

The value of obtaining industry certification in the information technology field through
community college CTE programs

by

Miriam Valceschini-Lynch

B.S., California State University, Los Angeles, 1981

M.S., California State University, Los Angeles, 1995

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF EDUCATION

Department of Educational Leadership
College of Education

KANSAS STATE UNIVERSITY

Manhattan, Kansas

2021

Abstract

Exploring the effectiveness of student attainment of industry certification through CTE programs in community colleges in the United States is critical when considering the potential impact on gainful employment. The effect of information technology industry certification on the certificate holder(s) is unclear. This study focuses on how obtaining industry certification affects students' ability to succeed in college and obtain gainful employment. Supporting this study is a body of reviewed literature that shares the research, discussions, and stakeholders supporting industry certification through CTE programs. Additionally, a comprehensive analysis surrounding college readiness and student success explains how the acquisition of industry certification can positively affect students' subsequent employability. Certification continues to play an essential role in information technology employment decisions, though perspectives may vary.

Keywords: advisory committee, Carl D. Perkins Act, community college, credentials, industry certification, information technology, skills gap, stackable credentials, student perception.

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Keywords: advisory committee, Carl D. Perkins Act, community college, credentials, industry certification, information technology, skills gap, stackable credentials, student perception.

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Dedication

I dedicate this dissertation to my family. My mother, who immigrated to America as a single mother to pursue a dream for her children and taught me anything is possible with hard work and perseverance. To my husband for his never-ending love and support. Finally, to my daughters, Sarah and Amanda, who inspire me every day in ways I never imagined. I hope this work inspires them to continue their chosen paths in life.

Chapter 1 - Introduction

Industry certification in information technology is relatively new. The first technology industry certification emerged in 1989. This certificate was for a Certified Novell Engineer, verifying that the bearer of the certificate possessed the necessary skills to perform the duties required by the Novell Corporation to be a Novell engineer (Adelman, 2000). Since then, both corporate vendors and industry/professional associations have created thousands of discrete certifications in the technology field in a relatively short period. In his report for the U. S. Department of Education, Adelman (2000) points out:

While hardly any of us who work in the traditional system of higher education noticed, a new, parallel universe of post-secondary credentials sprung up in the 1990s. One can see it now in job advertisements, on the Web, and in the financial markets: an educational and training enterprise that is transnational and competency-based, confers certifications not degrees, and exists beyond governments' notice or control. And it is much bigger than we imagine. (p. 10)

Adelman (2000) further points out that, “While formal course work is not required to prepare for certification, the volume of offerings and providers worldwide is considerable” (p. 5). Most providers are not part of the universe that reports data on enrollments, credentials awarded, faculty, and staff, in the annual post-secondary data collection of the United States Department of Education. Some higher education institutions have been active participants in the certification programs, with collaboration models ranging from linking "challenge examinations" to credits, incorporating multiple certifications into bachelor's degrees, and awarding their certificates based on curricular packages purchased from for-profit developers (Adelman, 2000). The entities that provide the course work are authorized to do so by the certification sponsor, ensuring that course

content and instruction meet the sponsor's standards. The sponsor must certify the instructors who lead the course in content areas and teaching and assessment practice. The industry has also established a Council on Computing Certification to develop the standards for accrediting certification programs (Adelman (2000).

Different industries suffer skills gaps for various reasons, including too few workers in the training pipeline or changing role requirements that lead to misalignment of job descriptions. Some fields, such as computer and information science and information security analysis, suffer from a shortage of workers and long lead times in training new ones. In other job market areas, such as office and administrative jobs, hiring and training systems seem misaligned as employers raise the bar for hiring (Restuccia et al., 2018). In theory, professional certifications should be a key element in addressing the lack of knowledge of the skills required in today's job market. Yet, in practice, certifications still fall short of their potential (Markow et al., 2018).

More than a quarter of the employed United States population holds a license or certification, in addition to any degrees they may possess (US Department of the Treasury Office of Economic Policy, US Council of Economic Advisers, and US Department of Labor, 2018). Certifications align with industry needs, and they hold the promise of reducing the need for employers to rely on college degrees. In certain occupations, certifications outline career ladders that define industries and give employers and students guidance about necessary skills to advance. Those occupations, however, are the exception, and if the nation is to close the skills gap, perhaps they should become the norm. The term "skills gap" describes a fundamental mismatch between the skills that employers rely upon and students' skills. This mismatch makes it difficult for individuals to find jobs and employers to find appropriately trained workers (Markow et al., 2018).

Goals, Benefits, and Disadvantages of Certification

Certifications fall into two broad categories, each with its distinct impact: Door Openers, which help new labor market entrants enter a field, and Career Escalators, which pave the path for experienced workers' upward mobility (Markow et al., 2018).

This study considered that the supposed purpose of the employers is to identify qualified certificated information technology (IT) students and reward existing employees for obtaining IT industry certification with an increase in salary and possibly a promotion. The study further considered that the presumed goals of the certificated student are to document skill levels to possibly obtain employment in the IT industry or a salary increase and possibly a promotion. These supposed goals benefit the job-seeking information technology worker and the employer, as certifications can be used as a standard to increase the attention of hiring managers. In addition, many professionals will place certification acronyms on resumes and business cards to advertise their achievements. Therefore, employers must be familiar with different certifications and specializations to make educated hiring decisions and promotions. (Goodman et al., 2014).

A disadvantage of some standard certifications is that they are not dependent on background, experience, or educational level. Many certificates are available to anyone who can afford the training or dedicate their time to study and then sit for the exam (Wilcox, 2006). Though the development of the associated skill set makes the chance of passing the certification more likely, some people do well on the certification exams with only book knowledge (Forrier & Sels, 2003).

Another downside of depending exclusively on certifications is the rapidly changing technology. Updates in equipment and software drive the changing certification standards, and,

therefore, employees and potential employees need constant retraining and recertification (Mardis et al., 2018).

Employers frequently complain about having a hard time finding talent. Employers often resort to requesting college degrees for positions that never required one before—an imprecise and potentially self-defeating strategy. Indeed, only a minority of major U.S. companies consider college graduates prepared for the workforce (Marlow et al., 2018).

Certifications can provide a more precise screening tool to identify qualified talent, validating a clearly defined set of knowledge and skills. Employers will have to work actively with certifying bodies and training programs to ensure that certifications meet industry needs. In addition, employers will have to start demanding certifications routinely as part of their hiring process. No one will go to the trouble of getting a certification unless employers signal that they want it (Marlow et al., 2018).

Clarification of Information Technology Certifications

As a form of credential, professional technical certification is also a designation of the individual's qualification to perform a job and a means to determine the skills individuals hold. A certification is a third-party attestation of an individual's level of knowledge or proficiency in a specific industry or profession. A standards organization grants a professional designation to confirm professional or occupational qualifications. A standards organization works with industry-leading certification providers to bring their programs successfully to market by providing industry certification exams (Call, 2017)

Exam candidates receive information technology industry certifications via an exam given by a certifying body. "Certification programs are often fostered or supervised by some certifying agency, such as a professional association" (Call, 2017, p. 2). Certification institutions

exist to verify that the certificate holder has passed exams on standards in the technical topics or for a specific area of expertise. One such certifying organization, Pearson VUE, manages electronic testing services for information technology certification programs worldwide (Call, 2017).

Some certification exams are more general in the area of application without regard to a specific manufacturer. For example, CompTIA is the developer of information technology certification exams and offers computer repair, networking, web development, cybersecurity, and many others certifications not identified with any particular vendor product. For example, one CompTIA exam is the A+ certification program that attests to general computer installation, repair, customization knowledge, and capabilities.

Other certifications are more specifically related to a vendor's software, hardware, or operating systems. For example, some major computer software and hardware vendors provide a certification program to install and support their products, such as Microsoft's Certified Systems Administrator (MCSA) for its Windows operating systems or Cisco's Certified Network Administrator (CCNA) for computer network routers and firewalls.

According to Wilcox (2006), having a more comprehensive set of information technology skills is more marketable for an employee. A combination of certifications will typically imply a more diverse set of skills than will a sole certificate. While most certifications do not expire, prospective employers may require proof of the validity and currency of certifications based on certain products, versions, or techniques and require renewal or recertification if the holder is not currently working with these products or in the information technology field.

Statement of the Problem

It is not clear what the *value* and benefits are of acquiring industry-based certifications in the field of information technology. Incomplete understanding, documentation, or data exist in this area because it is unclear what exact value employers place on certifications and what effect certifications have on the potential salary of information technology certificated individuals (Cegielski, 2004). Additionally, a person can have the ability to pass a certification exam and be incapable of performing the associated task (Heise, p. 4).

Examining employers' hiring practices is vital to understanding the significance of certification in a competitive information technology workplace. This research helps determine which certifications may be more indicative of abilities and, therefore, possibly more significant than other certifications. Randall and Zirkle (2005) suggested that entry-level certification is promoted as a “vehicle to provide students with viable skills needed by the workforce, to satisfy state skill standards, and to prepare students for post-secondary studies” (p. 287).

In today's advanced technological global economy, persons who complete a sequence of study or have a level of knowledge or skills can earn credentials. A credential may document experience, licensure, or expertise and sometimes permits practice in a field. Educational credentials are awarded via certificates or diplomas, indicate the completion of a degree, or that requirements meet a particular line of training (Jepsen et al., 2014). It is common for advanced qualifications to be necessary for some professions. Fields such as law, insurance, psychiatry, accounting, and education encourage or even require certification to work in the area. Additionally, many credential holders must stay current in their field by regularly updating their information technology credentials. It is common to complement educational credentials with an

industry-standard certification to prove standard proficiencies, especially in information technology (Jepsen et al., 2014).

If employment is a standard of accountability for career technical programs, and attaining information technology certificates leads to increased employment opportunities, acquiring industry certification fulfills this purpose. While the college itself cannot ensure employment, it can be responsible for preparing the student to the best of its ability to seize employment opportunities. Determining which credentials and certifications industry representatives see as necessary to gain entry-level employment can help career technical programs focus their efforts on preparing students to be employed (Whittington, 2017).

Significance of the Problem

The need for a qualified workforce is a global issue. With increasing frequency, industries are looking to career technical education programs to train workers to help unemployed and underemployed individuals become skilled enough to fill open positions (Hyslop, 2011).

According to Boggs (2012), community colleges respond to the community's needs by developing programs and curricula supporting labor market demand. To this end, community colleges have been vehicles for upward social mobility and economic growth in the communities they serve. It has become common practice in some CTE programs to offer industry-based certifications to enhance educational credentials. Incentives are critical to the growth in the number of certifications earned. While certifications struggle to gain acceptance in many corners of the job market, in others, there are indications of under-supply of workers with industry certification (Markow et al., 2018).

Purpose of the Study

The purpose of this study was to investigate how achieving industry certification in the information technology field relates to employment opportunities as verified by the perspective of students and the perspective and hiring practices of employers. In addition, this research explicitly examined the benefit to the employer and the student of acquiring information technology industry certification. This study is essential when considering the students' motivation for acquiring information technology industry certification offered as part of specific community college CTE programs. As Davis (2013) explained, "community colleges play an essential role in economic development with the aim of preparing the local, regional, and global workforce with job skills for the workplace" (p. 3).

Measuring the effectiveness of information technology industry certification is complicated due to gaps in available data. For example, there is minimal information regarding California community college students' satisfaction with college employment preparation programs and services. In addition, there are even less data and information on what value employers and employees in the information technology industry place on information technology industry certification.

This study intended to produce information that expands understanding of student's perceptions of the employment value of information technology industry certification. This research also aimed to inform community colleges about how they may better achieve the workforce development component of their mission through their programs and services. Ultimately, the goal was to contribute to community colleges "starting with the end in mind, working with education providers at the next level and with employers to ensure that program

learning outcomes are aligned with the requirements for success in further education and careers” (Davis, 2013, para. 1).

This study sought to address the gap in the research regarding employability and salary differentiation for certificate holders in Southern California compared to non-industry certificate holders.

Significance of the Study

Policy

This study provides valuable information to community college leaders and future information technology workers as they begin to ponder the balance of formal education, technical certifications, and real-world experience in job-preparedness and marketability. The results of this research can guide the hiring process and assist students in job preparation. Information technology workers may make better choices when deciding whether to add certifications to their resumes if they know how employers view it. Moreover, training institutions will benefit from planning information technology curricula if they find that both students and employers value these certifications. O’Banion (2015) stated, “The curriculum reflects our basic beliefs and values about what our society needs and about what our students should learn to be fully functional citizens” (para. 3).

Practice

This study provides a better understanding of how attaining industry certification in the information technology field relates to employability opportunities and what effect having industry certification has on salary. The knowledge of how representative an accreditation is of the holder’s skills will better inform decisions. Hiring managers may have the advantage of

knowing how much confidence to place in certified individuals without information technology experience.

Research

This study researched employers' perceptions of information technology industry certification as an accurate measure of skill. The analysis of this research provides vital information regarding the value of information technology certifications on successful job placement and retention.

This study used a quantitative approach to examine students' and employers' perceptions of the value of information technology industry certification. Survey participants were selected using a purposeful sample of California community college students in career technical education programs with at least one information technology industry certification. The instruments for data collection were surveys with close-ended questions, distributed and collected electronically.

The descriptive analysis summarizes the data findings, and inferential analysis identifies potential relationships between various student characteristics and their perceived value of information technology industry certification.

Rationale for the Study

The rationale for this study is to establish a view of the value of information technology certification within a subject population of information technology employers and students that possess at least one certification. This analysis accomplishes three goals: First, it details the study of a subject population. Second, it provides an overview of the current literature and current study results on this subject. Third, it interprets these data based on a comparative analysis of the

perceptions of the two groups, information technology employers and information technology workers, employers' hiring practices, and the value of information technology certification.

Wilcox (2006) claims, “The use of industry-based certifications as tools to aid employers in the hiring process, and for other human resources functions are in the process of maturing” (p 23). Employers include various factors in selecting employees, such as experience, academic degrees, and certification. Industry-based certifications continue to increase in importance within the factors that increase students' job access and career opportunities (Wilcox, 2006).

Understanding the benefits of certification is critical for internal and external stakeholders alike.

A review of the literature revealed differing opinions on the value of certification in the past. Many changes have recently taken place in the certification process. There is a shortage of more current data in the existing body of research regarding the perceived value of information technology certification and what impact information technology certification has on employment. If industry certification is of significant importance to employers, it will encourage more learning institutions to incorporate information technology certification into their programs.

It is essential to determine the needs of the technology job market and understand the confidence placed in an applicant based on their information technology certifications alone. While certification can serve as a tool to screen potential employees, it is unclear whether this is of perceived value as a single criterion. This study examined the employer’s perceived value of certification to represent skill level. This study explored how achieving industry certification contributes to job and salary attainment and salary increases to students.

Industry certification is vital to work efficiently and productively in today’s technological workforce. Call (2017) has identified the reasons why certifications are relevant and beneficial:

- IT skills are in ever-increasing demand. Employers want their employees to have these skills.
- Millennials and Generation Z'ers are not inherently IT savvy. Millennials and post-millennial, just like members of other generational cohorts, often lack skills at various points along the IT skills continuum, be it personal, essential, or professional-level IT skills.
- Certification allows students to stand out and demonstrate professional commitment. It is a way for students to differentiate themselves by showing they meet individual skills competency thresholds within specific IT areas. It also shows that they have demonstrated some personal ambition by earning such a credential.
- Certification facilitates and complements interdisciplinary learning. Some courses are not technology courses per se but integrate technology into the curriculum to teach essential concepts relating to those courses.
- Certification reduces knowledge gaps and computing mistakes. Industry certification is the best way to ensure that students close their Microsoft Office knowledge gaps and increase their job readiness.
- Certificates are associated with higher pay.
- Certificates are a hallmark of IT expertise. Microsoft certificates, owned by Microsoft, are widely recognized and highly trusted (pp. 9-21).

Though this study focused on information technology certifications, comparison to other disciplines is a possibility. In programs that require some form of certification where the exam is not lab-based, additional research could examine the perceived value of certifications to employers and students.

Certification as an Indicator of Professional Skill

In their study, Andersson and Reimers (2009) analyzed information technology degree programs and competing disciplines at ten post-secondary institutions. They concluded that an information technology program is perceived differently from information systems and computer science. There is an increased use of voluntary professional certifications as professional skill indicators in the information technology program. The results indicate that faculty with information technology certification affected student outcomes and student perceptions of instructor effectiveness and instructor technical qualifications. The results suggested that students' learning outcomes improved, and instructors' student perceptions with information technology certifications positively enhanced their assessment of their effectiveness. These results have significant implications for information technology programs, faculty, recruiting, and professional development (Andersson & Reimers, 2009). Hoffman (2005) found that “rising corporate information technology spending is leading to increased demand for workers with certifications in information security, project management, and other disciplines” (p. 1).

The recognition of non-educational awards, such as industry certifications, offers students and workers new avenues to demonstrate prospective skills. Still, it also raises questions about these credentials' quality and value (Association for Career and Technical Education, 2017). However, a gap exists because it is unclear what value employers place on certifications and their relation to employability opportunities.

Theoretical and Conceptual Framework

Grant and Osanloo (n. d.) stated, “the theoretical framework is the foundation from which all knowledge is constructed for a research study” (p. 12). This study used two theoretical frameworks. The first is the Theory of Motivation to analyze students' desire to obtain

technology industry certifications. The second is the Human Capital Theory to examine employers' perceptions of employees' added value when possessing information technology industry certifications.

Motivational Theory

Maslow's Theory of Motivation describes an individual's hierarchy of needs (Maslow, 1943). Motivation theory provides meaning to the subject matter from students' perspectives, substantiating their purposes for attending community college related to future employability and economic self-sufficiency. Building upon the theoretical framework, Grant and Osanloo (n.d.) described a conceptual framework as a structure made up of "concepts, assumptions, and beliefs that support and guide the research plan" (p. 17). Gainful employment by obtaining information technology industry certification is the conceptual framework that directed this research to merge education with industry certification. The researcher considered motivation theory and the concept of employment by earning industry certifications throughout this study, including developing research questions, analysis of findings, and recommendations by the researcher.

Human Capital Theory

The Human Capital Theory is the concept that people contribute intrinsically to the growth of an economy. The human capital theory promotes the idea of formal education as affecting economic growth, but whether the quantities or the qualities of the education affect the prediction of the information technology professional remains uncertain (Ng et al., 2005).

According to Smith (1789), people contribute to economic growth. Workers who have had higher education have gained experience, cultural knowledge, and intellectual capacity to be more productive, enhancing their effectiveness. This improved effectiveness and efficiency enable them to be more innovative. The Human Capital Theory asserts that it is more profitable

to invest in individuals' education and training than in machines and factories since the return on investment is higher in the long term. Possessing an industry certification may be considered an example of human capital skill.

Research Questions

This study focused on two questions:

1. In what ways do employers value information technology industry certifications?
2. From the perception of students, how has industry certification contributed to job and salary attainment?

Design of the Study

This study was a non-experimental quantitative design to identify employers' and students' perceptions regarding the employability of individuals possessing technology industry certifications. The researcher selected quantitative research to provide numerical descriptions and causal explanations for the topic chosen (Johnson & Christensen, 2014; O'Sullivan et al., 2008).

Sample

The researcher used a representative sample of students who passed technology industry certification exams to determine the value of industry certification related to job attainment or job promotion. In addition, the researcher used a representative sample of information technology professionals' employers to find out the perceived value of information technology industry certification.

Instruments

- The researcher administered secure surveys to two groups: Employers of information technology personnel and students who possess information technology industry certification(s) (See Appendix B and Appendix D).

Data Analysis Procedures

The researcher obtained data by secure surveys. Descriptive analysis was used to summarize data findings, and inferential analysis was used to identify potential relationships between information technology industry certification and the value industry certification has on employment.

Assumptions

The researcher made the following assumptions about the research project: (1) human resources and information technology professionals have a basic knowledge of technology industry certifications, and (2) information technology certifications increase the employability of job candidates.

Limitations

The researcher limited the study to industry certification exams given to students at one community college. The researcher also limited the analysis to employers of information technology professionals within the community of the college

Delimitations

The study included only students from the California community college system and information technology employers in the region served by the community college. The study only addressed information technology industry certification obtained through the CTE program. The study outcomes included employers' and students' perceptions of the intrinsic and extrinsic

value of obtaining industry certifications. In this quantitative study, the data provided an analysis of the importance of industry certification in the information technology field. It did not account for the attainment of other credentials or degrees, such as an Associate Degree.

Scope

The study's scope focused on one large community college in California and the employers in the surrounding service area.

Definition of Terms

1. **Advisory committees** – The primary purpose of an advisory committee is to serve as a resource and a sounding board for career and technology education teachers and administrators. Advisory groups at the individual career and technology education program level can make essential contributions by consulting with the faculty regarding business and industry needs and assisting the school in planning and implementing relevant education programs for students (Tenenbaum et al., 2000).

2. **Carl D. Perkins Act of 2006** – This Act makes federal funds available for vocational-technical programs (revised to be called career technical programs in the 2006 reauthorization) to purchase equipment, staff development, services for special populations, expansion of programs, etc. The most recent version of this act, Perkins IV, was signed into law on August 12, 2006. On July 26, 2018, President Donald Trump signed into law the reauthorization of the Act of 2006. As stated by the US Department of Education (2002), “The purpose of the Perkins Act is to prepare a workforce with the academic and vocational skills needed to compete successfully in a world market” (para. 7).

3. **Career Escalators** – Certifications that help workers advance by validating the knowledge and skills of experienced workers (Markow et al., 2018).

4. **Career technical education** – Provides students of all ages with the academic and technical skills, knowledge and training necessary to succeed in future careers and to become lifelong learners” (Advance CTE, n.d., para. 1). Career technical education is a type of workforce development program.

5. **Certifications** – A certifying body, often an industry association or trade group, awards certifications based on an examination process assessing whether an individual has acquired the designated knowledge, skills, and abilities to perform a specific job. Certification can measure the professional skills and abilities and advertise information technology professional qualifications (Hunsinger & Smith, 2009). Certification is a type of credential in a particular trade (Bartlett et al., 2005; Hale, 2011).

6. **Credentials** – Also referred to as certifications, can be defined as recognition awarded by a professional body or accrediting agency recognized nationally (Nemec & Legere, 2008). Attainment of a nationally recognized certification indicates that the holder has met or exceeded the standard of knowledge set by that respective body (Nemec & Legere, 2008).

7. **Door Openers** – Certifications that create standardized access to entry-level jobs in the industry. (Markow et al., 2018).

8. **Skills Gap** – A skills gap measures the difference between the skills needed for a job versus those possessed by a prospective worker (A better measure of skills gaps, 2011).

9. **Stackable credentials** – refers to a student’s ability to earn multiple credentials along the way to completing an associate degree. Students may “stack” these credentials following a study program outlined for their particular field of interest. For example, a student may earn a 30-hour certificate after one year of coursework while also being eligible to sit for some national credential exam. According to a policy brief published by the ACT (2011), the

United States Department of Labor defines stackable credentials as “part of a sequence of credentials that can be accumulated over time and move an individual along a career pathway or up a career ladder” (p. 8).

Organization of the Dissertation

This study contains five chapters. Chapter One is an introduction and overview of the study. Chapter Two provides a comprehensive literature review focusing on the value of industry certification in the field of technology. Chapter Three explains the details of the research design. Chapter Four summarizes findings and presents emerging themes based on the research. Finally, Chapter Five draws conclusions and recommendations for further study.

Summary

The purpose of this study was to ascertain whether attaining certificates increases employment opportunities. While redesigning curricula to include information technology industry certifications, administrators must determine whether the costs of making these changes produce a value-added benefit for the student in increased employment opportunities.

The study aimed to analyze survey results to learn whether attaining information technology industry certification increases employment opportunities.

Chapter 2 - Literature Review

Providing career technical education is one of the many functions of a community college. The need to provide this type of occupational training at the community college level began as early as 1900 when William Rainey Harper suggested that students who were hesitant to enter four years of study might be willing to try a two-year program. By 1937, 35% of offerings at public junior colleges were terminal, intended to lead to a degree. Moreover, by 1939, over 41,000 students were enrolled in terminal curricula in public and private institutions across America (Cohen & Brawer, 2008).

Community colleges found a unique role in the 1930s as the Great Depression shook the foundation of America's economy. New demands for occupational retraining and career paths that increasingly relied on technological changes led to an increased demand for education at these institutions. This trend continued throughout the early 1940s but exploded in the years following World War II due to the GI Bill's commitment to send America's young soldiers to higher education to repay their wartime sacrifices. The community college played an intricate role in expanding educational access for vocational-technical education due to President Harry Truman's Commission on Higher Education (President's Commission on Higher Education, 1947). The Commission's report stated,

As one means of achieving the expansion of educational opportunity and the diversification of educational offerings it considers necessary, this Commission recommends that the number of community colleges be increased and their activities be multiplied (p. 10).

From these early expansions, the community colleges began providing trained workers for the nation's economy. In the years following the GI Bill, community colleges adopted a technical education role, which provided workforce development for scientific and industrial careers (Cohen & Brawer, 2008). This purpose expanded with the implementation of the 1963 Vocational Education Act and other federal programs like the Comprehensive Training and Employment Act (1973), the Job Training Partnership Act (1982), and the Carl D. Perkins Vocational Education Act (1984). These Acts provided increased federal funds for workforce preparation and occupational studies. Federal funding and an increasing college-aged population led to explosive growth in the number of community colleges in America – from 678 in 1960 to almost doubling to 1,141 just 12 years later.

Real growth for these programs came in the 1960s when enrollment for career technical programs grew faster than liberal arts enrollment. Cohen and Brawer (2008) attribute this growth to several factors, including:

[T]he legacy left by early leaders of the junior college movement and the importunities, goading, and sometimes barbs of later leaders; the Vocational Education Act of 1963 and later amendments; the increase in the size of public 2-year colleges; the increase in part-time, women, disadvantaged, disabled, and older students; the community colleges' absorption of adult education programs and postsecondary occupational programs formerly operated by the secondary schools; and the changing shape of the labor market (p. 253).

The new technology-infused workplace required more than technical skills. It also required continuous training and adjustment. Demands for soft and technical skills resulted in a significant repurposing of adult education programs in the 1990s. Whereas in the past, adult

education was considered a public K-12 school function primarily to ensure that all adults could obtain a high school diploma through the passage of the GED, a new policy consensus emerged that called for career preparation as one of the fundamental aspects of adult education. (Cohen & Brawer, 2008)

The growth of noncredit education allowed community colleges to respond to two significant developments in skill development practices. The first was establishing skill standards and other forms of non-degree certification as norms in some of the emerging information technology sectors. Non-degree certifications emerged from the needs firms had in their hiring practices, especially in the information technology sector. They served as signals to indicate those who earned these certificates had specific knowledge of a software product or operating system. These certifications, such as the Microsoft Office Specialist and Cisco Entry Network Technician certifications, were organized around the vendors' products (Jacobs & Grubb, 2006). In addition, if the goals were related to performance, not seat time or course completion, would education for these certifications not be best taught in the shadow college rather than in the traditional course sectors? Even in the conventional occupational courses, new computer technologies were having an impact. It was hard to teach anything in information technology programs that were non-vendor specific—i.e., teaching CAD required the adoption of a particular system—and whether it was in the credit or noncredit program meant a choice. So, the development of education for these new certifications posed significant issues that would reemerge in the present period of workforce development at community colleges (Carnevale & Desrochers, 2001).

The terminology for career technical education has shifted from terminal education to vocational education to career technical education. The Carl D. Perkins Act of 2006 defines career and technical education as:

Organized educational programs offering sequences of courses directly related to preparing individuals for paid or unpaid employment in current or emerging occupations requiring other than a baccalaureate or advanced degree. Programs include competency-based applied learning, which contributes to an individual's academic knowledge, higher-order reasoning, problem-solving skills, and the occupational-specific skills necessary for economic independence as a productive and contributing member of society. (para. 1)

The federal government authorized the Carl D. Perkins Vocational and Technical Education Act in 1984 and reauthorized it in 1998 (Perkins II), 2000 (Perkins III), 2006 (Perkins IV), and 2018 (Perkins V). Named for Carl D. Perkins, the act aims to increase the quality of technical education within the United States to help the economy.

On July 31, 2018, President Donald Trump signed into law the re-authorization of the Act of 2018. The new law, the Strengthening Career and Technical Education for the 21st Century (Perkins V) Act, was passed almost unanimously by Congress.

The Perkins IV re-authorization included three significant areas of revision:

1. Using the term "career and technical education" instead of "vocational education."
2. Maintain the Tech Prep program as a separate federal funding stream within the legislation.
3. Maintain state administrative funding at five percent of a state's allocation

The Perkins V law also included new requirements for “programs of study” linking academic and technical content across secondary and post-secondary education and strengthening local accountability provisions to ensure continuous program improvement.

The Perkins Act provides \$1.2 billion in federal support for career and technical education programs in all 50 States, including support for integrated career pathways programs. The law is in effect through 2024 (Carl D. Perkins Vocational and Technical Education Act, 2021, paras. 1-4).

The passing of the Perkins Act reflected the increasing skills needed in the workplace and the reality that a high school diploma was not sufficient for much entry-level work. Thus, states began to shift some of the responsibility for adult education to community colleges. Research indicated that income and employment potential rose significantly for adults prepared to obtain their high school diploma and succeed in a community college technical program. The development of programs to bring adults into community colleges initiated on the noncredit side but soon became part of the credit programs. The new computer-based technologies required substantially providing new skills to technical workers. In 1992, Congress established the Advanced Technological Education (ATE) program, designed to provide funding for community college faculty to develop curricula that would produce technicians in the emerging fields of telecommunications, nanotechnologies, and cybersecurity. These degree programs were in technical areas that could lead to a four-year degree. As the skills required by many occupations continued to increase, the ATE was critical in orienting community colleges toward an understanding of the future trends in the industry (Teles, 2012).

The need for a qualified workforce is a global issue. With increasing frequency, industries are looking to career technical education programs to help train and retrain workers to

help unemployed and underemployed individuals become skilled enough to fill open positions (Hyslop, 2011). In addition, the development of new information and communication technologies extends the reach of service providers across national and international boundaries, using the internet to reach into the minds of our students (Clarke, 2001).

Today, the community college continues to offer these valuable services, and critically important is how they continue to support their communities in this dynamic technological knowledge-based society.

Industry Certification in CTE Programs

It has become common practice in some CTE programs to offer industry certification to enhance educational credentials. In their article, Goodman et al. (2014) state:

The incentives for schools to offer certification opportunities to their students are significant and have resulted in millions of additional dollars in state funding, including performance funds in the form of additional full-time equivalent (FTE) student membership. (p. 1)

However, the impact of certification on employment is not well defined.

The Association for Career and Technical Education (2019) states its meaning of certification:

Certifications indicate mastery of or competency in specific knowledge, skills, or processes that can be measured against a set of accepted standards. These are not tied to a specific educational program but are typically awarded through assessment and validation of skills in cooperation with a business, trade association, or another industry group.

After attaining a certification, individuals often must meet ongoing requirements to maintain the currency of the certification. (p. 1)

The value and benefits of acquiring certification(s) in the field of information technology are unidentified. An incomplete understanding exists in this area because it is unclear what value employers place on certification and what effect certification has on the potential salary of individuals with information technology industry certification.

CTE Course Offerings

Career Technical Education (CTE) decision-makers must frequently contend with whether their schools should offer information technology certifications to their students. They must determine whether such offerings provide an adequate return-on-investment (ROI) for their students and school(s) alike—the ultimate ROI, of course, being whether information technology certifications increase students’ career and college readiness (Call, 2017, p. 1).

Many CTE students attend community college to take “skills-builders” courses related to the workplace. Individuals identified as skills-builders are employed students who take classes at the community college to gain job skills but do not intend to complete an academic award or transfer (Booth & Bahr, 2013). Others seek to complete a certificate program, train for third-party industry certification, or complete an associate degree or transfer (Massie, 2014).

Employers address the skills gap by participating in “learn and earn” programs, including apprenticeship programs, corporate internships, corporate universities, cooperative education, prior learning assessments, public/private partnerships, and tuition assistance programs (Bridgeland et al., 2011). Of the 55 million job openings between 2010 and 2020, five million will require post-secondary vocational certificates (Carnavale et al., 2014).

Gomillian (2017) reports that:

Instructors, practitioners, and students have different goals, and as such, different perspectives on industry certifications. University and technical school programs focused

solely on certifications struggle to retain relevance and compete against boot camp certification programs. Yet, programs without certifications may not be serving the needs of their students as well as they could be. (p. 1)

Utilizing national credentials has many advantages. First, as stated by Foster and Pritz (2006), “Various types of credentials help make individuals’ knowledge and skills more marketable” (p. 14). When comparing having a national credential to a degree alone, Foster and Pritz (2006) note, “Rather than depending on time spent or credits gained, most certificates signify the achievement of a set of particular competencies about benchmarks or standards set by experts in that field” (p. 15). Another benefit is that integrating credentials into the program curriculum can “enhance the connection between community college programming and the credentials demanded by business” (Goodman et al., 2014, p. 18). Colleges can then more easily transcribe credit for credentials a student may hold before entering a program (Goodman et al., 2014). Ensuring the “portability and transferability of credits and skills attained” is a focus of the ACTE in looking at “stackable” credentials as well (Hyslop, 2008, p. 41). Perhaps one of the significant advantages of holding nationally recognized certifications is that “Often that means that those who hold certificates will be paid higher starting salaries, and it may reduce the time spent looking for a job” (Foster & Pritz, 2006, p. 15).

Industry credentials or occupational licenses provide an opportunity for communities and local economies to thrive with homegrown talent trained and employed in local business and industry. When the power of business and industry and the local communities unite to partner with education for economic development and educational planning, everyone wins. Higher levels of educational attainment contribute to a healthier local economy (California Community College, 2017).

Wiershem et al. (2010) surveyed 141 employers in the information technology field to determine the value of information technology certification from the employers' perspective. More than one-half of the employers surveyed required or desired IT-related certifications. The expected primary benefit was providing a baseline for technological knowledge generally and in a particular area (p. 99).

Studies have shown that many jobs requiring less than a bachelor's degree pay a higher salary than those requiring completion of a bachelor's degree, including health-related and technical fields (Carnevale et al., 2012). Many of these careers start at a higher salary, but there is a lower career ceiling for non-degree earners without a degree. These programs are offered as a certificate or associate's degree and are often associated with a state license or third-party industry certification (Carnevale et al., 2012). The high starting wages in many CTE areas have made this a growing field that attracts more students than in the past and has changed the landscape of college offerings. Bahr and Booth (2015) found a 30% increase in wages for those completing certificates and associate's degrees up to six years after leaving the college versus those who did not receive an academic award, meaning a 30% difference in annual reported wages between these groups. Some students choose these jobs instead of continuing in a CTE pathway that could yield more income in the long term.

Researchers have identified earnings gains in a series of linked studies by analyzing large-scale, system-wide student records linked with Unemployment Insurance data. These datasets are helpful because of the comparison between certificate holders with students who enrolled in college but did not complete an award (rather than students who never enrolled). Compared with high school students, certificate holders with no other college award have been found to earn significantly more (Marcotte et al., 2005). However, as expected, returns on

certificates are typically below those of degrees. The growing recognition of non-educational awards, such as industry certifications, offers students and workers new avenues to demonstrate their employers' skills. Still, it also raises questions about the quality and value of these credentials—problems that are difficult to answer because of issues with accessing data from third-party certification providers (Association for Career and Technical Education, 2017).

These studies draw on longitudinal transcript data on students entering college during the 2000s and unemployment insurance records of their earnings before and after college. The studies apply fixed effects methods and control for unmeasured selected student characteristics to identify the earnings gain from completing a certificate for first-time-in-community-college students. Across the studies, the years of coverage differ slightly. However, overall, the studies are consistent with methods and data (and harmonized across years post-entry to college). Overall, there are substantively meaningful earnings gains—approximately \$500 to \$800 per quarter— from completing a certificate relative to not completing any post-secondary award (Bailey & Belfield, 2017; Xu & Trimble, 2016).

Although the value of information technology certifications is debated in the information technology industry, academia has largely ignored the issue. The literature reviewed from educational databases produced no relevant results about the value of information technology industry certifications earned through CTE programs.

The study performed by Quan et al. (2007) intended to bridge such a gap. Supported by the human capital theory, the researchers built a comprehensive model to estimate the value of various information technology certifications regarding their contributions to information technology professionals' wages. The model was estimated using third-party survey data. The three main findings from the study are 1) information technology certifications are valuable in

general; 2) there is a substitution effect between information technology certifications and education and between certifications and experience; 3) the value of information technology certifications is job and industry-specific.

The necessity for certifications has become a fact of life for IT professionals. Almost any information technology position posting encountered will list some certifications requested or required. However, the extent and nature of certification valuation by employers remains unclear. A review of the research indicates a lack of research and, combined with the growing presence of certification, requires a deeper understanding of certifications' value (Wiershem et al., 2010).

Industry certification is vital to work efficiently and productively in today's technological workforce. Call (2017) has identified the reasons why certifications are relevant and beneficial. Those reasons include: information technology skills are in ever-increasing demand; millennials and post-millennials, just like members of other generational cohorts, often lack skills at various points along the information technology skills continuum, be it personal, essential, or professional-level information technology skills; certifications reduce knowledge gaps and computing mistakes. For example, Microsoft certificates are owned by Microsoft and are therefore widely recognized and highly trusted (pp. 10-15).

Certification is a popular topic found in almost every trade/education industry throughout the world. There is a heavy emphasis on certification-based education and maintenance throughout the industrial job field. Individuals often find themselves carrying multiple certifications covering specific skills necessary to their daily job functions. With the ever-changing workforce, certification is used as a tool to advance professionalism, creating a foundation for excellence based on standard requirements for best results. In a competitive job

market, having and maintaining the proper certifications creates opportunities and quickly shows specialized skills (Pinolini, 2020).

Theoretical and Conceptual Framework

Two lenses that frame this study are Maslow's Theory of Motivation and the Human Capital Theory. The Motivation Theory provides meaning to the subject matter from the students' perspective, validating their purpose for attending college and acquiring industry certification related to future employability and economic self-sufficiency. According to the Human Capital Theory, higher education is both a consumption good and an investment good. As an investment good, individuals sacrifice time and money to receive an education to earn a higher salary and have a better standard of living in the future. This framework supports information technology industry certification through community college CTE programs to produce prepared and qualified talent.

Human Capital Theory

The term "human capital" refers to knowledge, attitudes, and skills developed and valued primarily for their economically productive potential. It references the productive capacities of human beings as income-producing agents in an economy and the present value of past investments in people's skills. Human Capital Theory suggests that an investment in human capital through formal education or informal training will be rewarded with higher future earnings. Investment in human capital creates a labor force required for economic growth. Individuals weigh this investment's direct and indirect costs to invest in human capital and compare this investment with the potential return. The results of this study are supportive of the theoretical conclusions of Human Capital Theory.

Forrier and Sels (2005) define employability as "an individual's chance of a job on the internal and/or external labor market" (p. 106). According to Hughes and Byrd (2015), the

Human Capital Theory is significant in proposing the economic value of human resources. Applying the Human Capital Theory in a practical sense is used when examining human resources within organizations (Holton & Naquin 2004). The Human Capital Theory seeks to explain the gains of education and training as a form of investment in human resources (Aliaga 2001; Nafukho et al., 2004), with the premise that people are considered a form of capital for development (Aliaga 2001). It seeks to place an economic value on individuals. The Human Capital Theory has limitations because it is difficult to attribute a cost to a human being's knowledge, skills, and abilities. "From this perspective, education and schooling are seen as deliberate investments that prepare the labor force and increase the productivity of individuals and organizations, as well as encouraging growth and development at the international level" (Nafukho et al., 2004, p.546). Possessing an industry certification may be considered an example of human capital skill. The Human Capital Theory suggests that individuals' qualifications, knowledge, skills, and experience may lead to increased earnings or productivity (Becker, 1993; Rosen, 1987; Schultz, 1971). The Human Capital Theory provides a framework for studying perceived employability (Wittekind et al., 2010). The Human Capital Theory was used as a lens to analyze the value in human capital employers, and students place in information technology industry certification.

Motivational Theory

The Motivational Theory provides meaning to the subject matter from students' perspectives, substantiating their purposes for attending community college related to future employability and economic self-sufficiency. The Motivational Theory is tasked with discovering what drives individuals to work towards a goal or outcome. Businesses are interested

in motivational theory because motivated individuals are more productive, leading to the more economical use of resources (HRZone, 2013).

Maslow's Motivational Theory applies to student participation in higher education because education is a means to achieving employment, and employment is a means of attaining fulfillment across Maslow's needs spectrum (Neto, 2015). Sivakumar and Sarvalingam (2010) stated, "education is one of the basic needs for human development and to escape from poverty" (p. 20). As the rate of jobs requiring some post-secondary training continues to grow, survival and fulfillment found through employment become more dependent on an individual's college outcomes. Post-secondary credentials have also been found to affect earning potential. The National Center for Education Statistics (2018) reported, "for young adults ages 25–34 who worked full time, year-round, higher educational attainment was associated with higher median earnings; this pattern was consistent from 2000 through 2016" (para. 4).

Summary

Certification prepares individuals with current and relevant digital skills and credentials for the competitive global workforce. Entry-level certification is promoted as a vehicle to provide students with viable workforce skills to satisfy state skill standards and prepare students for today's highly technical job market. Qualifications, knowledge, skills, and experience of individuals may lead to increased earnings or productivity.

Chapter 3 - Methodology

Curricula for courses offered in the School of Career and Technical Education at a large community college in Southern California provide students with the skills necessary to achieve passing scores on industry certification exams in the field of information technology. Students are encouraged to pass these exams with the notion that industry certification will provide a higher salary or career advancement. The administration requires accountability for purchasing and delivering vouchers at the college. The college can measure pass/fail rates. However, the actual measurement of jobs employing students with information technology industry certification is not readily available because employers' perception of the value of industry certification by employers is not well-documented.

This study investigated how achieving industry certification in the information technology field, through CTE programs, with and without completing the Associate Degree, relates to employability opportunities. The hiring practices of employers verified employability opportunities for students with industry certification. The study further investigated students' perspectives on what degree achieved industry certification leads to job and salary attainment.

The reputations of training and certifying institutions are at risk if graduates present certifications and cannot perform the associated tasks. Students may test well and pass the certification exam without possessing an equal ability to perform the related functions; therefore, “certification is not a robust predictor of ability about specific information technology skills” (Cegielski et al., 2003, p. 105). Examining both employers' and students' perceptions of the value of certifications is vital to understanding the significance of certification in a competitive information technology workplace.

This study's primary purpose was to determine the perceptions by employers and students towards information technology industry certification for employability purposes. Any effect of their opinions that are evident in the study can be generalized to specific areas of California, represented by the information technology professional participants who have similar characteristics (Creswell, 2009).

Research Design

Research design, setting, participants, instrumentation, and data collection and analysis for this study were selected to produce relevant and usable information by “collecting data that [is] analyzed using mathematically based methods” (Muijs, 2011, p. 1). Research findings helped to determine if a pattern exists (Onwuegbuzie & Leech, 2005) between the achievement of technology industry certification exams and employability opportunities.

This study is a non-experimental quantitative design to identify students’ and employers’ perceptions of the value of information technology industry certification. The researcher surveyed one group of participants to determine their perceptions regarding the employability of individuals possessing technology industry certifications. The researcher studied another group of participants to assess how industry certification leads to job and salary attainment. The researcher purposively selected the first group of participants based on an interest in hiring students in the information technology field. The second group of participants came from a database at a community college of students who have obtained industry certification within the past three years.

Rationale for Research Design

Researchers use quantitative research to analyze trends, compare groups, or use statistical analysis to interpret results (Creswell, 2014). In quantitative research, the investigator identifies a

research problem based on trends in the field or on the need to explain why something occurs. Describing a pattern means that the research problem can be answered best by a study. The researcher seeks to establish the overall tendency of individuals' responses and note how this tendency varies among people (Creswell, 2009, p.13).

The design of the study is appropriate to answer this study's research questions, which are as follows:

1. From the perspective of students, how has industry certification led to job and salary attainment?
2. In what ways do employers value information technology industry certifications?

This study used a non-experimental quantitative design to identify the value employers place on technology industry certifications and students' perceptions of, and satisfaction with, the career opportunities afforded by having industry certifications.

Additionally, correlational research "studies the relationship between one or more quantitative independent variables and one or more quantitative dependent variables" (Johnson & Christensen, 2014, p. 45).

Participants and Setting

This study's population of interest is two-fold: (a) potential information technology employers of individuals with information technology industry certification and (b) students who have achieved industry certification. Data allows more accurate tracking of students who have obtained employment due to certification(s). The researcher intended to capture the perception of students who achieved industry certification through the community college CTE program and to understand the value of technology industry certification to employers.

The participants in this study met the researcher's criteria of identifying either an employer of information technology professionals or a prospective or current student of an employer that employs information technology professionals.

Participating Students

The students for the study were identified through the participating community college's internal database. The only students invited to participate were those who had acquired at least one information technology industry certification. Students were also required to be 18 years or older and provided the college with permission to share their contact information. Further details about the student participant sample are contained in Chapter 4, "Description of the Student Sample" section.

Participating Employers

The college provided the researcher with the email addresses of 50 employers of information technology personnel who serve on the community college's Advisory Committees for its information technology programs. The participating employers employed one or more employees with skills related to information technology. Further details about the employer participant sample are contained in Chapter 4, "Description of the Employer Sample" section.

Sampling Procedure

The procedure for selecting this study's participants was a purposeful, convenience sample. A convenience sample gathers "statistical data . . . from a specific group of people" as they "fit the criteria" (Robert, 2015, p. 166). Convenience sampling is appropriate in this study. An expert sample found information technology professionals who have knowledge and expertise in the qualification and employment of individuals with industry certifications (Trochim & Donnelly, 2007).

Instrumentation

The researcher used quantitative survey measures to gather data for this study. The researcher used two different surveys. One online survey with a total of 16 questions for employers of information technology professionals. The researcher used Survey Monkey, a secure survey engine, to collect data about students' perception of the value of information technology industry certification (See Appendix D). Another online survey with 21 questions was designed for prospective students seeking employment with technology industry certifications (See Appendix D). Surveys are one of the most popular data collection methods due to the ability to economically reach a large sample size and collect information in a uniform format (Jones et al., 2013).

Questions included in the survey followed standard research protocols, including identifying appropriate variables to measure, developing questions that correctly measure variables, and listing questions in a logical sequence (Johnson & Christensen, 2014; O'Sullivan et al., 2008). The researcher used a blend of Likert-scale, multiple-choice, and dichotomous questions throughout the surveys. Logic was built into the surveys, and participants were guided to answer only those questions that aligned with their experiences. Participants were also able to leave questions unanswered.

The researcher generated survey content based on previously conducted surveys that sought similar information. Additionally, the surveys included demographic questions, and the researcher utilized the California community college system data protocols to determine the labeling of demographic characteristics (California Community Colleges Chancellor's Office, 2020). Therefore, the survey instrument data labeling was consistent with the system-level in

ethnicity, gender, age range, and major discipline. The survey questions utilized for this study are available in Appendix B and Appendix D.

Instrumentation Pilot and Dissemination

Before distributing the surveys, the researcher had several educational professionals and a professional researcher review the survey question content and order and tested the logic and online format. The researcher made revisions based on feedback from the pilot group to ensure the questions were written and would result in valuable responses related to the overarching research questions.

After the pilot, the survey was disseminated to the student and employer sample populations through a Survey Monkey web link provided in the research study invitation emails sent in June 2020. The content of the email invitations is available in Appendix A and Appendix C. The survey was available online for an initial two-week period after sending the initial invitation. Following the two weeks, a reminder email was sent to encourage participants who had not yet completed the survey. Survey availability was then extended for another two weeks in July 2020. The researcher disabled external access to the survey after the extended period.

Reliability and Validity

Validity, or meaningfulness, is “The primary concern of all researchers who gather educational data” (Suter, 2012, p. 267). While validity addresses meaningfulness, reliability addresses consistency. For this study, a secure survey engine, Survey Monkey, provided the construct validity of the instruments. The construct of this study is the benefit of industry certification knowledge of information technology employers and students. The survey research

company also provided reliability because similar instruments have been repeated numerous times with reliable results.

Data Collection

Data were collected using the two survey instruments produced through Survey Monkey, a secure survey platform. The potential participants received an email with a link to the survey. This email explained the study's purpose, invited participation amongst members, shared the dates of survey availability, and provided the necessary information for accessing the survey. Follow-up reminders to complete the survey were also sent, depending on an established timeline. The researcher sent surveys to study participants in June 2020. Data were collected, segregated, and analyzed. The researcher calculated the results in June and July 2020. Due to the 2020 Covid pandemic, the researcher's teaching schedule, teaching delivery methodologies, and teaching material required extensive modification and revision. Therefore, the researcher presented the findings in August 2021.

The secure electronic surveys were suitable for collecting data (Sproull, 1986) for many reasons, including environmental friendliness, user-friendliness, and cost-effectiveness. Additionally, the electronic survey's nature provides a quicker response (Schuldt & Totten, 1994).

The researcher used a secure survey engine for the survey questions. The reliable, secure survey engine, Survey Monkey, performed the preliminary data analysis and reporting.

Ethical Considerations

The researcher followed standards to maintain ethical practices throughout the research process. The standards included maintaining participant confidentiality, avoiding misrepresentation of data, and minimizing error (Resnik, 2015). Additionally, all participants,

including the community colleges and students, were afforded "respect, beneficence, and justice" (O'Sullivan et al., 2008, p. 264) as an integral part of the research process.

The researcher took steps to safeguard against unethical research practices, including obtaining an institutional review board and appropriate leadership approval at the researcher's institution, Kansas State University.

Appendix E exhibits the memorandum containing Kansas State University's Institutional Review Board approval to protect against unethical research practices. Participants also received informed consent rules outlining that voluntary participation would not impact their academic or employment standing and making findings of the study accessible to all participants and the public through publication.

Assumptions

There were two key assumptions in this study. The first assumption was that the participating community college produced a student list of contacts that accurately aligned with the study participant criteria. The second assumption was that students and employers answered the survey questions honestly.

Analysis

Through a detailed analysis of the numerical data generated from the survey responses, the researcher pursued answers to the research questions posed in this study:

RQ1: From the perspective of students, how has industry certification led to job and salary attainment?

RQ2: In what ways do employers value information technology industry certifications?

Survey Monkey allows for the downloading of the data into a Microsoft Excel format. The data were examined for thoroughness, accounting for missing data, and accuracy of responses.

Limitations

The study is limited to certifications most likely made available to California community college students enrolled in information technology courses at a large community college. The researcher limited this study to students from a small sample of students at one California community college within a system of 115 community colleges. Thus, the findings are not generalizable to all higher education students. The study was also limited to employers in the community in the area served by the community college. The choice of the employer sample is further limited to employers on the community college's Information Technology Advisory Committee at Long Beach City College.

Summary

Chapter Three provides a detailed account through which the researcher selected participants and data were collected and analyzed. A detailed analysis occurred by analyzing the numerical data generated from the surveys disseminated to employers of professionals in information technology and students who have achieved industry certification that led to job and salary attainment. The detailed analysis will provide students, educators, and the workforce with insight into the value, reliability, authenticity, and credibility of the data retrieved and analyzed.

Chapter 4 - Findings and Analysis

The purpose of the study was to investigate how achieving industry certification in the technology field, through CTE programs, with or without completing an Associate Degree, relates to employability opportunities in one community in Southern California. The study includes verifying employers' hiring practices and students' perspectives from the community college serving that community. This chapter comprises the results and analysis of quantitative data gathered through secure web-based surveys, from California community college students and from employers of information technology professionals aimed at addressing two research questions:

RQ1: From the perspective of students, how has industry certification led to job attainment or salary increases?

RQ2: In what ways do employers value information technology industry certifications?

This chapter offers the analysis of data drawn from two samples: A sample of 46 students from one Southern California community college who successfully earned at least one information technology industry certification and a sample of 33 employers in that community college's community who previously hired or are looking to hire information technology personnel. The study includes a description of the samples and an exploration of the findings organized and presented by themes derived from grouping together related survey questions. The themes are (a) the perceived value of industry certification to students and employers, (b) employers' perception of students' skill level with industry certification, (3) readiness for employment in an information technology role, and (4) job and salary attainment.

Description of the Student Sample

Student Survey

The participating community college identified, through its internal database, a combined total of 175 students who met the researcher's criteria of being in a career technical education program and passing one or more industry certification exams. The study subjects also had to be 18 years or older and provided permission to share their contact information. The contact information permission was obtained as a part of each community college's general student information sharing policies and practices and was not specific to this research. The college provided the researcher with the email addresses of 175 students, who received an email explaining the research project and inviting the students to follow a link to participate in the web-based survey. The students' email addresses were composed of internal college and personal email addresses, solely based on what the student provided the college as their primary email address. The survey process for all the students was the same. Out of 175 students emailed, 14 email messages were returned as undeliverable, leaving an assumed total of 161 students who received the invitation.

The researcher requested students return the completed survey within two weeks from receiving the email request to respond to the survey questions. After two weeks, students received another invitation email to complete the survey if they had not already done so. Of the 161 students, 46 responded, yielding 46 useable responses for an overall response rate of 26%. The variation in answers per question is shown throughout the presentation of findings within this chapter. Additionally, the researcher employed pairwise deletion. For example, the student cases were not omitted in cases where there was missing data for the question driving each analysis. Still, an analysis was completed on subsets of the data.

Sample Student Demographics

The web-based survey administered to students included six demographic-related questions regarding gender, age, ethnicity, education level, major, and employment status. All students responded to the gender and age questions. Respondents predominately identified as male, between the ages of 20 and 25, and Hispanic. Just over half of the respondents (54%) identified as Hispanic, aligning with the college's reported demographics of predominately serving Hispanic students. The students' major area of study distribution was broad. Two technology-related fields, Cyber Security and Networking and Computer Science, had the most significant participants. Ten respondents, or 22%, chose Cyber Security and Networking, and nine respondents, or 20%, chose Computer Science.

Additionally, 46 students responded to the employment question, with 21 students or 46% unemployed, 25 or 54% employed. Of the students employed, ten were in a job that aligns with their major area of study, and 15% were in a position that does not align with their major area of study. The detailed results of the demographic characteristics are available in Table 1.

Table 1

Demographic Characteristics of Student Respondents

	Sample	
	<i>N</i>	%
Gender		
Female	12	26
Male	31	67
Declined to State	3	7
Total Gender Responses	43	

	Sample	
	<i>N</i>	%
Age		
19 or Less	6	12
20-24	20	44
25-29	6	13
30-34	5	11
35-39	3	6
40-49	4	9
50+	2	4
Declined to State	0	0
Total Age Responses	46	
Ethnicity		
African-American	6	13
American Indian/Alaskan Native	0	0
Asian	4	9
Filipino	1	2
Hispanic	25	54
Pacific Islander	1	2
White Non-Hispanic	5	10
Multi-Ethnicity	3	7
Other	0	0

	Sample	
	<i>N</i>	%
Declined to State	1	2
Total Ethnicity Responses	46	
Declared Major		
Biology	2	4
Business	5	11
Business Information Worker	1	2
Communications	2	4
Computer Science	9	20
Computer Technology	1	2
Culinary Arts	1	2
Cyber Security and Networking	10	22
Database Administration	1	2
Electrical Technology	1	2
English	2	4
Math	2	4
Nursing	5	11
Psychology	2	4
Web Development	2	4
Total Declared Major Responses	46	

	Sample	
	<i>N</i>	%
Employment		
Employed but not in a job that aligns with major	15	32
Employed in a job that aligns with major	10	22
Unemployed	21	46
Total Employment Responses	46	

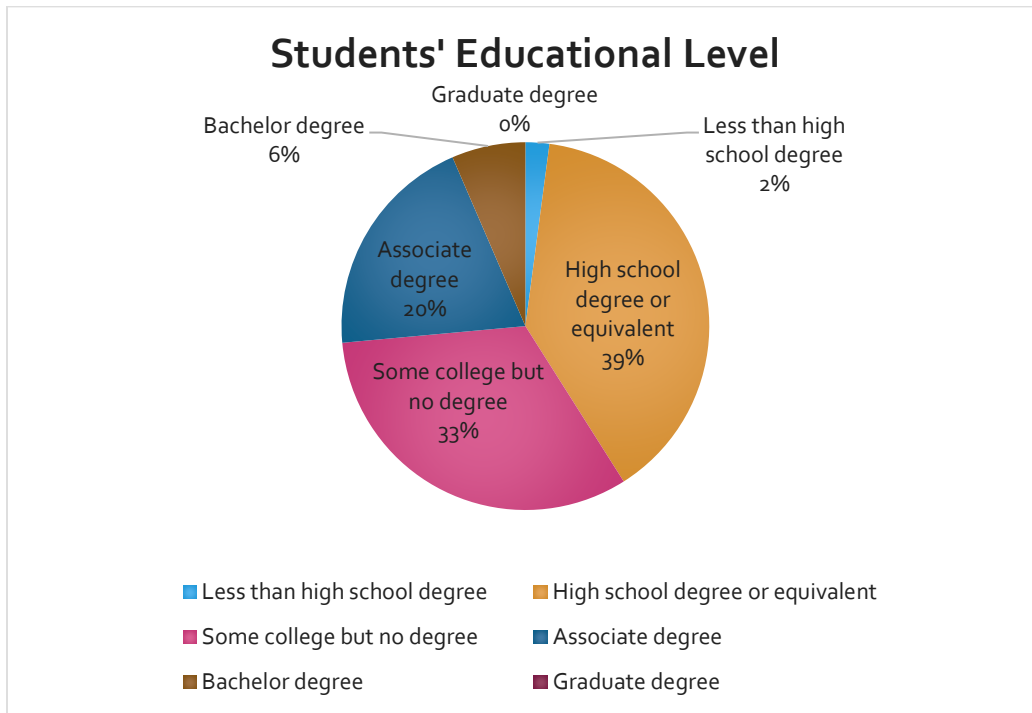
Results of the comparisons made of the sample's ethnicity and age characteristics with the population of students enrolled in California community colleges (California Community Colleges Chancellor's Office, 2020) showed that males in this study were overrepresented (67% to 45%). Comparison results also showed that the proportion of Hispanics were overrepresented (54% to 46%). Age was not directly comparable with statewide data since the study sample intended to capture students with information technology industry certifications. In contrast, the statewide figures consist of all students enrolled in a California community college. The largest age category in the study sample was 20-24 years old (44%). Statewide, this age category represented 29% of enrolled students. An absence of statewide data precluded comparisons by major and employment status.

The educational level of the student respondents is consistent with the typical demographic of community college students (California Community Colleges Chancellor's Office, 2020). Of the 46 respondents, 18 students, or 39%, had a high school degree or equivalent (e.g., GED). The second-highest percentage, 33%, had some college but no degree.

Nine students had associate degrees, and three students had bachelor's degrees. No student had a graduate degree (See Figure 1).

Figure 1

Educational Level of Students Surveyed



Interestingly, of the 37 student responses, only 10 or 22% responded that they are in school or training to update their skills in computer-related technology. The other ten students, or 22%, indicated they are not enrolled in school or training programs to enhance computer-related technology skills.

Analysis of Students' Value of Certification

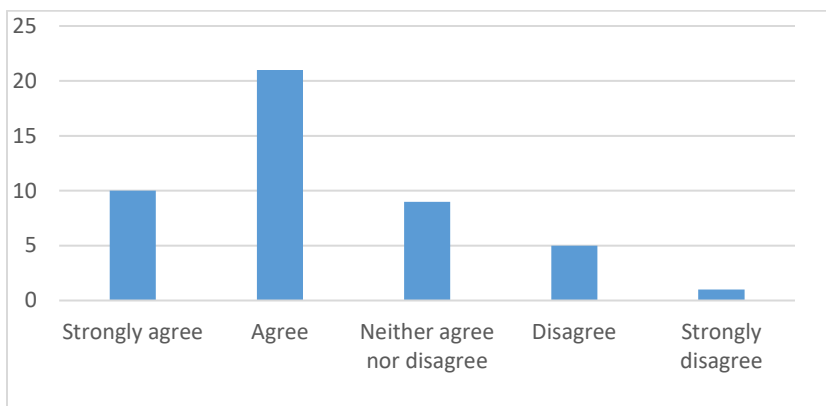
The first research question addresses students' perspectives on how industry certification led to job attainment or salary increases.

Figure 1 is a graphic depiction of students' confidence in the benefit of information technology certification related to employment. The researcher asked the students to rate their

confidence by addressing this statement: “I am confident that my industry certification gives me the knowledge and skills needed in a job related to my area of study.” On a scale of one to five, with one being “strongly agree” and five “strongly disagree,” five students or 11% strongly agree, and 21 students or 46% agree that information technology certification was a factor in finding employment or promotion. Fourteen students or 30% neither agree nor disagree, four students or 9% disagree, and two students or 4% strongly disagree. (See Figure 2).

Figure 2

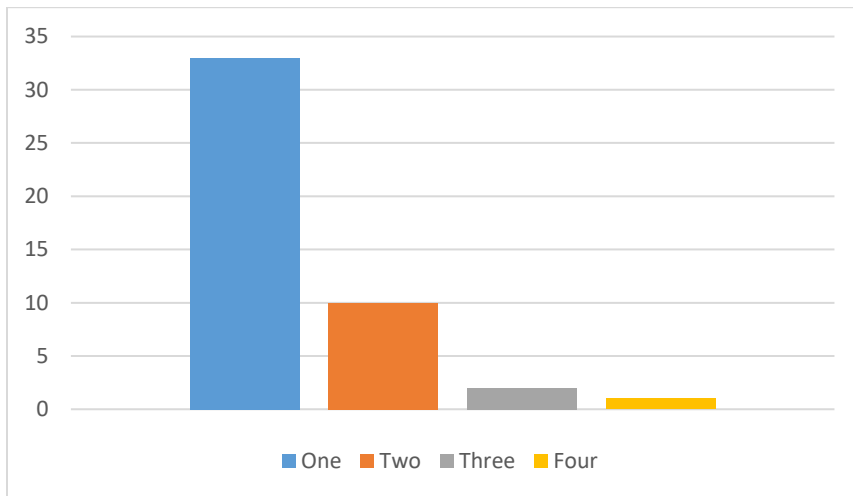
Students' Confidence Re Industry Certification as a Factor in Finding Employment



The researcher took the student sample from a database of students at one community college who had a passing score on at least one industry certification exam acquired due to passing a related information technology class. In response to the survey question, “How many information technology industry certifications do you have?” Thirty-three students, or 72%, have one industry certification. Ten students, or 22%, have two industry certifications, two students have three industry certifications, and one student has four industry certifications. Therefore, all student respondents have at least one industry certification (See Figure 3).

Figure 3

Number of Information Technology Certificates Held by Students



Regarding the type of technology industry certifications students possess, most students responded that they are certified in Microsoft products. Microsoft Technology Associate (MTA) certification is held by 37% of respondents, and 35% have Microsoft Office User Specialist (MOS) certification. These results are not surprising, given the popularity of Microsoft products in the information technology industry. The second-highest percentage of respondents, 20%, have the Internet Core Competency Certification (IC³), the worldwide benchmark to gauge a student's understanding of computer systems like hardware, software, firmware, networking, and computer literacy. Fewer respondents have the more specialized types of certification—7% have the Computing Technology Industry Association (CompTIA) certification, and 2% have CISCO certification. The exam for industry certification in CompTIA and CISCO is more technical and difficult to pass (See Table 2).

Table 2*Types of Industry Certifications Possessed by Students*

Certification Name	Sample	
	<i>N</i>	%
Microsoft Technology Associate (MTA)	17	37
Microsoft Office User Specialist (MOS)	16	35
Internet Core Competency (IC ³)	9	20
CompTIA	3	7
CISCO	1	2

Considering the theoretical framework of Maslow's Motivational Theory used as a lens for this study, one of the questions on the student survey asked students to identify their primary motivations for pursuing industry certifications. The researcher provided respondents with a list of seven motivation options based upon options found in similar studies referenced in the literature review. Respondents were able to select up to two options that best described their motivation. As shown in Table 3, of the 46 respondents, 65% said their primary motivation for pursuing an industry certification is to become eligible for better employment. Eleven percent chose the desire to make a better life for themselves and their family. Next, 13% selected making more money, 4% to learn about a topic of interest, 2% to become a better person, 4% to satisfy parents—no one selected to improve self-confidence.

Table 3*Students' Main Motivation for Pursuing Industry Certification*

Motivation	Sample	
	<i>N</i>	%
To become eligible for better employment opportunities	30	65
To make a better life for myself or my family	5	11
To make more money	6	13
To learn about a topic or area of interest	2	4
To become a better person	1	2
To satisfy the wishes of my parents	2	4
To improve self-confidence	0	0

In response to the question regarding the impact of information technology industry certification on salary increases, 7% of respondents received salary increases after passing a certification exam. Still, the majority, 24%, did not receive salary increases, and 17% indicated they do not have jobs in the information technology field. Twenty respondents, 43%, skipped this question.

Among those who received salary increases, only seven respondents provided answers to the percent salary increase they received. Of those seven, 29% received one to ten percent increases, while 43% received ten to twenty percent increases.

The responses to the question, “Does your employer require industry certification?” were surprising, considering that the employers surveyed were employers in the information

technology field. Twenty-two students, or 48%, said that their employer did not require industry certification, seven students, or 15%, answered, “Yes,” and ten students, or 22%, did not know.

As shown in Table 4, the majority of the participants responded that they had at least one year of work experience in the information technology field. Four respondents, or 9%, had more than ten years, 11% had five to ten years, 24% had four to five years, 39% had one to three years, 13% had less than one year, and 4% had no information technology work experience.

Table 4

Students’ Work Experience in the Information Technology Field

Work Experience	Sample	
	<i>N</i>	%
None	2	4
Less than one year	5	13
One to three years	18	39
Four to five years	11	24
Five to ten years	5	11
More than ten years	4	9

The researcher used a *Z-test* of proportion to determine whether a significant relationship between certification and job attainment or job promotion exists. The analysis results showed that the proportion of students who reported being hired or promoted due to certification [32.4%] was significantly lower than those who did not [67.6%] ($Z = -2.91, p < .01$). Indeed, of the total participants, six students declined to report on whether certification led to getting a job or being promoted. In contrast, the majority (71%) of participants agreed or strongly agreed that industry certification in information technology helped them get their job. This data reinforces

participants' responses to their perceived confidence in industry certification's role in enhancing their knowledge and skill. Over 67% of participants agreed or strongly agreed that industry certification in information technology improves knowledge and skills in their area of study. About 30% remained neutral concerning their confidence in the role of certification in information technology in enhancing knowledge and skills.

Description of the Employer Sample

Employer Survey

The contact information permission is a part of each community college's general information sharing policies and practices and was not specific to this research. The college provided the researcher with the email addresses of 50 relevant employers, who received an email explaining the research project and inviting them to follow a link to participate in the web-based survey. The participating 50 employers are employers of information technology personnel who serve on the community college's Advisory Committees for its information technology programs. Out of the emails sent to the 50 employers, three of the email messages returned as "undeliverable," leaving an assumed total of 47 employers who received the invitation. Of the 47 employers, 33 responded, yielding 33 useable responses for an overall response rate of 70%.

Sample Employer Demographics

The web-based survey administered to employers included three demographic-related questions regarding the description of the type of business or company, the number of employees in the organization or company, and how many information technology employees are part of the company. All employers responded to the type of company. Respondents predominantly work in the Information Technology (IT) Department. Most employers, 45%, are in a company with one to nine employees, while 30% are part of a company with 10 to 49 employees.

Additionally, 29 respondents, or 88%, indicated they work in a company employing one to nine information technology staff. The detailed results of the demographic characteristics are available in Table 5.

Table 5

Demographic Characteristics of Employer Respondents

Characteristic	Sample	
	<i>N</i>	%
Type of Business or Company		
HR Department only	4	12
IT Department only	22	67
HR and IT Departments	2	6
Other	5	15
Total Respondents	33	
Number of Company Employees		
1 to 9	15	45
10 to 49	10	30
50-99	6	18
100-499	2	6
More than 500	0	0
Total Responses	33	

Characteristic	Sample	
	<i>N</i>	%
Employer-Required Certification		
Yes	6	18
No	27	82
Total Responses	33	

Analysis of Employers' Value of Certification

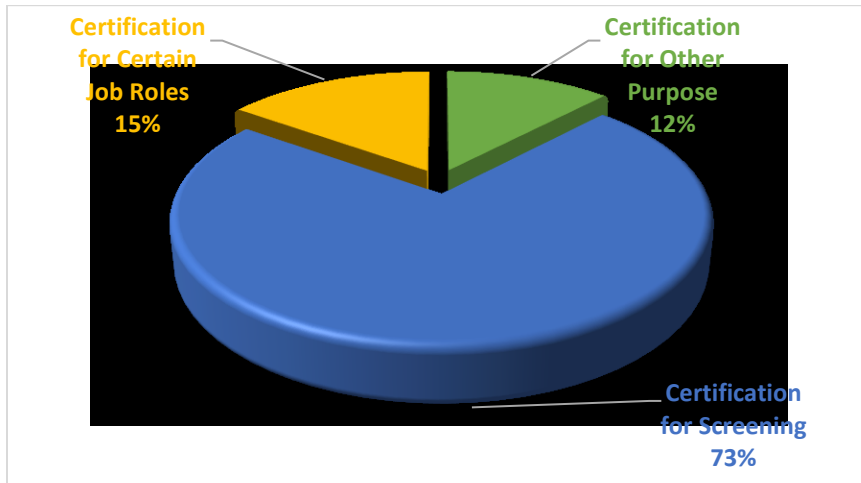
The second research question sought to address how employers value information technology industry certification.

The results of the descriptive analysis revealed several ways in which employers value industry certification. Of the 33 employer respondents, the majority (82%) do not require a potential information technology employee to possess information technology industry certification.

Nevertheless, about 73% of employers consider information technology certifications a factor in the hiring process, at least as a screening criterion (See Figure 4).

Figure 4

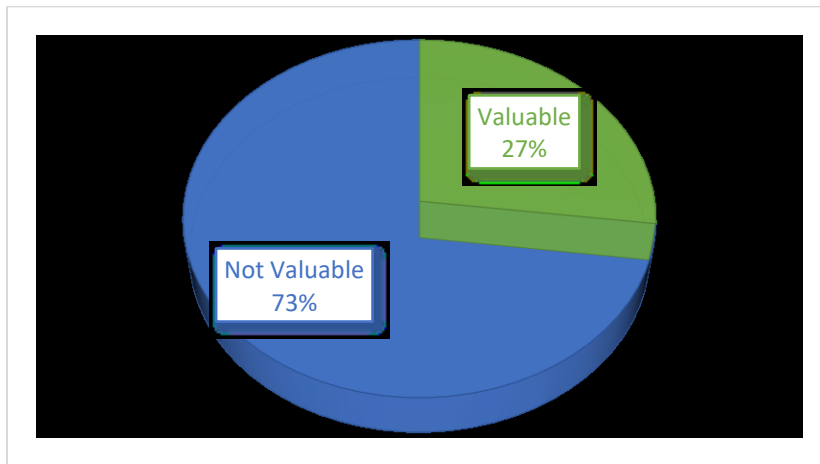
Employers' Perceived Purpose of Certification in Hiring Process



Surprisingly, when asked how valuable industry certification is for hiring preferences, 73% answered not valuable, while 27% answered valuable. (See Figure 5).

Figure 5

Hiring Preferences for Potential Employees with Certification

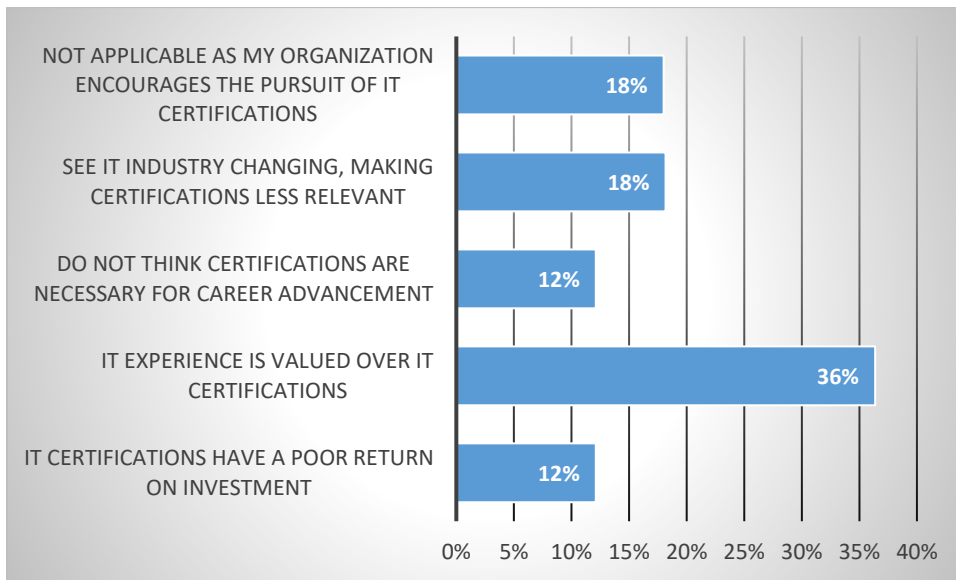


About 63% of the employers think that the HR staff in their organization has at least a basic understanding of what information technology certification represents. In comparison, 21% believe the Human Resources staff has little or no knowledge of IT certifications.

Of the employers surveyed, 18% encourage the pursuit of industry certification. Of the organizations that typically do not promote information technology certification, 36% indicated that information technology experience is valued over information technology certification. Poor return on investment was chosen by 12% of respondents, another 12% do not think certifications are necessary for career advancement, 18% see information technology changing industry, making certification less relevant, and 18% encourage the pursuit of industry certification (See Figure 6). Further, of the employers that do not use industry certification as part of their professional development practice, 33% of employers are not clear on the value of industry certifications to hiring and promotion practices, and 5% do not know about industry certifications.

Figure 6

Employers' Perception of Value of Industry Certification.



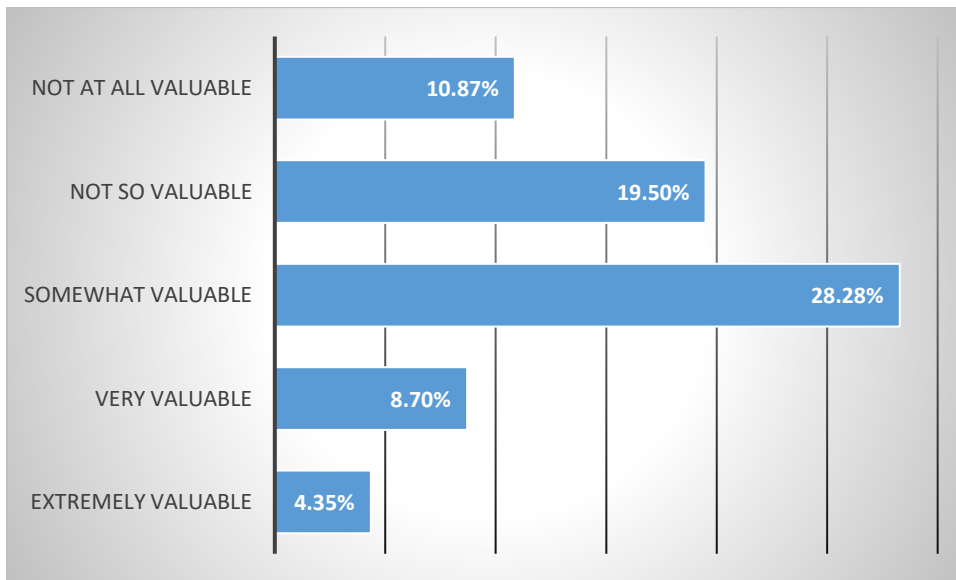
Surprisingly, while 26% of employees receive hiring preferences if they have an industry certification, 73% do not receive hiring preferences. A majority of the employers, 60%, indicated that information technology certification does not make a difference in validating the knowledge

and skill of an employee. In comparison, 30% affirmatively responded that information technology industry certification does make a difference. Also, 60% do not believe information technology certification makes a difference in validating the knowledge and skill of an employee.

Finally, the last survey question asked employers to rank what they perceived was the value of information technology industry certifications for employees seeking employment in the information technology field. On a scale of one to four, with one being “not at all valuable” and four being “extremely valuable,” only two employers, or 4% felt that industry certifications are extremely valuable, and 10.8% believed that technology industry certification is not at all valuable (See Figure 7).

Figure 7

Employers' Perception of Value of Industry Certification



The researcher used a *Z-test* of proportion to determine whether a significant relationship exists between certification and hiring preferences. The analysis results showed that the percentage of employers who confirmed that potential employees would receive hiring preferences if they have an industry certification [27%] was significantly lower than those who did not [73%] ($Z = -3.56, p < .01$). The explanation for this inconsistency is in Chapter 5.

Summary

The data studied and discussed in this chapter presented the opinions and perceptions of the value of information technology industry certification in the hiring process. The data analyzed the perspectives of both employers and students in the field of information technology. The researcher examined demographic information to see what role it played in the choices made by employers and reviewed and analyzed the data to compare the employers' versus applicants' attitudes regarding the value of industry certification in employment in information technology. Chapter 5 will summarize the findings, conclusions, and implications for future research on this topic.

Chapter 5 - Summary, Discussion, and Recommendations

Summary of the Study

Overview of the Problem

With today's growing focus on technology and the subsequent rising need for information technology workers, it may be difficult for employers and students to find the right employment match. Over the past decade, information technology industry certification has grown extensively, bringing questions about its value to employers and information technology students.

The study's design intended to determine how prospective employers and students perceive the value of information technology industry certification. A literature review revealed different interpretations of industry certification and uncovered a need for a more up-to-date study.

The value and benefits assigned to acquiring industry-based certification in the field of information technology are unidentified and typically not quantified or monetized. It is unclear what value employers place on certifications held by students. It is also unclear what effect certification has on the employment experience or the job-seeking experience of students.

As a part of its mission, the California community college system aims to prepare students to enter the workforce. Similarly, gainful employment is a core reason students participate in postsecondary education. Additionally, employers' demand for workers trained in various technical and professional skill areas continues to grow. Examining employers' hiring practices is vital to understanding the significance of information technology industry certification in a competitive information technology workplace.

Research evaluating the value of information technology industry certifications for prospective employers of information technology-related positions is limited. There is even less information available regarding students' perception of the importance of information technology industry certifications and their relationship to job attainment and job satisfaction. While the college itself cannot ensure employment, it can be responsible for preparing the student to the best of its ability to seize employment opportunities.

Purpose of the Study

This study aimed to explore the perceptions of students and employers of information technology personnel regarding the value of information technology industry certification. This study addressed two research questions:

RQ1: From students' perspective, how has industry certification led to job attainment or salary increases?

RQ2: In what ways do employers value information technology industry certifications?

Review of the Methodology

This study used a non-experimental quantitative design to examine two areas: students' perspectives about the value of industry certification received from their community college and employers' perceived value of information technology industry certification. A focused sample of 46 students from one Southern California community college participated by completing questions in a web-based survey anonymously. The sample students met the researcher's criteria of being in a career technical education program and passing one or more industry certification exams. The responses of 46 out of 175 invited students were received and used in this study, yielding a 26% response rate.

The participating employers are employers of information technology personnel designated through the community college's Advisory Committees for its information technology programs for a total of 50 employers. The college provided the researcher with the email addresses of 50 employers. Those employers participated by completing questions in an anonymous, secure web-based survey. The sample employers met the researcher's criteria for employing employees with varied information technology qualifications. The responses of 33 out of 50 invited employers were received and used in this study, yielding a 66% response rate.

Discussion of the Findings

Students' Perceptions of Industry Certification

Maslow's Theory of Motivation served as the theoretical framework for this study, providing a lens for examining students' pursuit of information technology industry certification. This study found that most students ranked better employment opportunities, making more money, and making a better life for themselves and their families as their primary purposes for obtaining information technology industry certification. These motivation-related findings indicate that students seek information technology industry certification as a means for gaining gainful employment, which can satisfy Maslow's self-fulfillment needs as it relates to current and future employability and economic self-sufficiency. This finding confirms the utility value of certification, reflecting a commitment to the profession to realize one's full potential (Gawel, 1996).

These findings related to students' motivations may be helpful to community colleges as they seek to satisfy students' goals and the college's mission. They may potentially raise the importance of information technology industry certification and the significant role community colleges play in preparing students for employment. Moreover, these findings support

recommendations from the literature review that proposed the measure of a college's success should go beyond certificate or degree completion and extend into employment placement outcomes.

Employers' Perception of Industry Certification

The Human Capital Theory served as the theoretical framework for this study, providing a lens for examining employers' perceptions of information technology industry certification and the perceived employability of students with information technology industry certification.

Human capital is the economic value of the abilities and qualities of labor that influence productivity (Becker, 1993; Hughes & Byrd, 2015). These qualities include higher education, technical or on-the-job training, health, and values such as punctuality and work ethic.

Possessing information technology industry certification can result in greater output for the economy and higher income for the individual.

The study found that most employers (82%) do not require a potential employee to possess information technology industry certification for actual employment. However, many (73%) consider information technology certifications as screening criteria when interviewing employees. But, only 28% of employers believe that information technology industry certifications are valuable in validating skills or expertise in a particular area.

Consistent with this pattern, most employers believe that their human resource colleagues have a basic or solid understanding of information technology certifications. The findings broadly support the work of other studies on the value of technology certification (e.g., Cegielski, 2004; Cegielski et al., 2003). Practically, these findings show that community colleges could use this information to explore relationships with outside employer stakeholders to explore increasing awareness about the benefits of the information technology industry certifications.

The test of proportion used to determine whether a significant relationship between certification and hiring preferences by employers exists showed that the proportion of employers who confirmed that potential employees would receive hiring preferences if they have an industry certification was significantly lower than those who did not. In response to the question, "Do you require potential information technology employees to possess information technology industry certification?", 82% said that they do not. However, in answer to the questions, "What is your overall opinion of information technology industry certifications to validate skills or expertise in a particular area?", 73% consider it to be at least somewhat valuable. Based on the most optimistic survey responses (explained in the previous paragraph) relating to using industry certification as screening material and employers' belief that information technology industry certifications are valuable in evaluating skills, this might be an area for further investigation. Perhaps a more comprehensive, varied survey audience would produce more positive results.

This study suggested that employers had a positive perception of information technology industry certification. There may be an opportunity for further assessment of why employers would not give potential employees hiring preferences when holding information technology industry certifications related to the specific job descriptions.

Implications of the Study

This study contributes to a growing body of research focused on the outcomes of community college programs. It captures students' perspectives of the value of information technology industry certification at a unique time in history as many students are experiencing unemployment. The low response rate limits the generalizability of the study results in only one community college in the sample. While the study sample mirrored statewide California community college enrollment in ethnicity, cautious general applications to Hispanic students

may be warranted. Still, further research on this issue would be required to test and potentially expand the applicability of the results across all demographic categories. However, the findings are still representative of a range of California community college students' experiences and perspectives across different colleges, majors, and demographic characteristics. The methodology is also replicable and can apply across the system. Further, the findings are likely transferable to California community college practitioners system-wide, as elements of the research can apply to their similar situation of offering students the opportunity to acquire information technology industry certification.

The results found in this study are encouraging in the sense that employers look at information technology industry certification as screening criteria. Another encouraging outcome is that employers feel that industry certification is valuable in validating skills or expertise in a particular area. Additionally, this study found that most students ranked better employment opportunities, making more money, and making a better life for themselves and their families as their primary purposes for obtaining information technology industry certification.

Recommendation for Future Research

Further study could be conducted in this area to provide additional and more detailed information.

- Research the needs of employers based on their organization type and size.
- Research both specific certifications versus general certifications to find out the perceived value across all certificates.
- Conduct research with a larger pool of both students and employers. There is the possibility that the sample size in this study was too small or unrepresentative of the total

population of California community college students to generalize these findings based on the demographic characteristics.

- Research the value of certification in trade associations to internal and external stakeholders.
- A qualitative study could expand the present research to capture the exact views of information technology employers and employees or potential employees.

While this research may apply to other communities and with different organizations, these findings cannot apply since the generalizability is not directly tested. This research can be easily replicated at various locations to compare the results with associated employability, earnings, job stability, and the impact on hiring preferences.

Finally, an ongoing effort to update the findings in these technology areas is necessary as information technology jobs evolve and employment needs change.

Concluding Remarks

The purpose of this study was to determine the general differences of employer and applicant attitudes and perceptions of the value and implications of holding information technology industry certification(s). In theory, this research intends to give learning institutions guidance in providing learners with the skills needed to gain employment in the information technology field. With technology continuously evolving, employers of information technology personnel's needs are continually changing. More companies will employ the graduates of information technology programs with the proper curriculum planning and offerings. Certification will continue to play an essential role in information technology employment decisions, though positions and perspectives may vary

In the process of information technology certification, many entities must be accountable for certification success. These accountabilities lay with certification organizations, training institutions, employer establishments, and candidates for information technology positions. Researching the perspectives of the technology industry certification brings some areas of interest and concern to the forefront.

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Appendix A – Employer Survey Email Invitation

Subject Line

Response Requested by June 30, 2020. Employer Experience Survey

Body of the Email:

Dear Employer:

I am emailing to request your participation in a *Value of Industry Certification* survey for employers who may hire students who have acquired industry certification(s) through community college programs.

If you are not the person responsible for any of the hiring processes at your company, can you please forward this survey to the appropriate person(s).

The purpose of this survey is to gather and analyze employers' perspectives about the value of industry certification(s).

Your participation in this research project is much appreciated and will consist of completing this short survey, which should take less than five minutes.

Participation in this research is entirely voluntary, and there are no foreseeable risks to you.

Submission of the survey and selecting the consent option will indicate your consent to participate in this research project. Additionally, you can skip any questions you desire.

The results of this research project will be published in a dissertation, but no names are being collected on the survey, and your identity will remain anonymous.

By completing this survey, you will be eligible to opt-in to a drawing to receive a \$25 Amazon gift card as an incentive for your participation.

This research project is being conducted independently by Miriam Valceschini-Lynch, who is a doctoral student utilizing this information to complete a degree at Kansas State University. If you have any questions or concerns about this research project, please contact Miriam Valceschini-Lynch via email at mvlynch@ksu.edu or the Kansas State University research office at comply@k-state.edu.

Thank you.

Appendix B – Employer Survey



The Value of Industry Certifications Employer Survey

1. In relation to HR and IT, which best describes your business or company?

- HR department only
- IT department only
- HR and IT departments
- Other, please specify _____

2. How many employees does your organization have?

- 1-9
- 10-49
- 50-99
- 100-499
- More than 500

3. Specifically, how many IT staff does your company have?

- 1-9
- 10-19
- 20-29
- 30-39
- 40-49
- More than 50

4. Do you require a potential IT employee to possess IT industry certification?

Yes

No

5. In which of the following way(s) do IT certifications factor into the hiring process in your organization? (Choose all that apply).

Used as a screening instrument

IT certifications are required for certain job roles

IT certifications facilitate matching applicant skills with departmental needs

IT certifications are used to differentiate between otherwise equally qualified applicants

Other (please specify)

6. What goes through your mind when you see an IT industry certification listed on a job candidate's resume?

Subject matter expertise

Committed to a career in IT

Good knowledge of subject matter

Shows initiative

7. What is your overall opinion of IT industry certifications to validate skills or expertise in a particular area? Do you consider these certifications:

Extremely valuable

Not so valuable

Very valuable

Not at all valuable

Somewhat valuable

8. Please think about your interaction with you HR staff, how do you think HR colleagues at your organization perceives IT certifications?

- HR Staff has a solid understanding of what IT certifications are all about
- HR staff have a basic understanding of IT certification
- HR staff have little or no understanding of IT certification

9. If your organization does not typically encourage the pursuit of IT certifications, what are the reasons why?

- IT certifications have a poor return on investment
- IT experience is valued over IT certifications
- Do not think certifications are necessary for career advancement
- See IT industry changing, making certifications less relevant
- Not applicable as my organization encourages the pursuit of IT certifications

10. As a result of passing the certification exams, do employees within your organization receive any of the following? Choose all that apply.

- | | |
|---|--|
| <input type="checkbox"/> Salary or pay increase | <input type="checkbox"/> Public recognition, such as highlighting the employee's achievement in a newsletter, during a meeting, etc. |
| <input type="checkbox"/> Bonus | <input type="checkbox"/> None of the above |
| <input type="checkbox"/> Promotion | |

11. Please consider the following statements about potential IT job candidates and IT certifications at your organization. How much do you agree or disagree with each of the following statements about them?

	IT certifications provide a baseline set of knowledge for certain IT positions	IT certified individuals tend to perform better than non-IT certified individuals	IT certified individuals are more likely to be promoted than those without IT c	IT certified individuals receive higher starting salaries than those without IT certification	IT certifications ensure the credibility of IT employees
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strongly Agree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. What benefits has your organization realized as a result of employees being IT certified?

- More productive IT workforce
- More insightful problem solving
- Better communication skills
- Better able to understand new or complex technologies

13. Does a potential employee receive hiring preferences if he/she has an industry certification?

- Yes
- No

14. If you currently do not use industry certifications as part of your talent/professional development practice, why not?

- Not clear on the value of industry certifications to my hiring and promotion practices
- Don't know about industry certifications
- No one applies with any certification
- Other (please specify)

15. Does IT industry certification make a difference in validating the knowledge and skill of an employee?

- Yes
- No

16. How valuable do you perceive information technology industry certifications are for employees seeking employment in the information technology field?

- | | |
|---|--|
| <input type="checkbox"/> Extremely valuable | <input type="checkbox"/> Not so valuable |
| <input type="checkbox"/> Very valuable | <input type="checkbox"/> Not at all valuable |
| <input type="checkbox"/> Somewhat valuable | |

Appendix C – Student Survey Email Invitation

Subject Line

Response Requested by July 2, 2020. Student Experience Survey

Body of the Email

Dear Student:

I am emailing to request your participation in a *Value of Industry Certification* survey for students who have acquired industry certification(s) through community college programs.

The purpose of this survey is to gather and analyze student perspectives about the value of industry certification(s).

Your participation in this research project is greatly appreciated and will consist of completing this short survey, which should take less than five minutes.

To participate in this survey, you must meet the following three criteria:

1. Be 18 years or older;
2. Currently or recently enrolled in a Career Technical Education (CTE) program;
3. Passed an industry certification exam; and

Participation in this research is completely voluntary and there are no foreseeable risks to you.

Submission of the survey and selecting the consent option will indicate your consent to participate in this research project. Additionally, you can skip any questions you desire.

The results of this research project will be published in a dissertation but no names are being collected on the survey and your identity will remain anonymous.

By completing this survey, you will be eligible to opt-in to a drawing to receive a \$25 Amazon gift card as an incentive for your participation.

This research project is being conducted independently by Miriam Lynch who is a doctoral student utilizing this information to complete a degree at Kansas State University. If you have any questions or concerns about this research project please contact Miriam Valceschini-Lynch via email at mvlynch@ksu.edu or the Kansas State University research office at comply@k-state.edu.

Thank you.

Appendix D – Student Survey

The Value of Industry Certifications - Student Survey

Thank you for taking the time to complete my survey!

1. I am 18 years or older and consent to participate in this research project, which consists of completing this survey.

Yes

No

2. My age is

19 or Less

35-39

20-24

40-49

25-29

50+

30-34

Decline to State

3. My ethnicity is

African American

Pacific Islander

American Indian/Alaskan Native

White Non-Hispanic

Asian

Multi-Ethnicity

Filipino

Other

Hispanic

Prefer Not to Say

4. My gender is

Male

Female

Prefer not to say

5. What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree
- High school degree or equivalent (e.g., GED)
- Some college but no degree
- Associate degree
- Bachelor degree
- Graduate degree

6. Are you currently in school or training to update your skills in computer-related technology?

- Yes
- No

7. What is your declared major area of study? Please specify in the space below.

8. How many information technology industry certifications do you have?

- One
- Two
- Three
- Four
- More than four

9. What type of information technology industry certification(s) do you possess? (Choose more than one if applicable).

- MOS (Microsoft User Specialist) (Word, Excel, PowerPoint, Access, or Outlook)
- MTA (Microsoft Technology Associate)
- CompTIA
- CISCO
- IC3

Other (please specify)

10. What is your main motivation for pursuing industry certifications? (Select up to two options that best describe your motivation.)

- To become eligible for better employment opportunities (a new job and/or promotion)
- To make a better life for myself or my family.
- To make more money
- To learn more about a topic or area of interest
- To become a better person
- To satisfy the wishes of my parents
- To improve self-confidence

11. Did you get a job or get a promotion in your current job due to your industry certification?

- Yes
- No

12. I feel that my industry certifications in the IT field helped me to get my job.

- Strongly agree Disagree
 Agree Strongly disagree
 Neither agree nor disagree

13. I am confident that my industry certification gives me the knowledge and skills needed in a job related to my area of study.

- Strongly agree Agree Neither agree nor disagree Disagree
 Strongly disagree

14. In which of the following certification types do you place the most value for IT applicants?

- Standardized Certifications (such as general networking, coding, security, troubleshooting, etc.)
 Individual Brand Certifications (from individual companies such as CISCO or Microsoft)
 Both are of equal importance
 Neither is important

15. How much work experience do you have (both IT and non-IT experience)

- None Four to five years
 Less than one year Five to ten years
 One to three years More than ten years

16. If you were employed in the IT field before obtaining your industry certification, did you receive a salary increase after passing an industry certification exam?

Yes

No

17. If your answer to the previous question was "Yes," what percent salary increase did you receive?

One to Ten Percent

More than Thirty Percent

Ten to Twenty Percent

Prefer not to say

Twenty to Thirty Percent

18. Does your employer require industry certification?

Yes

No

19. Do you agree that an applicant's certification is valuable in the hiring process?

Strongly agree

Disagree

Agree

Strongly disagree

Neither agree nor disagree

Other (please specify)

20. Do you plan to pursue additional IT industry certifications?

Yes

No

If so, which one(s)?

21. My current employment status is

Employed but not in a job in my major area of study.

Employed in a job in my major area of study

Unemployed

22. Are you currently employed in the information technology field?

Yes

No

If you are employed in the information technology field, what is your job title?

If you are not employed in the information technology field, what is your field of employment?


Appendix E – KSU IRB Approval



University Research Compliance Office

TO: Dr. Margaretta Mathis
Adult Learning and Leadership
363 Blumont Hall

Proposal Number: 9849

FROM: Rick Scheidt, Chair 
Committee on Research Involving Human Subjects

DATE: 08/26/2019

RE: Proposal Entitled, "The Value of Obtaining Industry Certification in the Information Technology Field through Community College CTE Programs"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.