered by an outside agency.

Procedures

A four-round data collection process based on Dillman's (1978) Total Design Method was used to obtain responses to the questionnaire. Questionnaires were coded and logged into a computerized database to track responses. In round one (the initial mailing), a questionnaire was sent to the career and technical education deans of the 552 institutions in the sample. Round two involved a postcard mailing to CTE deans at those institutions that had not responded to the round-one solicitation. Round three involved a second mailing of the questionnaire to those individuals who had not responded to the first two solicitations. Round four utilized e-mail and phone calls for making final contacts with participants. The multiple rounds of data collection were designed to increase the response rate. They also allowed for a comparison of the responses from early and late respondents.

Of the 552 institutions surveyed, 204 returned surveys—resulting in a 37% response rate. The response rate on this survey compared favorably with a study conducted by AACC, which sent their questionnaire to chief academic officers at more than 1,100 community colleges, and 205 responded, for a 19% response rate (Nock & Shults, 2001).

To verify the representativeness of the respondents to the population, several statistical comparisons were performed. The demographic characteristics of the respondents who provided useable data were compared to the characteristics of the nonrespondents within the sample. Comparisons for geographic region, local setting, campus type, and institution size involved running crosstabs and calculating Pearson's chi-square. Except for "campus type," no statistically significant differences were found between the respondents and nonrespondents within the sample for these demographic comparisons. The comparison between the respondents and the target population also revealed no

statistically significant differences between these two groups on the demographic indicators. Additionally, no statistically significant differences were found between the nonrespondents within the sample and the target population on the demographic indicators. Finally, a comparison of the early and late respondents revealed no statistically significant differences between the demographic characteristics of the two groups except within "campus type."

Data Analysis

The status of national industry-based skill standards integration into community college CTE programs was assessed by measuring the characteristics of a nationally representative sample of community colleges at one point in time. Prespecified variables were used to describe prevalence, or frequencies, as well as the various ways in which industry-based skill standards influence the development of community college curricula. In accordance with the research questions, the examined variables reflect the extent to which industry-based skill standards have become integrated into the community college CTE curricula, assessment processes, and diplomas, credentials, and certificates.

Groupings were used to organize the data and to describe the differences in characteristics among the sampled colleges. Grouping included consolidation of the colleges by region, locale, and student enrollment figures (hereafter referred to as institution size). These are similar groups to those used by AACC for their analysis of community college data. Groupings by college region included three groups: a) East—composed of the New England, Mid-east, and South-east states; b) Midwest—composed of the Great Lakes and Plains states; c) West—composed of the South-west, Rocky Mountain, and Far-west states. Groupings by college locale also included three groups: a) Urban—composed of large cities (≥ 250,000) and midsize cities (< 250,000); b) Suburban and large town—composed of fringes of large cities, fringes of midsize cities, and large towns (≥ 25,000); c) Rural—composed of small towns (250–25,000) and rural areas (< 2,500). The following institution sizes were used: a) ≤ 1,000 students; (2) 1,001–3,000 students; b) 3,001–10,000 students; c) over 10,000 students.

The following parameters were established for reporting data associated with awareness, implementation, assessment, and certification/credentialing.

Parameter 1: Awareness. Awareness of skill standards was based on those institutions reporting offerings in a particular program area. For example, frequency distributions for awareness of manufacturing skill standards were calculated only for those institutions that reported offering manufacturing programs. This parameter was applied to the remaining 9 program areas.

It was recognized that respondents could have awareness of a particular set of skill standards even though the program was not currently offered at their institution. However, the parameter remained as stated above because the questionnaire was designed to direct respondents to the items associated with the next program area if the current program area under investigation was not offered at their institution. For example,

if the institution did not offer a manufacturing program, the questionnaire directed participants to move to the subsequent program area (industrial—non-manufacturing). These guidelines were applied to the remaining sections of the questionnaire by program area.

Parameter 2: Implementation/implementation purposes. Overall, implementation was based on those institutions that reported an awareness of skill standards (parameter 1) for a particular program area. This parameter assumed that institutions could not be implementing a set of standards for which organizational members had no awareness. The specific ways that an institution was implementing skill standards (purposes) were based on those institutions that reported the implementation of skill standards for a particular program area.

Parameter 3: Assessment. Frequency distributions associated with assessment of student achievement and the specific type of assessment methods used were based on those institutions reporting implementation of skill standards for a program area (parameter 2). This parameter assumed that institutions could not assess students on skill standards unless the standards were first being implemented.

Parameter 4: Certification/credentialing. Frequency distributions associated with certification and credentialing were based on those institutions reporting the assessment of student achievement (parameter 3). This parameter assumed that institutions could not offer certifications/credentials without assessment processes in place.

Item 9 asked specifically about the characteristics of any certification/credentialing exams used by the institution. Frequency distributions associated with this item were based on those institutions that reported use of an exam as part the certification/credentialing process.

RESULTS

Out of the 204 institutions responding to the survey, 153 (75.7%) reported the use of skill standards within postsecondary CTE curricula, while 49 (24.3%) indicated skill standards were not currently being used. Therefore, the frequency distributions for each program area, along with all other statistical analyses were calculated for those institutions reporting use of industry-based skill standards only ($n = 153$).

Institutional Participation in Use of Skill Standards

The percentage of institutions (based on $n = 153$) offering each of the 10 CTE program areas is as follows: business, administrative, and information technology (87%), health occupations (82%), automotive/mechanical (73%), construction/trade (67%), manufacturing (67%), family and consumer sciences/childcare (59%), graphic arts (50%), industrial (47%), hospitality/hotel management (46%), and agriculture (37%).

Awareness of Skill Standards. For those institutions that offered specific CTE programs, their representatives were requested to identify their level of awareness of the applicable skill standards. Respondents' awareness of applicable skill standards varied across the 10 program areas. For three of the program areas (manufacturing, construction/trade, health occupations), approximately 72% of the respondents indicated they were aware of the applicable skill standards. For automotive/ mechanical, approximately 80% of the respondents were aware of the applicable skill standards for this field, while only 30% were aware of the standards for the field of agriculture (30%). Out of the remaining five program areas, the percentage of respondents aware of the applicable skill standards ranged from 38% (graphic arts) to 62% (family and consumer sciences/childcare).

Implementation of Skill Standards. Respondents were then asked if the applicable industry skill standards or a similar state-level skill standards were being implemented by the community college. The data revealed that health occupations (99.2%) and automotive/mechanical (94.6%) were the two programs areas in which the largest number of institutions were implementing national skill standards or similar state-level standards. For trades/construction, 76.7% of the respondents indicated their institutions were implementing standards in this program area, with 64.9% of the institutions reporting implementation within the family and consumer science/childcare area. The data revealed that only 16% of the institutions were implementing standards associated with agriculture, while 19.8% reported implementation of graphic arts standards. For the remaining program areas, the number of institutions implementing applicable national- or state-level skill standards ranged from 33.3% (industrial) to 50.9% (manufacturing).

Approaches to Implementation

The survey was designed to solicit the various ways institutions were implementing skill standards into the various CTE curricula areas. Those respondents who stated through an earlier survey item that their institutions were implementing skill standards into a specific program area were offered eight approaches to implementation from which to select (see 'approaches to implementation' within "instrumentation"). Although the survey included 'other' as a category, it was not selected by any of the participants in the study. Respondents were guided to select as many approaches of implementation as applicable for a particular program area. While respondents reported the applicable skill standards were being implemented in all of the eight ways listed, particular skills were implemented more extensively by community colleges in comparison to other types of postsecondary CTE institutions.

Both automotive/mechanical and health occupations had the highest percentage of institutions implementing skill standards across the eight approaches. For those institutions that implement automotive/mechanical skill standards, approximately 73% of those institutions implemented them in all eight ways listed on the survey. Implementation for the purpose of developing curriculum was reported by 81.3% of the institutions, while 59.3% of the institutions used these same skill standards for selecting CTE faculty. Roughly 76% used these skill standards for assessing student performance. All of the above numbers look similar for the health occupations skill standards. For

those institutions that implement health occupations skill standards, approximately 74% of those institutions implemented them in all eight ways. Implementation for the purpose of developing curriculum was reported by 83.3% of the institutions, while 64.6% of the institutions used these same skill standards for selecting CTE faculty. The percentage of institutions using the standards for assessment purposes was 81%.

The program areas of graphic arts, agriculture, and business, administrative, and information technology had the lowest percentages of institutions implementing applicable skill standards across the eight ways. Less than one-fourth (23%) of the institutions implemented skill standards in all of the eight ways. Specifically, 31% of the institutions reported implementing skill standards for the purpose of curriculum development, and 13.8% of the institutions implemented them for the purpose of selecting new CTE faculty members. Twenty-four percent (24%) of the institutions reported using skill standards for student assessment. A similar pattern was found in the agriculture program area. On average, 26% of the institutions implemented agriculture skill standards for all eight purposes listed. Thirty-five percent (35.3%) of those institutions implemented agriculture skill standards for the purpose of curriculum development, while 17.6% used them for selecting faculty. The results of the data analysis revealed that 29.4% of the community colleges used these standards for the purpose of student assessment. Finally, for the program area of business, administrative, and information technology, an average of 30% of the institutions reported implementing the applicable skill standards across all eight ways. The percentage of institutions implementing the standards for the purpose of curriculum development was 39.5%, while the percentage of institutions implementing the standards for the purpose of selecting CTE faculty members was 19.7%. A total of 34.2% of the responding institutions used the business, administrative, and information technology skill standards for student assessment purposes.

Of the remaining five CTE program areas, the percentages of community colleges implementing the applicable standards in all of the eight ways were as follows: manufacturing, 35%; industrial, 32%; construction/trade, 51%; family and consumer sciences/childcare, 44%; and hospitality/hotel management, 42%. Across all 10 program areas, the largest percentage of community colleges was implementing standards for the purpose of curriculum development, while the smallest percentage of community colleges was implementing standards for the purpose of faculty selection.

Approaches to Assessment

Respondents who reported student assessment as a purpose for implementing applicable program skill standards were asked to respond to a follow-up question on the survey about specific types of methods used. Two options were provided: traditional knowledge-based, which involves paper-and-pencil, and/or computer-based methods or performance-based/authentic assessment methods. Although the survey included 'other' as a category, it was not selected by any of the participants in the study. Traditional knowledge-based methods were most frequently reported over performance-based/authentic methods by community colleges in the program areas of industrial (86% vs. 67%); family and

consumer science/childcare (80% vs. 65%); business, administrative, and information technology (77% vs. 67%); and hospitality/hotel management (90% vs. 70%). Many institutions reported equal use of each type of assessment method for all program areas offered. This included manufacturing (76%), trades/construction (84%), automotive/mechanical (89%), agriculture (86%), and health occupations (89%). The one program area for which community college respondents reported higher use of performance-based/authentic assessment over traditional knowledge-based assessment was graphic arts. For this program area, 83% of the community colleges reported using performance-based/authentic assessment, while 67% reported using traditional knowledge-based assessment.

Certification/Credentialing

For each of the 10 program areas, certificates/credentials were found to be part of the skill standards assessment process. Thirty-three percent (33%) of the institutions that had assessment activities within the graphic arts program awarded some type of certificate/credential. For health occupations programs, 83% of the institutions that had assessment activities awarded some type of certificate/credential.

Across all 10 program areas, community college respondents identified degree/diploma completion as the most common means for awarding certificates/credentials for program skill standards. While the majority of community colleges did not offer a certification exam without coursework, some colleges indicated this was an option. A limited percentage of community colleges offered this option for the program areas of trades/construction (5%), automotive/mechanical (6%), family and consumer science/childcare (6%), and health occupations (4%).

Coursework with a certification exam was the second most common option offered by community colleges in the program areas of graphic arts (40%), health occupations (54%), and hospitality/hotel management (40%). Coursework without a certification exam was the second most common option offered by community colleges in the program areas of manufacturing (38%), industrial (44%), automotive/mechanical (46%), agriculture (50%), family and consumer science/childcare (47%), and business, administrative, and information technology (46%). Community college respondents reported equal offering of coursework with and without a certification exam (48%).

Finally, for those institutions in which the respondents stated that their community colleges were using some form of certification/credential exam, the specific nature of the examination was solicited. In addition to the options of traditional knowledge-based and performance-based/authentic, respondents could choose from two other characteristics describing the examination process. These included “developed by skill standards agency” and “administered by outside agency.”

With the exception of graphic arts and agriculture, all of the respondents described the examination procedures at their respective community colleges as using all four options as presented on the survey. This means that many community colleges obtain their

certification/credentialing exams from a skill standards agency. These data also suggest that many community colleges rely on an outside agency to administer these certification/ credentialing exams.

DISCUSSION AND CONCLUSIONS

The purpose of this study was to identify the extent to which national industry-based skill standards were being implemented in community college CTE curricula in 10 program areas. It is important to keep in mind that while the survey was designed to focus primarily on national industry-based skill standards, respondents were also asked about similar state-level skill standards. Therefore it is possible that a respondent would be aware of a state-level standard, but not a national-level standard. With this in mind, the following conclusions were drawn from this study.

Awareness of National Industry-Based Skill Standards. The awareness level of national industry-based skill standards, without a doubt, varies across individuals in various CTE programs and community colleges. While respondents had some awareness of the applicable skill standards for a particular program area, this awareness varied. The program areas in which respondents reported the highest level of awareness correspond to those same fields that can have very rigorous credentialing and certification requirements for employment—including manufacturing, construction, automotive, and health occupations. Carter (2005) has found that the number of certifications for mechanics, repairers, technicians, machinists, welders, carpenters, electricians, and truck drivers rose by 48 percent. Given these rigorous credentialing and certification requirements, it is logical that individuals would be more keenly aware of the standards that impact these fields in order to keep program content and course work up to date. On the other hand, those areas in which awareness of national skill standards was lower, such as graphic arts and agriculture, are also areas of study that do not require rigorous credentialing and certification requirements in order to enter the job market. While this was not part of the study, it seems logical that a relationship exists between the level of national skill standards awareness on the part of each respondent and the level of credentialing and certification required in order to secure a job in a particular program area.

Implementation of Skill Standards. Colleges are implementing both national industry-based and similar state-level standards; however, more institutions implement the national standards (Aragon, Woo, & Marvel, 2004). It is apparent from the data that the level of implementation of skill standards varies across the 10 CTE program areas. However, as with the level of awareness, it does appear that the level of implementation of both national- and state-level skill standards has a direct relationship to the type of certification/credentialing requirements for a particular area of work and whether these certification/credentialing requirements must be met in order to enter the job market.

Those program areas in which the highest numbers of community colleges were implementing skill standards included construction (77%), automotive/mechanical (95%), and health occupations (99%). In fact, nearly all of the respondents who reported awareness of the applicable national- and state-level skill standards for these program

areas also indicated that their respective institutions were implementing them. As a whole, each of the jobs associated with these three program areas require certification and credentialing requirements be met prior to job entry. Therefore, offering strong CTE programs that have adequately prepared students to achieve certification/credentialing requirements is in each community college's best interest and fits into the mission of the institution (Cohen & Brawer, 2003).

It is important to keep in mind that these findings do not imply that other CTE program areas lack certification/credentialing requirements. However, these other program areas, as a whole, do not require that certification/credentialing requirements be met prior to entering the field. In addition, many of these other areas require certification/credentialing associated with tools and tasks unique to a specific organization; therefore, this certification/credentialing process would occur after an individual who has completed a program begins work.

Approaches to Implementation. Community colleges that are currently implementing national industry-based skills standards are doing so for all eight purposes listed on the survey. The majority of community colleges are implementing standards for the purpose of developing curriculum. The purpose least selected for implementing skill standards is that of selecting CTE faculty members. From the distribution of the data in each of the 10 program areas, it is clear that those community colleges that implement skill standards allow them to influence many areas of the instructional process, including curriculum development and student assessment. In addition, skill standards implementation is playing a role in terms of marketing the program to both business/industry and students.

Approaches to Assessment. As noted in the previous section, many respondents report that their respective community colleges are assessing students' achievement of skill standards. The distribution of program areas in which student assessment occurs is split about equally between the use of traditional knowledge-based assessments such as paper-and-pencil or computer-based tools, and performance-based/authentic assessments. Because this section of the survey focused on assessment methods other than those linked directly to certification/credentialing, it is not clear from these survey data what factors cause a program area to utilize one method of assessment over the other. It is logical to conclude that this evaluation selection process is based on the ease of design and implementation, and resources available for assessment purposes. However, more in-depth study is required to confirm this hypothesis.

Certification/Credentialing. All respondents who reported assessment activities at their community colleges also indicated that some type of certification/credential was offered. Again, the frequency with which certifications/credentials were offered by the colleges in the sample varied across CTE program areas. With the exception of agriculture, the percentages of colleges offering some form of certification/credential ranged from 53% in manufacturing to 83% in health occupations, with the remaining programs showing, on average, 70% of the colleges offering certificates/credentials in at least one CTE area. While the reasons are not clear for variations in the percentage of certifications/credentials offered across program areas, as discussed in previous sections,

those variations may be related to entry-level job requirements associated with a particular area of work. Additionally, the variations are likely influenced by the employer demand for employees with advanced training and certification (Carter, 2005).

The main method of certification/credentialing is through the awarding of a degree or diploma offered through community colleges. This is not an unexpected finding, as this method is the main means by which community colleges currently certify/credential their students. It is logical that a community college would build in CTE certification into its existing certification/credentialing process. However, it is also important to keep in mind that course work both with and without a certification exam are common methods for certifying/ credentialing students. Because community colleges do report that they certify/credential with course work alone (no exam involved), questions for future investigation would include "What means of assessment are involved with this model?" and "How is/are standardization of knowledge, skills, and abilities ensured in a particular program area?" The fact that a limited number of community college CTE programs offer certification exams without course work suggests that the community college may be serving as a testing center for administering exams.

Finally, the results of the study support the conclusion that certification/credentialing exams take on different characteristics across CTE program areas. These exams take on both traditional knowledge-based and performance-based/authentic formats. With the exception of graphic arts and agriculture, colleges are using exams developed by skill standards agencies, as well as using outside agencies, to administer the exams.

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