Opportunities for Industry Skill Credentials at Iowa Community Colleges

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Abstract

Industry skill certifications are becoming increasingly important to employers and students while garnering significant political attention. These credentials differ from traditional credentials such as degrees and diplomas because they require the passage of a professional, industry, occupation, or vendor examination tied to fixed standards. In the fall of 2005, a survey was conducted to gather baseline information about the skill credentials community college students receive. Among the data collected was information about what programs are aligned with the certifications, who issues the credentials, whether aligned instructional programs are certified or accredited by that entity, whether the entity has credential requirements for the instructors, whether the test is voluntary, whether students take the exam while enrolled or after graduation, and exam pass rates.

A diverse array of certifications were reported by the colleges with examples found in a variety of areas such as computer networking, mortuary science, pesticide application, nursing, culinary arts, accounting, pipe welding, automotive and much more. The credentials are offered by a plethora of providers including professional organizations, industry associations, commercial vendors, and state agencies. The alignment of programs with certifications varies between colleges and between programs within each college. Even in areas such as automotive technology, where industry standards and certifications are well established, there is variation in the utilization of industry credentials. Overall, the health services and information technology services career clusters have the most certifications available to students. For the most part, students pay for the certification exams rather than colleges, vendors, or other entities. Most of the exams are not offered as a part of the curriculum, but are taken by students within a year of completing their program of study. The entities issuing certifications often accredit or certify the programs and set requirements for instructors. While the results of health cluster certification exams are almost universally submitted to colleges, less than a quarter of non-health certifications have even basic pass rate information reported to the colleges.

Introduction

In the new, knowledge-driven economy, workers seeking jobs need more than a high school diploma. While many get two or four-year college degrees, increasingly workers are also acquiring one or more certifications that reassure employers they have specific skills. These credentials are earned from a diverse array of providers including professional, industry, and trade associations, commercial vendors, state governments and others.[1]

The term credential essentially refers to a wide variety of qualifications for work including degrees, certificates, certifications, and even work experience. Most educators are familiar with traditional education credentials such as the diplomas and degrees their institutions issue which document formal education.[2] These credentials signify the acquisition of general skills and require the completion of a prescribed course of instruction. Certification, however, requires the passage of an exam tied to fixed, often national, standards.[3] This comprehensive testing ensures that students are competent in discrete limited areas.[4] The exams are occupationally-focused and tied to benchmarks set by an industry organization. The validation of the acquisition of skills by students provides employers with an assurance that students are ready to enter and successfully perform in the workforce.[5]

Definitions:
Credentials – A broad array of qualifications for work including degrees, certificates, diplomas, certifications, and work experience.
Certifications – Credentials that require the passage of an exam benchmarked to predetermined occupational or professional standards (a subset of credentials).
Licenses – Certifications that are required for a person to legally work in a given occupation (a subset of certifications). Licensure is mandatory (for individuals to engage in a specified set of activities) while certification is voluntary.[6]

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[1] Carnevale, Anthony P. and Desrochers, Donna M. "The Credentialing Crunch" *Community College Journal* Apr/May 2001. P.32-39 Available online at: http://www.aacc.nche.edu/Content/ContentGroups/CC_Journal/April_May_2001/p32-39.pdf
[2] Ibid.
[3] National Governor's Association. "Getting it Done: Ten Steps to a State Action Agenda A Guidebook of Promising State and Local Practices." Available online at: http://www.nga.org/portal/site/nga/menuitem.9123e83a1f6786440ddcbeeb501010a0/?vgnextoid=0517a32889da2010VgnVCM1000001a01010aRCRD
[4] Brown, Bettina. "Vocational Certificates and College Degrees." *ERIC Digest No. 212*. 1999. Available online at: http://www.ericdigests.org/2000-2/degrees.htm
[5] Mahlman, Robert A.; Austin, James T.; Jeong, Steven. "Industry-Based Certification: Policy Implications for Career-Technical Educators." Ohio State University. July 29, 2002. Available online at: http://www.cete.org/wpapers/pdfdocs/IndustryCertificationPOLICY.pdf
[6] Our definition of certification excludes registration since that does not involve an exam but includes the subset of certification known as licensure. Distinctions between licensure and certification more generally are not always clear since some certifications that are required for an individual to work in a given occupation carry the title "certification" rather than "license" (e.g. Radiological Technologist). Sometimes students need not complete any schooling prior to seeking certification exams (many IT certifications are examples) though others do (e.g. nursing licensure requires education, experience, and the passage of an exam based on established standards).

Examples of certifications

Certification	*Issuing Entity*	*Type of Organization*
Cisco Certified Network Associate	Cisco Systems	Vendor
CompTIA A+ Certification	CompTIA (Computing Technology Industry Association)	Vendor-neutral Industry Organization
American Welding Society Certified Welder	American Welding Society	Professional Association
Registered Nurse licensure	Iowa Board of Nursing	Government

Overview

The need for certified skills is driven by globalization and the demands of the "new" economy. As product and labor markets are geographically extended from local to national and international markets, uniform industry skill standards become increasingly necessary. The primary purpose of certifications is to indicate a level of proficiency in a given occupational area. The main beneficiaries of this information are employers since the certifications indicate that prospective employees have the necessary knowledge to perform given tasks. Occupational certifications enable employers to accurately and reliably determine the knowledge and skill proficiency levels of applicants as well as incumbent workers. They often exempt employers from providing a significant amount of specialized entry-level job training and ensure that employees have a knowledge base that allows them to adapt to changing conditions on the job, further reducing informal and formal training costs.[7] For this reason, a well-credentialed workforce is a powerful economic development tool as businesses and industries seek to locate where costs are lowest and workers are already trained and possess standardized and demanded skills.[8]

For licensure (and statutory certification), a subset of certifications, the impetus is a bit different than for voluntary certifications. Licenses are designed to protect consumers and provide them with information (rather than solely provide employers with information). Through government regulation, consumers are provided with confidence that workers in an occupation meet an acceptable standard of knowledge. State licenses differ from professional and industry certifications because nongovernmental

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While the terms certificate and certification are similar, certifications require the passage of a criterion-referenced assessment, while certificates (a non-degreed credential) usually only require the satisfactory completion of a prescribed course of instruction (though both acknowledge learning).
Certification differs from program accreditation. Program accreditation involves the recognition and approval of programs of study. Certification, on the other hand, applies to individuals and attests to their specific occupational knowledge.
Spill, Rick. "An Introduction to the Use of Skill Standards and Certifications in WIA Programs, 2002." National Skill Standards Board. 2002. Available online at: http://www.eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/0d/ee/b6.pdf

[7] Carnevale, Anthony P. and Desrochers, Donna M. "Help Wanted . . . Credentials Required: Community Colleges in the Knowledge Economy." American Association of Community Colleges. 2001. Available online at: http://www.ccsso.org/content/PDFs/Help%20Wanted%20-%20Credentials%20Required%20-%20Commy%20Colleges.pdf

[8] Spill.

certifications are voluntary, except where the state requires them prior to granting a license (or statutory certification).[9]

For students, certifications are attractive because they are portable and demonstrate that the student has met fixed regional or national standards (rather than local standards) demanded throughout those areas. With standardized skills and jobs, people can move from one part of the country to another without needing significant retraining. As relationships between employers and employees become less stable and the pace of change accelerates, the validation of skill attainment and the portability of credentials become increasingly important.

Additionally, workers with certifications are generally highly desired by employers, at least in the short run, because of the focus on skills needed by industry (verified by a third party).[10] Increasing numbers of employers are turning to certifications as a means of ensuring that prospective employees have the requisite skills for given occupational specialties. The promise of a better job with increased earnings has led many to seek certifications.[11]

Colleges also often find certifications attractive since, in addition to being immensely popular among potential students, they can provide faculty and administrators with the opportunity to evaluate program successes and make outcomes at least partially known to students and employers.[12] Often, community colleges and other educational institutions align their programs with these certifications.[13] By aligning programs with certifications, a public perception of institutional quality can be created as education and training become more consistent within the state and nationally.[14] Students will then be more likely to acquire a similar set of qualifications to those completing other programs aligned with the same certification. National industry skill credentials may supplement the awards granted for completion of programs.

Additionally, certification usually entails continuing education requirements providing colleges with enhanced noncredit enrollment.[15] Lifelong learning is now a key component of the knowledge economy. Technology demands continual upgrading of skills, not only in IT occupations but also in technology-enabled jobs in factories, offices, and hospitals. As knowledge fuels economic growth, the pressure to increase human capital grows inexorably. Workers now seek "blocks" of skills at different times throughout their careers and want evidence of their skills when changing jobs. Non-

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[9] Ibid.

[10] Cantour, Jeffrey A. "Skill Certifications and Workforce Development: Partnering with Industry and Ourselves." *Leadership Abstracts*. January 2002. Available online at: http://www.league.org/publication/abstracts/leadership/labs0102.html

[11] It should be noted, however, that earnings returns from professional, industry, and vendor certifications are difficult to quantify, especially over the long term (Carnevale and Desrouchers) and comparisons with traditional credentials is not possible.

[12] Flynn, William J. "More than a Matter of Degree – Credentialing, Certification, and Community Colleges." National Council for Continuing Education and Training. 2002. Available online at: www.nccet.org

[13] Wonacott, Michael E. "Credentials: One Size Fits All?" *The Highlight Zone: Research @ Work*. 2000 (No.2) NCCTE Available online at: http://www.nccte.org/publications/infosynthesis/highlightzone/highlight02/index.asp

[14] Flynn.

[15] Cantour.

degreed credential and certification programs provide these smaller blocks. Certifications are a credential students can receive without taking any credit courses or completing any college program in its entirety.[16] Often organizations issuing certifications require continuing education for workers to maintain their certification (and sometimes recertification as well) since keeping workers skills up-to-date is essential for competitiveness in the new economy.[17]

However, while certifications can yield immense benefits, they are not a panacea. Standardized skills may not be those most needed by local industry. Community colleges must carefully balance the needs of local industry with regional, national, and global skill requirements. Aligning curricula to national skills by preparing students for certification exams may provide students and employers with an important benchmark of skill attainment. However, if a specialized local industry needs workers to have specific skills not included in national standards, community colleges may need to adapt to meet the need.[18] Since in the global economy, companies locate in industry clusters to maximize efficiency, community colleges have powerful incentives to customize occupational curricula to local industry clusters.[19]

The skill standards that certification programs reference can also be problematic since they can be specific or general depending on whether an occupation is defined narrowly or broadly. This sometimes leads to disagreement amongst stakeholders (e.g. disagreements between related industries or between businesses and workers). Further complicating matters, a GAO report stated that often all stakeholders (e.g. employers, educators, workers) are not involved in developing certification systems (probably because they are created by a diverse group of usually nongovernmental entities).[20]

Additionally, students and employers alike may find traditional credentials (college awards such as degree, certificates and diplomas) superior because of their broader perspective than narrow skill certifications. Increasingly, community colleges are seeking ways to link their traditional credentials to baccalaureate degree programs and continued or advanced education. In addition to job-specific and technology-specific skills, workers need more general problem-solving, communication, and interpersonal skills (soft skills) to be successful in the knowledge economy. New work processes increasingly require greater cognitive skills traditionally represented by general academic credentials. Many educators further contend that the general education learned in traditional credential programs meets cultural and political needs ignored by occupation-specific training leading to certification. While this is certainly the case, students need not always decide between seeking certifications or traditional credentials; instead they

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[16] Carnevale and Desrouchers.
[17] Carnevale and Desrouchers.
[18] Carter, Patricia. "Toward New Models for Certification and Credentialing in Community Colleges." Discussion Paper presented by the National Council for Occupational Education and the National Council for Continuing Education and Training. 2000. Available online at: http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED451868
[19] Carnevale and Desrouchers.
[20] "Skill Standards: Experience in Certification Systems Shows Industry Involvement to be Key." General Accounting Office. May 1993. Available online at: http://www.eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80124/2014c.pdf

can and often do seek both.[21] Increasingly, employers look for a combination of applied skills (often represented by certifications) and general cognitive skills (represented by degrees).[22]

The current performance-based certification system is a labyrinth because of the incredibly large number of issuing entities nationally (most estimates are over 1,600). These certifications vary significantly in the extent to which they are recognized by industries and educational institutions. While licensures are widely accepted by necessity, some others have gained little traction or have only gained recognition in specific areas. Since almost any organization can issue certifications, the level of quality of these certifications is only as great as the extent to which industry accepts them. There is no comprehensive quality assurance system as there is with college degrees.[23] Some certifications in a given field require greater levels of proficiency than others in the same field. Usually, certification programs succeed in labor markets by the extent to which they assure employers that certified workers have mastered specific skills.

The National Skill Standards Board (NSSB) was created in 1994 in an effort to resolve many of these issues. The organization was to create a comprehensive system of voluntary national skill standards, assessments, and certifications with the active participation of relevant stakeholders. It was to serve as an arbiter of quality, ensuring that standards, assessments and certifications were benchmarked to high performance levels and administered in a fair and equitable way. However, after making some progress, NSSB was de-funded in 2003 leaving states, educational institutions, and industries to grapple with the morass of issues on their own.

Methods and issues

While students completing many community college programs receive degrees, certificates and diplomas, often they are also obtaining skill certifications as well. The extent to which students receive these credentials is unknown, however. Many of the certification functions, and indeed many certification areas, occur outside postsecondary institutions and consequently the U.S. Department of Education does not collect data about them. The certifications conferred by a plethora of industry, trade, vendor, and professional organizations are not included in federal data because their primary mission is not education and training. These organizations simply maintain education requirements and/or offer assessments of skills and confer non-degreed credentials. While these groups are not a part of the traditional education sector, collectively, they form a significant and rapidly growing portion of the credentialing market.[24] This paper

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[21] Bartlett, Kenneth R. "The Signaling Power of Occupational Certification in the Automobile Service and Information Technology Inustries." National Dissemination Center for Career and Technical Eduation. 2004. Available online at: http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED483201

[22] Ibid. Certificates and other non-certification credentials can also represent applied skill attainment.

[23] Kerka, Sandra. "Career Certificates: High Quality and Cutting Edge?" ERIC Trends and Issues Alert No. 16. Available online at: http://www.otan.us/teasers/voced/voceddoc34.html.

[24] GAO report, Carnevale and Desrochers.
Additionally, although industry representatives, educators, and policymakers often argue that standards and certification systems are beneficial, little empirical data exists to determine their true value to workers and employers.

attempts to provide baseline information about what certifications are available to students at each community college in Iowa and in each career cluster (for the 2004-2005 academic year).

To gather this information, a survey was created and sent to each community college career and technical education dean. The survey asked for a list of certifications and then asked the following about each entry: What entity issues the certification and what is its website?[25] Is a program (or combination of courses) aligned with the certification (if so, what is the program and what is its CIP number)? Is the program itself accredited or certified by the issuing entity? Are there any credential requirements for the instructors required by the issuing entity (if so, what are they)? Do students take the certification exam while enrolled? If students do take the test while enrolled, is it voluntary? If they don't take it while enrolled, do they within a year of graduation? Who pays for the exam? Is the certification exam taken as a part of the curriculum or do students take it on their own? Does the college receive any information about whether students pass the exam (if so, how many students took/passed the exam)?

Once the survey was completed, a number of issues immediately arose. First, some of the data sets returned to the Department of Education were incomplete or the data was reported improperly or inconsistently. For example, one college initially reported only health certifications while another did not report any health certifications (both of these data sets were very incomplete). For some certifications reported, none of the survey questions were answered. Secondly, some certifications were reported as a group rather than each being listed individually. For example, ASE certifications were sometimes reported as a single entry rather than a complete list of certifications. Thirdly, the names of certifications were reported differently by each college making comparisons between the schools challenging. Finally, some colleges reported only certifications offered to students in career and technical programs excluding those received by students enrolled in noncredit programs.[26]

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[25] The survey asked for the issuing entity's website so further information could be gathered.

[26] There were also numerous typographical errors.

Some of the data submitted was entirely incorrect (e.g. the American Dental Association accredits dental assisting programs but does not issue dental assisting credentials to students; the Dental Assisting National Board issues these certifications).

Some colleges may have mistakenly reported program certifications in addition to certifications students receive and some many have reported industry-offered courses/training that do not involve criterion-referenced exams.

Reporting of noncredit certifications appears to have greater gaps than credit career and technical programs since the career and technical deans were not explicitly asked to report this information until the revision process began.

Some data sets listed the issuing entity in place of the certification's title. For some certifications, there is confusion about whether, for a group of exams, each exam is a certification (of a particular set of skills) or whether the passage of all of the exams leads to a certification (e.g. Cisco Certified Network Associate was reported by colleges a variety of ways).

In situations where both certifications and state-issued licenses were offered or when the entity creating/issuing the test is not the same as the entity issuing the license, often the certification was incorrectly reported (e.g. NCLEX exams and state nursing licensure).

Questions arose about who issues the "certified nurses' aide (CNA)" credential. It was noted that community colleges handle testing and issue the certification following rules set by the Iowa Department of

The career and technical education deans were given several opportunities to review and revise the data that was submitted. Most chose to do so (though a few did not), dramatically improving the data sets. However, many of the issues remain significant including gaps in the data (e.g. one college did not report its information technology certifications) and improper reporting of certification titles (e.g. some colleges reported the Cisco Certified Network Associate certification while others reported CCNA 1-4). This is not intended to be a criticism of CTE deans and others who worked on gathering the data however, since the survey itself was quite demanding. With 15 questions for each certification and colleges reporting 40-50 certifications, each college was asked about 600 sometimes challenging questions. Some individuals put forth a great deal of effort in compiling complete sets of data (gathering data from faculty and making revisions).

It is also important to note some limitations of the data given the questions included in the survey. First, there is no reporting of the percentage of program completers that take the certification exam. Some may have reported a given certification even though very few students seek it, while in other programs most or all students might take the exam. For example, both Northwest Iowa Community College (NCC) and Kirkwood Community College report that students receive ASE certifications. However, few NCC automotive service technology students seek and receive ASE certification while most automotive service technology students at Kirkwood get certified. This survey does not take into account the proportion of students in given programs that seek or receive certification.

Second, a certification may be offered at one campus within a community college's area but not at all areas. For example, a certification might be offered to students in a given program at Clinton Community College but not Scott Community College. As far as this survey is concerned, this scenario would result in the certification being reported in the data under Eastern Iowa Community College in the appropriate career cluster.

Discussion

The results of the survey indicate how cloudy this issue is to many community college faculty and deans. In one instance, a biology/biotechnology instructor uses an American Chemical Society credential exam as a tool for student evaluation but was unaware of its use as a tool for industry certification. Many community college career and technical deans and faculty appear to have been unaware of some of the certifications their students receive let alone what was available to students at other colleges in the state and beyond. Since such a wide range of entities offer certifications through sometimes complex and unique arrangements, getting a clear sense of these activities can be difficult (making it challenging to gather even basic information). For example, National Institute of Automotive Service Excellence (ASE) certifications are among the best-known

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Inspections and Appeals. Because the credential requires the passage of an exam involving standards set by an outside entity, it was included in this report.

Sometimes the certifications will show up in two different career clusters since different programs were aligned with the credential (e.g. students in both secretarial programs and information technology programs might get Microsoft Office Specialist certified.

industry skill credential. However, even these were sometimes reported incorrectly. Several colleges reported ASE certifications as being issued by the National Automotive Technicians Education Foundation (NATEF) even though NATEF was created by the automotive industry to recommend to ASE whether or not to accredit ASE training programs while ASE itself issues the certifications to individuals. Consequently, the reporting for the question about whether the issuing entity certifies the program itself was plagued with errors. Such complex arrangements are not uncommon. For instance, the National Council of State Boards of Nursing offers and maintains the NCLEX-RN and NCLEX-PN exams that the Iowa Board of Nursing requires to be passed before nurses can receive licenses. There may even be instances where several industry certifications are a prerequisite for licensure (e.g. boiler inspector licensure) or another certification.

However, despite difficulties in determining who issued what credentials, a wide range of certifications were reported (available through both credit and noncredit programs). Many were reported in the information technology and health areas, which is not surprising given national trends in these areas. Most of the credentials in the health services career cluster tend to be licenses that force students to seek certification. Information technology, on the other hand, is a rapidly and constantly changing industry. While certification is voluntary, this industry has been a leader in vendor/industry skill certifications. Every community college responding to the survey has certifications in these two career clusters.

While health services and information technology services have the most skill credentials available to community college students, certifications are also offered in most other career clusters. The array of certifications reported was very diverse – examples can be found in the areas of culinary arts, mortuary science, crime scene investigation, CFC handling, pesticide application, accounting, and pipe welding among others. However, not every college has students obtaining certifications in each career cluster.

For college programs that are aligned with certifications, the results of the exams can be valuable to faculty, helping them learn which areas the students are proficient and where they are not so adjustments can be made and overall proficiency (and certification rates) can be improved. However, a surprisingly high percentage of non-health programs do not receive this information. Of the certifications reported in non-health clusters, less than a quarter were indicated to have pass rate information submitted to the college (~59% were reported to have no pass rate information submitted to the college, and ~17% percent were unclear). Even when pass rate information is available, it is not clear if detailed results are returned to the colleges. It appears that sometimes the colleges only receive information about the percentage of students who passed the exams. Detailed results provide college faculty with not only data about the number who took and passed the exam but also information about the areas in which students were deficient.

Since the exams are created and offered by third parties, they are usually not free of charge. The vast majority of certification exam fees appear to be paid for by the students who take them. Only a small percentage of tests are subsidized by the colleges and an even smaller percentage by other entities such as vendors. Of the exams that were paid for by colleges, testing was usually a part of the curriculum and took place while students were still enrolled (rather than after graduating or completing the program). However, even when the exams are part of the curriculum, students usually pay. It is not

clear though whether the fees for certification exams taken as a part of a program's curriculum are included in tuition and fees or whether the cost is assessed separately by the issuing entity since either way the student is paying. This question may be more than academic, however, for financial aid reasons.

Usually, students appear to not be taking certification exams while enrolled. Of those certifications with responses to this question in the survey, less than half involved students taking exams while enrolled. Of the "no" responses (to the question about whether the exam is taken while students are enrolled), most, if not all, indicated that the exams were taken within a year of students completing their program or course. However, it is unclear how many students actually do take the exams after graduation since colleges do not always receive data on this. A very high percentage (~80%) of the certification exams are taken by students on their own rather than as a part of a program's curriculum.[27] Of the remaining fifth of certification exams offered as a part of the curriculum, most were taken by students while enrolled, though not all (it is not clear why this is the case).[28] For the small portion of exams taken as a part of the curriculum, most were offered on a voluntary basis.

The entities issuing certifications are often accrediting or certifying the programs aligned with individuals' certifications. Roughly half of the programs aligned with certifications appear to be accredited or certified by the organization issuing certifications to individual students. However, this data may be somewhat corrupted by confusion about who actually accredits the program. For example, ASE certifies students while NATEF recommends program accreditation to ASE. In this area, some reported that ASE did not accredit or certify the programs aligned with their certification while others reported it did (while still others did not respond to the question).

The organizations issuing certifications also often require that instructors meet certain criteria before they can prepare students for certification. Usually, instructors must have at least the level of certification they are preparing students to obtain, however, sometimes (especially in the health field) requirements for instructors are much more stringent. For a small percentage of certifications, instructors had to take a special course (training) or test. There was not a direct correlation between issuing entities accrediting programs and issuing entities requiring that instructors meet certain requirements.

There is much variation in the use of industry skill credentials at the community college level. Even in areas such as automotive technology (where certifications are well-established), there is variation in use. For example, most colleges prepare students for ASE certification, though some do not.

Conclusions

Because the data is incomplete, not completely standardized, and there may be errors in reporting, it is difficult to draw comprehensive conclusions about the

[27] For "no" responses to the question of whether students take the exam while enrolled, it was assumed that the test was voluntary and no response to the question that followed was required. However, many responded to the question anyway and a surprising number had indicated the tests were "mandatory" rather than voluntary. The primary reason for this appears to be because licenses require a person to pass an exam before they can work in the related profession. Therefore, while the test is voluntary, individuals do not really have a choice whether or not to take the exam.

[28] These figures do not include "unknown" or "unavailable" responses.

certifications community college students receive in Iowa. However, that being said, it seems clear their use is widespread in a variety of career clusters. A diverse array of certifications were reported by the colleges with examples found in a variety of areas such as computer networking, mortuary science, pesticide application, nursing, culinary arts, accounting, pipe welding, automotive and much more. The data also sheds other interesting insights such as the lack of exam performance data received by colleges which would hamper the improvement of programs aligned with those exams (the notable exception being in the area of health) and the fact that students usually must pay for the exams (creating equity issues). The credentials are offered by a plethora of providers including professional organizations, industry associations, commercial vendors, and state agencies. The alignment of programs with certifications varies between colleges and between programs within each college. Even in areas such as automotive technology, where industry standards and certifications are well established, there is variation in the utilization of industry credentials. Overall, the health services and information technology services career clusters have the most certifications available to students. For the most part, students pay for the certification exams rather than colleges, vendors, or other entities. Most of the exams are not offered as a part of the curriculum, but are taken by students within a year of completing their program of study. The entities issuing certifications often accredit or certify the programs and set requirements for instructors. While the results of health cluster certification exams are almost universally submitted to colleges, less than a quarter of non-health certifications have even basic pass rate information reported to the colleges.

Implications for Future Study

If data is to be collected on industry skill credentials in the future, it may be valuable to create a manual of sorts defining each term and explaining exactly what information is desired and how to fill out each field. The survey questions should be revised somewhat, first to clarify exactly what information is needed (and explaining the complex nature of industry credentialing) and second to add new questions to gather other relevant information (while possibly removing less interesting questions). A new question should be added -- "What percentage of program completing students take/pass the certification exam?" In the current results, students at two different colleges may get the same certifications, however at one college the percentage of students who get certified may be small while the percentage at another college may be large.

Other Considerations

We must be careful not to consider certification rates as a performance measure since so many certification-issuing entities exist. For example, there appears to be several air conditioning service technician certifications. It would not be desirable for colleges to always encourage students to take the easiest certification exams in a given area when more rigorous exams with higher standards (and better industry acceptance) may be available. Additionally, not all certifications received by students are central to their occupation (e.g. first aid or CPR certification for factory workers). Because the goals of higher education are so numerous and ambiguous (e.g. improve citizens' intellect, prepare students for jobs), any performance measure focused solely on

employment outcomes while excluding educational outcomes is not likely to be a completely accurate gauge of success.[29] Further, local industry needs may vary and necessitate deviation from skill standards.

As the knowledge economy grows, the proportion of occupations requiring complex knowledge and esoteric skills will also increase. Because of this, employers are likely to continuing seeking the validation of those skills in particular occupational areas through certification (exams). As certifications become increasingly important to employers and political leaders, it may be worthwhile for the state or colleges (collectively or individually) to consider developing their own career/technical skill standards and exams to validate learning and skill attainment. This way, all stakeholders' interests and values could be taken into account and curricula would not be directly or indirectly set by industry (in an ad hoc, inconsistent, and piecemeal fashion). Additionally, performance/proficiency data would be available to college faculty and administrators. At the least, it may be desirable for some body to sanction certain certifications (such as those created by professional associations with wide acceptance). Since some certifications are certainly warranted, it may make sense for colleges to act together to set standards for program alignment with certifications. A compilation and review of the best practices in other states may shed some light on the multitude of options available.

[29] Carnevale and Desrouchers.

Appendix 1
Suggested Criteria for Evaluating Industry Skill Standards, Assessments, and Certifications to which Curricula are to be Aligned

While the potential benefits of aligning curricula with industry skill credentials are profound, so are the potential unintended consequences. Since industry certifications vary greatly on many dimensions, the selection of credentials for program alignment must be made carefully and systematically. Robert Mahlman and James Austin of the Center on Education and Training for Employment at Ohio State University created criteria for evaluating industry-based student credentialing systems. These criteria include marketability, recognition, alignment to curriculum, quality of input standards, quality of assessments, and usability in educational settings. They are summarized in this document but may be found in greater detail in Mahlman and Austin's paper for the National Skills Standards Board titled "Evaluating Credentialing Systems: Implications for Career-Technical Educators."[30]

Marketability and Recognition – Marketability refers to the extent to which the certification system results in an increased preference in hiring and higher wages for students. Recognition refers to the extent to which the certification is accepted and used by employers across a wide geographical area (portability).

Alignment to Curriculum – This criterion refers to the extent to which the curriculum matches the skills assessed by the certification exam. If a certification covers only a portion of the curriculum, the program itself cannot be evaluated by credentialing rates. A deficiency in coverage can sometimes be addressed by using multiple industry credentials that, in combination, adequately match the curriculum. Additionally, fairness in testing requires that students have had the opportunity to learn the material being assessed. Students should not be evaluated through an exam that includes content not covered in the curriculum.

Quality of Input Standards – This criterion refers to the extent to which the content standards upon which the certification and assessment are based are appropriate. This involves determining whether the standards are current (periodically revised) and validated.

Technical Quality of the Assessment System – This criterion refers to the extent to which the assessments, upon which credentialing decisions rely, are appropriate. Test quality is a function of the procedures used to develop the test and the psychometric properties of the test and test items.

Usability in Educational Settings – This criterion refers to the extent to which the industry credentialing system is usable in an educational setting. Variables falling under this umbrella include the cost of the assessment, timing issues, and the availability of test results to educators and administrators.

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[30] Mahlman, Robert and Austin, James. "Evaluating Credentialing Systems: Implications for Career-Technical Educators." Available online at:
http://www.cete.org/wpapers/pdfdocs/Evaluating_Credentialing_Systems_for_CTE.pdf
In this, the authors also propose a nine-step collaborative process to selecting certification systems.