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Understanding Why Students Take Industry-Based Credentialing Examinations: Instrument Development and Pilot Study

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UNDERSTANDING WHY STUDENTS TAKE INDUSTRY-BASED CREDENTIALING EXAMINATIONS: INSTRUMENT DEVELOPMENT AND PILOT STUDY

by

Jennifer H. Lawrence, M.A.

A Dissertation Presented in Partial Fulfillment
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We hereby recommend that the dissertation prepared under our supervision by **Jennifer H. Lawrence, M.A.** entitled **Understanding Why Students Take Industry-Based Credentialing Examinations: Instrument Development and Pilot Study** be accepted in partial fulfillment of the Requirements for the Degree of

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ABSTRACT

Educational credentialing is complicated for students with the addition of industry-based credentialing (IBC) in traditional academic and career and technical fields (Bahr, 2015; Lumina Foundation, 2015; Xu & Ran, 2015). Human Capital Theory and Cognitive Engagement Theory framed this study which looked at IBC training from the student point of view (Grisham, 2013; Saldana, 2016; Walters, 2004). The body of literature on credential training is sparse and largely focused on institutional policy rather than student perception and participation (Bahr, 2015; Xu & Ran, 2015). There is evidence that salaries are positively correlated with IBCs and studies show that employers pay more for additional credentials (Bahr, 2015; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015; Xu & Ran, 2015). Increasing IBC exam participation is an important issue for colleges because IBC completion is now being considered as part of the completion rate for institutions (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). An increase in credential completions leads to institutional funding through performance funding models (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017).

A survey instrument was developed through a Delphi to measure why students choose to take IBC examinations. Three themes were developed—Student Services Impact, Academic Instructional Impact, and Intrinsic Motivational Impact. Using the findings from the study, colleges can positively

influence a student's decision to take an IBC exam. The study results demonstrated three areas that connect back to the literature demonstrating where colleges can have a direct effect on a student's decision. The instrument should be used to measure a wider group of students to determine if the themes developed in this study are applicable across all student groups, programs, and institutions.

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DEDICATION

Achieving my Doctorate is the accomplishment of a life-long dream. I could not have achieved this dream without the love and support of my husband and my children. This work is dedicated to Erik who gave me unending physical and emotional support to focus on this dream and achieve this goal. It is also dedicated to my children—Madison, Reese, and Jax. I hope this achievement inspires them to never stop dreaming and to never stop learning.

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ACKNOWLEDGEMENTS

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CHAPTER 1 INTRODUCTION

Education credentialing is confusing to students (Lumina, 2015). In addition to academic degrees, credentials include industry-based credentialing (IBC) (Bahr, 2015). IBCs are a third-party assessment of skills deemed important to that particular industry (Bahr, 2015; Dadgar & Weiss, 2012; Johnson, 2016; Xu & Ran, 2015). The CPA exam to become a Certified Public Accountant or the NCLEX exam to receive a nursing license are examples of IBC exams. Industry-based credentialing has expanded into new areas including: cyber technology, construction management, oil and gas production, business administration, and advanced manufacturing (Lumina Foundation, 2015). The system that students navigate is a complex, multi-layered process that is confusing to students, educators, and businesses alike (Lumina Foundation, 2015; Rosenbaum & Rosenbaum, 2016). IBCs are beneficial to students, employers, and institutions.

The benefit to students is that they earn credentials along their career pathway and course of study (Stevens, Kurlaender, & Grosz, 2015). Students with IBCs have a higher salary potential than those without, which is an important concept for students to understand and for institutions to teach students (Bahr, 2015; Jacobson & Lalonde, 2013; Matheny, Chan, & Wang, 2015; Stevens, Kurlaender, & Grosz, 2015). In career and technical education, academic credentials alone are not enough to get hired in some high demand, high wage jobs (Lumina Foundation, 2015).

The benefit to employers is that companies realize that the education and training of employees is an investment in human capital (Bahr, 2015). One measurement of potential employees' capability can be assessed through IBCs (Bahr, 2015; Bartlett, Horwitz, Ipe, & Liu, 2005; Xu & Ran, 2015). This measurement signals a potential employer the likeliness of the potential employee's capability, thus potentially saving the employer money on training (Bahr, 2015). It is estimated that postsecondary credentials are positively correlated to higher wages more than the number of years of education without a credential (Bahr, 2015; Xu & Ran, 2015).

The benefit to institutions is more funding in states with performance-based funding models (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). In career and technical education, Bahr (2015) noted that the "completion agenda" or the belief that schools are only successful if students complete academic degrees, is changing in large part to the influx of IBCs in academics. In his research, Bahr (2015) identified a segment of college students he described as skills builders who attend college to take a few classes to increase their skillset and/or obtain and IBC. This segment of the college population is growing and by focusing only on academic completion, colleges are getting penalized financially (Bahr, 2015). In some states, short-term, workforce certificates that are aligned to IBCs are now considered "completers" under the performance-based funding formula for higher education (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). Getting IBC completers

is important to institutions to increase funding through performance-based models.

Postsecondary education institutions are aware of the growing trend in IBC training and are actively working to align curriculum with IBCs endorsed by area industry partners (Johnson, 2016). Most students will have the opportunity to take an IBC exam at some point in their college career (Xu & Ran, 2015). Community colleges are better when dealing with the shifting demands of skills training (Bahr, 2015; Xu & Ran, 2015). In his research, Bahr (2015) labeled this population as "skills builders" while Xu and Ran (2015) referred to non-credit training as the "hidden college" within the college environment. Most of the work researching IBC training in non-credit draws a distinction that certain populations benefit greater from this type of training (Stevens, Kurlaender, & Grosz, 2015). Women, adult learners, and developmental (or remedial) learners benefit the most from IBC or workforce training and are often rewarded with a better job opportunity or a higher wage (Stevens, Kurlaender, & Grosz, 2015). While the benefits exist, it remains unclear as to why some students take IBC exams and others do not (Johnson, 2016).

Statement of the Problem

Performance-based funding models are incentivizing career and technical education institutions to redefine how completion rates are calculated (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). More industries desire a skilled workforce which can be identified through IBCs (Aragon, Woo, & Marvel, 2005;

Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, 2000; Castellano, Stone, & Stringfield, 2005). Students are often confused about what qualifies as an IBC, the process to take exams, and the qualifications required to take exams (Johnson, 2016). It is important for institutions to change policies and practices to address this confusion. In Louisiana, IBCs are defined as certifications that have been verified by an independent national third party (Louisiana Workforce Commission [LWC], 2015). These credentials are valued by industry because employers can assess a potential employee's skill level through the standardized skills certification (LWC, 2015). There are high wage, high demand jobs in Louisiana are in technical trades and many of those trades have industry-recognized credentials (LWC, 2015). Colleges should work to align credit courses with IBCs so students can earn both at the same time. The problem is that career and technical institutions need to be more strategic in their programs so that more students complete IBC exam. This study determined the barriers and the rationale that impacts a student's decision to take an IBC exam.

Theoretical Framework

Human Capital Theory assumes that institutions will meet the needs of society and change in response to the demand for skilled labor (van der Merwe, 2010; Walters, 2004). Human Capital Theory is the fundamental belief that education and skills preparation makes people more productive in their jobs (van der Merwe, 2010; Walters, 2004). Proponents of the theory advocate that educated or trained workers are more prepared and therefore, more productive than their lesser or uneducated colleagues (van der Merwe, 2010). The theory

incorporates the belief that formal schooling is needed to develop the cognitive skills associated with certain jobs (van der Merwe, 2010, p. 107).

Investment in education and the establishment of a skilled workforce is an investment in human capital. Bahr (2015) noted that companies realize that the education and training of employees is an investment in human capital. When viewed through a human capitalist lens, investing in a skilled or educated workforce returns for employers are increased productivity, increased job satisfaction, and lower turn-over rates (Rosenbaum & Rosenbaum, 2016). IBCs are a way for employers to have an independent, third-party verification of skills and abilities, thus demonstrating the value of investing in that employee versus someone without the education or skills training (Bahr, 2015; Jacobson & Lalonde, 2013). Looking at the problem through a human capital lens, should show that employers embrace IBCs as a way to screen prospective employees and provide a calculated way to determine the amount of investment a company should make in that prospective employee.

In addition to Human Capital Theory, the Cognitive Engagement Theory lens is valuable to address the problem looking at possible intrinsic motivations of students. Cognitive Engagement Theory informed the perspective on a student's decision to take an IBC exam. Cognitive Engagement Theory addresses the amount of effort demonstrated by students in their own learning experiences (Fredricks, Blumenfeld, & Paris, 2004; Smiley & Anderson, 2011). In programs that do not require an IBC completion, students must put forth effort to learn about IBC exams, understand the process, and independently take the exam.

Significance of the Problem

There is a benefit for students who graduate with credentials (Bahr, 2015; Rosenbaum & Rosenbaum, 2013). Because of the confluence of industry wanting more students with IBCs and politically the desire to have more completers, there is a need to have more students complete IBCs. Some high demand, high wage careers require more than a traditional academic degree (Lumina Foundation, 2015). Students who have IBCs may have a better chance of employment at higher wages (Matheny, Chan, & Wang, 2015). It is estimated that postsecondary degrees are worth more with IBCs added to it (Bahr, 2015; Xu & Ran, 2015). More students completing credentials leads to more funding within performance-based funding models (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). Programs linked to IBC training are becoming eligible for funding because students who complete this training are now being counted as "completers" in performance-based funding models (Louisiana BoR, 2017). This is an important metric for institutions because they can potentially increase funding by aligning programs with IBCs (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). Institutions have incentives to get more students to take more IBCs. It is important to determine a way to make this happen. This study used the Delphi Method to develop an instrument to try and understand what influences a student's decision to take an IBC exam.

Purpose of the Study

The purpose of this study was to determine the primary factors that affect a student's decision to take an IBC exam. The literature demonstrates that IBCs benefit students, employers and institutions (Bahr, 2015; Johnson, 2016; Matheny, Chan, & Wang, 2015; Rosenbaum & Rosenbaum, 2013; Xu & Ran, 2015). Students benefit through higher wage potential (Matheny, Chan, & Wang, 2015). Institutions benefit through performance-based funding models that reward institutions with additional funding if completion rates are higher (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). Because there is a benefit to both institutions and students, college administrators should encourage students to take IBC exams.

There is more literature describing college administrative viewpoints of IBC attainment and fewer that look at student decision-making (Aragan, Woo, & Marvel, 2005; Bragg & Reger, 2000; Xu & Ran, 2015). Not as well established in the literature at the student-level. More student-level data would be beneficial to college administrators as they try to develop policies to address completion rates. An instrument is necessary for college administrators to use to measure the primary factors that influence their student population to take an IBC exam.

Skilled-based programs that lead to IBCs is alternative academic training and it is important for workforce development (Bahr, 2015; Jacobson & LaLonde, April 2013; Stevens, Kurlaender, & Grosz, 2015). Xu and Ran (2015) demonstrated a positive correlation between skills-based program completions

and skills tied directly to jobs. The relevance of the job skills to the job is positively correlated and communicating the positive correlation from the institution to the student is important. Because of the potential benefits, the instrument development in this study and the subsequent student data will benefit college leadership.

Research Methodology

The research was divided into two phases: (Phase 1) the development of an instrument via the Delphi Method and (Phase 2) the Beta Test of that instrument which I analyzed and used as a Pilot Study. An instrument was developed in Phase 1 of the study to measure why students, from the perspective of CTE instructors, take industry-based credential (IBC) exams.

The Delphi Method was used to create the survey instrument. The Delphi Method is used to achieve a consensus of opinion using subject matter experts (Hsu & Sandford, 2007). The Delphi method was appropriate for this study because the scientific methodology is good for issues that require input from subject matter experts (Grisham, 2008). This research used expert opinions to craft an instrument to measure the rationale students used when deciding to take an IBC exam. Phase II of the study Beta Tested the survey and analyzed the data in a small Pilot Study.

Research Question

The purpose for this study was to answer the following question: Why do students in career and technical education programs take industry-based credential (IBC) exams? The study was designed to create an instrument to measure why

students take IBC exams. In education, the value of industry-based credentials is prominent with educators and it is highly valued by employers (Bahr, 2015; Johnson, 2016; Rosenbaum & Rosenbaum, 2016; Xu & Ran, 2015). However, the research is unclear if students see the same value in industry-based credentials that employers use when hiring graduates.

Definitions

Delphi Method is used to achieve "convergence of opinion concerning real-world knowledge solicited from experts within certain topic areas" (Hsu & Sandford, 2007, p. 2). The Delphi method is appropriate for this study because "it provides a scientific methodology that is well suited to issues that require the insights of subject matter experts" (Grisham, 2008, p. 114). The Delphi method was designed to achieve one or more of the following objectives:

1. To determine or develop a range of possible program alternatives;
2. To explore or expose underlying assumptions or information leading to different judgments;
3. To seek out information which may generate a consensus on the part of the respondent group;
4. To correlate informed judgments on a topic spanning a wide range of disciplines, and;
5. To educate the respondent group as to the diverse and interrelated aspects of the topic. (Hsu & Sandford, 2007, p. 1)

Industry-based credential or IBC is defined as “an independent, third-party credential that is industry-accepted and results from a process whereby an individual's knowledge and/or skill in a particular area is verified against a set of pre-determined standards” ("IBC," 2015, p. 1). According to the Louisiana Workforce Commission, “An IBC is tangible evidence that an individual has successfully demonstrated skill competencies in a specific set of work-related tasks, a single occupational area, or a cluster of related occupational areas as recognized by a specific industry…Employers, as members of a particular industry base, participate in setting the standards and creating criteria for certificate attainment” ("IBC," 2015, p. 1).

Limitations

This study is limited by the time available for the study, the instrument of the study, and the sample response rate of the study. The study was conducted over the summer and among one community college system. While 11 colleges were represented in the Delphi phase of the study, all colleges were part of the same system in one southern state. The purpose of the dissertation project was to gain insight on the value of industry-based certifications from a student’s perspective. The survey used a traditional Likert-type items and Likert Scales to determine how students view the value of industry-based certifications. Every effort was made to ensure a high response rate. Efforts included multiple follow up contacts and encouragement through email. The sample size was limited however, it met the threshold acceptable for Delphi panels (Hsu & Sanford, 2007; Gaston, 2014). Sample size included the immediate population available. Using

an electronic, mobile-friendly format was designed to increase response rate and number of contacts per panel expert and per student. Additionally, the survey was intentionally short to encourage response (Phillips, Phillips, & Aaron, 2013).

Delimitations

A sample was selected from the population of community college students. The sample was limited to students in career and technical education fields and they were surveyed about the role of industry-based certifications (IBC) in their respective programs of study. Those programs included, but were not limited to: Cyber Technology, Oil and Gas Production Technology, Industrial Technology, Advanced Manufacturing and Mechatronics, Accounting, Business Administration, and Advanced Welding. This sample is representative of the college campus as a whole in terms of student demographics and student type—e.g. online students, traditional students, night students, etc. These programs were chosen because: 1) these programs have the most industry-based credentials embedded into their respective programs and 2) the industry partners and potential employers of students from these programs are interested in industry-based certifications. The sample was also limited to the students in classes whose instructor volunteered to Beta Test the survey.

Conclusion

Industry-based credentials provide a benefit to students, employers, and institutions. A weakness in the literature is the lack of focus on IBC training from a student perspective. This study developed a survey using the Delphi Method to measure what issues influence a student's decision to take an IBC exam. The

study used a panel of CTE instructors to narrow down the categories that affect student decision. The survey instrument was Beta Tested in a small Pilot Study of CTE students and the results were analyzed to gain insight from a student perspective. Because IBCs are a benefit to institutions through performance-based funding models, institutions should communicate to students the positive correlation between employer desire to have more employees with IBCs and the higher wages earned by those with IBCs so students will decide to sit for IBC exams. CHAPTER 2 will review the literature relevant to industry-based certifications and higher education.

CHAPTER 2 LITERATURE REVIEW

Industry-based credential (IBC) education is popular in career and technical education (CTE) (Lumina, 2015). Credentials include two and four-year academic degrees and industry-based credentials (IBC) (Bahr, 2015). Understanding credentials is a complex, multi-layered system that is confusing to students, educators, and businesses alike (Lumina Foundation, 2015; Rosenbaum & Rosenbaum, 2016). Credentialing has expanded into new areas including: cyber technology, construction management, oil and gas production, business administration, and advanced manufacturing (Lumina Foundation, 2015).

There are benefits of IBCs for students, employers, and institutions. The benefit to students is that they earn credentials along their career pathway and course of study (Stevens, Kurlaender, & Grosz, 2015). If a student does not complete an academic degree or certificate, potentially, they could still have an IBC to demonstrate to potential employers a specific skillset (Bahr, 2015; Stevens, Kurlaender, & Grosz, 2015). Students who have IBCs have a better chance of employment at higher wages (Matheny, Chan, & Wang, 2015). It is estimated that postsecondary credentials have a higher labor market return than the number of years of education without a credential (Bahr, 2015; Xu & Ran, 2015). Most of the work researching IBC training draws a distinction that certain populations receive a greater benefit from this type of training (Stevens, Kurlaender, & Grosz, 2015). Women, adult learners, and developmental (or remedial) learners benefit the most from IBC or workforce training and are often

rewarded with a better job opportunity or a higher wage (Stevens, Kurlaender, & Grosz, 2015).

The benefits of IBCs for employers concerns the need for a skilled workforce. Employers want employees with a demonstrated skillset (Bahr, 2015; Stevens, Kurlaender, & Grosz, 2015). In career and technical education, academic credentials alone are not enough to get hired in some high demand, high wage jobs (Lumina Foundation, 2015). Bahr (2015) noted that companies realize that the education and training of employees is an investment in human capital. One measurement of potential employees' capability can be assessed through IBCs (Bahr, 2015). This measurement signals a potential employer the likeliness of the potential employee's capability, thus reducing the risk to the employer and potentially save the employer money on training (Bahr, 2015). Together with the academic credential, the IBC signals to potential employers that the student has passed a third-party assessment of skills deemed important to that particular industry (Dadgar & Weiss, 2012).

The benefit to institutions is additional funding through performance-based funding models (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). In CTE education, the performance funding is affected by the number of completers (Bahr, 2015). IBC completers should be included in the performance-based funding models (Bahr, 2015). In his research, Bahr (2015) has identified a segment of college students he described as "skills builders" who attend college to take a few classes to increase their skillset and/or obtain and IBC. This segment

of the college population is growing (Bahr, 2015). Dismissing skills builders as completers penalizes colleges financially (Bahr, 2015). In some states, short-term, workforce certificates that are aligned to IBCs are now considered "completers" under the funding formula for higher education (Kansas BoR, 2014; Louisiana BoR, 2017; NCSL, 2015; Washington State Board of Community & Technical Colleges; 2017). Getting IBC completers is important to institutions.

Because IBCs are recognized across industries and because they are taught in both a credit and non-credit format, most students will have an opportunity to earn an IBC at some point in their college career (Xu & Ran, 2015). Xu and Ran (2015) observed that there is not a lot of data on non-credit students and credential attainment due to the traditional college focus on academics. Community colleges are better when dealing with the shifting demands of skills training (Bahr, 2015; Xu & Ran, 2015). In his research, Bahr (2015) labeled this population as "skills builders" while Xu and Ran (2015) referred to non-credit training as the "hidden college" within the college environment.

Part of the confusion surrounding industry-based certifications (IBCs) is the definition of IBC used in various studies. Colleges label certifications, degrees, awards, diplomas, and programmatic outcomes differently. While there are a few commonly accepted terms, colleges create programs which have a different threshold for both academic and non-credit awards (Lumina Foundation, 2015). Industry-based credentials are defined as credentials earned by a student, issued by an independent third party, and endorsed by industry (LWC, 2015). These credentials are often national in nature and many times they are issued

through the industry association (LWC, 2015). The addition of IBCs to the academic training adds an independent endorsement of the skills covered during the program (Xu & Ran, 2015). Given the employment implications of IBCs, students should take advantage of IBC testing throughout their career pathway. This study developed an instrument to measure why students decide to take IBC exams and Beta Tested the instrument with students in career and technical education programs as a Pilot Study.

Theoretical Framework

This study was designed to study the problem of IBC exams through the Human Capital Theory lens. Human capital theory assumes that educational institutions respond to an increased demand for skilled labor (Walters, 2004). Individuals will pursue education until the cost of acquiring more education is greater than the benefit (Walters, 2004). Education and skills preparation makes people more productive in their jobs (van der Merwe, 2010; Walters, 2004). This theory assumes that educated or trained workers are more prepared and therefore, more productive than their lesser or uneducated colleagues (van der Merwe, 2010). The compensation for individual investment in education is a higher wage and the probability of future income growth (Karpova, et al., 2016). Research indicates that the impact of education 60% of the difference in earnings due to the level of education (Karpova, et al., 2016).

When viewed through a human capitalist lens, investing in a skilled or educated workforce returns are measured in increased productivity, increased job satisfaction, and lower turn-over rates (Rosenbaum & Rosenbaum, 2016). IBCs

are a way for employers to have an independent, third-party verification of skills and abilities, thus demonstrating the value of investing in that employee versus someone without the education or skills training (Bahr, 2015; Jacobson & Lalonde, 2013). Employers should embrace IBCs as a way to screen prospective employees and provide a calculated way to determine the amount of investment a company should make in that prospective employee.

Critics of human capital theory assert that the theory does not take into count several factors and should be replaced with more up-to-date theories—like credentialism, which looks at the value of academic credentials (Walters, 2004). Critics note that human capital theory does not account for the benefit to the upper class regarding access and success in higher education (Walters, 2004). Human Capital Theory does not account for other social and structural arrangement which perpetuate inequality and suggest that some people are not socially and culturally prepared to gain access and succeed in higher education (Walters, 2004). Most of the critics to human capital theory are questioning the value of academic credentials. The abstract nature of academic degrees does not specify the skills holders of these degrees have and therefore, the value of these degrees come into question (van der Merwe, 2010). Walter (2004) observed that a concern among credentialists is the perspective that higher education does not guarantee a respectable job. By definition, IBCs represent confirmation of acquired skills verified by a third independent organization validated by industry (LWC, 2015). Even if students do not perceive the same value of IBCs as employers, research shows that employers are in tune with their employment needs because they are

using credentials to move employees with the relevant skills into those jobs (Bahr, 2015; Jacobson & Lalonde, 2013; Walters, 2004; Xu & Ran, 2015). Therefore, institutions should put more effort into moving graduates into jobs that require particular skills training (Walters, 2004). The Human Capital Theory has a strong application for this study because it is often considered strongest in relation to applied and technical programs versus liberal arts or humanities programs (Walters, 2004). The strongest support for Human Capital Theory is individual-level evidence, which suggests that educated and skilled people earn higher wages than others (Walters, 2004). Given this evidence, it is necessary to relate the value of IBCs to students, so they will invest the time and energy into taking and passing industry-based examinations earning these valuable credentials.

Cognitive Engagement Theory can be used to determine what efforts can be made to engage students in this part of the learning process. Cognitive engagement in academic work is defined as "A psychological process involving the attention, interest, investment, and effort students expend in the work of learning" (Smiley & Anderson, 2011, p. 18). This definition is appropriate for this study to try and determine why students choose to take IBC exams. This engagement includes the investment in and effort directed toward learning, and mastering the skills promoted by the academic work (Smiley & Anderson, 2011). This use of investment and effort aptly describes what is needed to engage students in IBC exams (Fredricks, Blumenfeld, & Paris, 2004; Smiley & Anderson, 2011). The idea of investment suggests the willingness put forth the effort necessary to understand difficult skills (Fredricks, Blumenfeld, & Paris,

2004, p. 60). Cognitive engagement is also used when measuring the impact of assessments (Smiley & Anderson, 2011).

Cognitive engagement depends on the context in which it is deployed (Smiley & Anderson, 2011). Because IBC exams are context rich in one industry, cognitive engagement is more applicable to the study than motivational theory or goal orientation theory (Smiley & Anderson, 2011). Critics of cognitive engagement theory cite problems with measurement as a rationale to dismiss results (Smiley & Anderson, 2011). Because cognitive engagement is an intrinsic factor, it is difficult to measure (Smiley & Anderson, 2011). However, this study was not designed to measure the engagement of students. It was designed to discover what issues impact and influence their engagement with IBC exams. Engagement is malleable, so looking at IBC exam participation through this lens suggests that faculty and administrators can have an affect on student engagement with IBC exams and therefore, positively impact participation (Fredricks, Blumenfeld, & Paris, 2004, p. 60). Cognitive Engagement as a lens for the study suggests that the investment students make in their own learning can be influenced therefore, increasing the opportunity for colleges to improve exam rates (Fredricks, Blumenfeld, & Paris, 2004). Together with the human capitalist lens, cognitive theory rounds out the internal and external factors that influence a student's decision to take an IBC exam.

Review of the Literature

The literature review began by researching topics including: career and technical education, industry-based credentials, and workforce training. The

search resulted in a broad range of studies, so the search was restricted to more specific terms including: job-driven training, industry recognized standards, IBC and curriculum design, sector training, career pathways, and IBCs and academics. These search terms helped to isolate literature related to industry-based credentials and the impact those credentials have on academic teaching and workforce development. Included with these search terms, specific attention was given to studies that focused on the college environment. While studies exist regarding credentialing, no specific studies looked at an academic environment that merged curriculum with IBCs. Additionally, studies did not research the reasons why students choose to take or not take IBC exams.

This research culminated in 26 studies. Inclusion criteria for this review were as follows: (a) the study must explore alternative credentialing, (b) the study included a breakdown of industries studied, and (c) the study included participants from a college setting. Fifteen studies met the criteria and were included in the review.

Non-credit credential training -- Research regarding industry-based credential (IBC) training within an academic setting is relatively new. Early research established that monitoring alternatives to traditional academic training was important for workforce development (Bahr, 2015; Bragg, Reger, & Thomas, October 1997; Jacobson & LaLonde, April 2013). IBC training occurs in non-credit divisions of academic institutions (Xu & Ran, 2015). There is a lack of data due to poor tracking of non-credit students (Xu & Ran, 2015). Xu and Ran (2015) suggested that completion rates for non-credit students increased when

training is directly tied to an occupation. The majority of the studies involved surveying the administration of colleges rather than researching individual student outcomes (Bahr, 2015; Xu & Ran, 2015). Looking at the administrative benefits of teaching IBCs within academics is not the same as looking at student outcomes as it relates to IBC training (Xu & Ran, 2015).

Industry-based Credentials -- Studies explored a wide range of industries. Due to the technical nature of industry-based credential (IBC) training, a majority of the industries studied included more technical trades like manufacturing, construction, cyber and computer occupations (Aragon, Woo, & Marvel, 2005; Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, 2000; Castellano, Stone, & Stringfield, 2005). Of the credentials studied, researchers noted that there are significant returns for the students who graduated with industry-based credentials as well as academic credentials (Dadgar & Weiss, 2012; Rosenbaum & Rosenbaum, 2016; Stevens, Kurlaender, & Grosz, 2015). With regard to students who earn credits but not necessarily credentials, Bahr (2015) found earnings gains at all levels of community college education attainment.

Review of the Benefits of IBCs -- Several studies tracked wage information after academic credential completion and compared the wages of those students who completed the academic credential versus students who did not complete (Bahr, 2015; Rosenbaum & Rosenbaum, 2016; Stevens, Kurlaender, & Grosz, 2015). There is a lack of information regarding short-term certificate training and occupational or industry-specific training (Bahr, 2015; Stevens, Kurlaender, & Grosz, 2015). Studies focused on credentialing based on industry type and

specific credentialing from an Administrative point of view and how it benefits institutional change (Aragon, Woo, & Marvel, 2005; Bragg & Reger, 2000). The methodologies used varied with regard to treatments, participants, and research design. A majority of the research studies used a mixed method design to explore credentialing and workforce training (Bragg, Reger, & Thomas, 1997; Bragg & Reger, 2000, Castellano, Stone, & Stringfield, 2005; DuPre & Williams, 2011). Additionally, surveys were the most common treatment and most studies used several rounds of surveys to follow up with students after graduation at multiple points during their career (Aragon, Woo, & Marvel, 2005; Bragg, Reger, & Thomas, 1997; Bragg & Reger, 2000; Callahan & Strong, 2004; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015).

Effective Heutagogy -- A relatively new term, heutagogy, has emerged in the study of adult learning (Nadelson, et al., 2016). This category of self-determined learning differs from its pedagogy (direct instruction) and andragogy (self-directed learning) counterparts because it "occurs without a structure or leader setting the context and directing the learning toward a specific goal" (Nadelson, et al., 2016, p. 220). The Nadelson, et al. (2016) study sought to determine how college students engage in self-determined learning. The researchers wanted to know the motivations, goals, and processes college students use when directing their own learning experiences (Nadelson, et al., 2016). The study also tried to show how college students not only accessed the information, but how they judged the information (Nadelson, et al., 2016). Unlike in direct instruction where the teacher plays a key role in determining the value of information

sources, on their own, college students may or may not have the skills necessary to decipher good information from bad information (Nadelson, et al., 2016). Heutagogy supports the Cognitive Engagement lens for this study as cognitive engagement also measures the determination of students to engage and invest in their own learning experience. These theories suggest that students may need direct instruction or encouragement from faculty and college leadership to pursue IBC attainment.

Today, 21st Century skills include the ability to decipher information and the ability to determine if the information is reliable and from a trustworthy source (Nadelson, et al., 2016). In an effort to judge the skills of the participants, Nadelson, et al. (2016) needed to determine the motivation, goals, and processes college students make in effort to find this information through self-determined learning. Nadelson, et al. (2016) noted that "with self-determined learning experiences, the responsibility of determining what source to access and the value and accuracy of the information is completely up to the student" as opposed to directed instruction (p. 220). With self-determined instruction, students have "complete control of their learning and are responsible for making decisions in terms of direction for exploration, the supporting information sources, value of the information sources, and accuracy of the accessed information" (Nadelson, et al., 2016, p. 220). Nadelson, et al. (2016) concedes that self-determined learning rarely happens in formal education, it does occur outside the classroom when adult students decide what to read and watch. In addition to traditional sources for information, more and more adult students are getting information from other

sources and left to determine the validity of those sources (Nadelson, et al., 2016). Given that the decision to take an IBC may happen outside of formal education, knowing how students make that decision, and determining what barriers exist for students is helpful to faculty and college leadership.

The Johnson (2016) study looked at motivation of graduate students to take an industry-based exam in project management. The study tried to determine if graduate students were taking the Project Management Professional and Certified Associate in Project Management after taking for-credit project management course (Johnson, 2016). Even though a majority of students were interested in the certification, but few actually pursued the certification (Johnson, 2016). While graduate students likely exemplify heutagogistic tendencies confusion about the IBC process and requirements were barriers for students who wanted to take the exams (Johnson, 2016). Johnson (2016) recommended that institutions look for better ways to engage students to take the exams and educate students about the process.

Research Methodology

The methodologies used varied with regard to treatments, participants, and research design. A majority of the research studies used a mixed method design to explore credentialing and workforce training (Bragg, Reger, & Thomas, 1997; Bragg & Reger, 2000, Castellano, Stone, & Stringfield, 2005; DuPre & Williams, 2011). Additionally, surveys were the most common treatment and most studies used several rounds of surveys to follow up with students after graduation at multiple points during their career (Aragon, Woo, & Marvel, 2005; Bragg, Reger,

& Thomas, 1997; Bragg & Reger, 2000; Callahan & Strong, 2004; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015).

A survey instrument was not available to measure student decision-making, so it was necessary to create one. The Delphi Method is specific about the process used to create the instrument. This study followed the best practices established for the Delphi Method. This method uses multiple rounds of questionnaires to collect data from a panel of experts and form a consensus on the issues presented (Grisham, 2008; Hsu & Sandford, 2007). Through the multiple rounds, the study maintained the primary characteristics with using the Delphi technique: anonymity, a feedback process, and statistical analysis techniques to interpret the data (Hsu & Sandford, 2007). By maintaining these characteristics of the survey design model, it helped reduce the effects of "noise" which is defined "as the effects of dominant individuals which often is a concern when using group-based processes used to collect and synthesize information" (Hsu & Sandford, 2007, p. 2).

Following other study methodologies as a guide, the use of electronic surveys to collect the respondent opinions aided in collecting and soliciting honest feedback (Aragon, Woo, & Marvel, 2005; Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, IV, 2000; Bragg, Reger, IV, & Thomas, 1997; Callahan & Strong, 2004; DuPre & Williams, 2011; Hsu & Sandford, 2007; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015).

The respondents for this survey were college instructors and professors who are subject matter experts in career and technical education (CTE) fields and

that use IBCs in curricula development or have curricula mapped to IBCs either by course or by program. Most of the studies on IBC have focused on administrative personnel (Aragon, Woo, & Marvel, 2005; Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, IV, 2000; Bragg, Reger, IV, & Thomas, 1997; Callahan & Strong, 2004; Jacobson & LaLonde, 2013). These instructors were selected from community colleges across several CTE disciplines including, but not limited to: cyber technology, allied health, nursing, mechatronics, advanced manufacturing, engineering technologies, accounting, business administration, and oil and gas production mirroring the participants in several studies (Aragon, Woo, & Marvel, 2005; Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, IV, 2000; Bragg, Reger, IV, & Thomas, 1997; Callahan & Strong, 2004; DuPre & Williams, 2011; Hsu & Sandford, 2007; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015; Stevens, Kurlaender, & Grosz; Xu & Ran, 2015).

The survey results were analyzed using quantitative data analysis. Quantitative research summarizes results numerically (Lodico et al., 2010). This description of results through numbers helps researchers determine relationships between variables. For this study, I used a nonexperimental design to describe whether a relationship exists between variables (Lodico et al., 2010). I determined how students value IBCs through an instrument developed during the Delphi study phase of the project which used a Likert scale that assigns numbers to attitude constructs from strongly agree to strongly disagree. Quantitative measures were represented in several studies (Aragon, Woo, & Marvel, 2005; Bahr, 2015; Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, IV, 2000; Bragg,

Reger, IV, & Thomas, 1997; Callahan & Strong, 2004; DuPre & Williams, 2011; Hsu & Sandford, 2007; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015; Stevens, Kurlaender, & Grosz; Xu & Ran, 2015). Quantitative methods worked best because this phase of the study used several of the characteristics of a quantitative relationship study as defined by Lodico, et al. (2010) including: measurement of at least two variables thought to be related, data collected at one point in time, scores on each variable obtained for each individual, and correlations computed between the scores for each pair of variables using statistical tests. By using statistical analysis of precise enumerated skills via a survey instrument, this study should use a quantitative approach to reach desired results (Merriam, 2009).

A quantitative approach is necessary to measure student value of IBCs for several reasons. This correlational, nonexperimental design is appropriate to answer the research question because it tries to discover the relationship between two or more variables (Lodico, et al., 2010). This study did not try to determine causation, but rather if a relationship exists between the variables under investigation (Lodico, et al., 2010). Surveys were used as the instruments to collect the information for this study.

Research Design

The research design is consistent with the studies exemplified in the literature (Aragon, Woo, & Marvel, 2005; Bahr, 2015; Bartlett, Horwitz, Ipe, & Liu, 2005; Bragg & Reger, IV, 2000; Bragg, Reger, IV, & Thomas, 1997; Callahan & Strong, 2004; DuPre & Williams, 2011; Hsu & Sandford, 2007;

Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015; Stevens, Kurlaender, & Grosz; Xu & Ran, 2015). The variables measured via the survey include: student attitude on the value of IBCs; students understanding of IBC impact on future wages; student feeling of academic preparedness; and students evaluation of IBC cost and access.

The study is a Correlational Study because the study tried to examine if a relationship exists between variables—rationale students have regarding taking IBC exams (Rockinson-Szapkiw, 2013). This design is often used as exploratory research and is predictive in nature (Rockinson-Szapkiw, 2013). One weakness in this design is that it cannot determine cause and effect as it would threaten the validity of the research (Rockinson-Szapkiw, 2013). The study results were collected through online surveys using Survey Monkey. The online software platform allows for multiple surveys and individual response tracking via individual email links.

Conclusion

This overview of the literature addressed the current conditions surrounding industry-based credential (IBC) training, lack of student engagement, and instructional methods used to reach students during this training (Aragon, Woo, & Marvel, 2005; Bragg, Reger, & Thomas, 1997; Bragg & Reger, 2000; Callahan & Strong, 2004; Jacobson & LaLonde, 2013; Matheny, Chan, & Wang, 2015). In summary, a majority of the current research studied administrative impact and more research is needed from a student perspective to learn why students are not taking IBC exams (Aragon, Woo, & Marvel, 2005; Bragg &

Reger, 2000). Administrators, faculty, employers, and industry can do more to encourage students to take the exams and to become credentialed. The Human Capital Theoretical lens indicates that a more credentialed workforce is a better prepared workforce (Walter, 2004). Additionally, institutions will benefit financially from investing in IBC training and aligned courses (Bahr, 2015; Xu & Ran, 2015).

The weakness in the literature include: a lack of information on individual student wage outcomes, a lack of information regarding student success and completion rates, and underreported non-credit certification data post completion of the training (Bahr, 2015; Xu & Ran, 2015). Additionally, studies did not include research on how traditional career services are embedded into technical programs (Bahr, 2015; Xu & Ran, 2015). There are benefits of industry-based or workforce training in specific occupations (Bragg & Reger, 2000; Johnson, 2016; Rosenbaum & Rosenbaum, 2016). There is a connection and general benefit for students who graduate with credentials (Bahr, 2015; Johnson, 2016; Stevens, Kurlaender, & Grosz, 2016). The studies showed the vast differences in the manner in which colleges approach career and technical training (Bahr, 2015; Xu & Ran, 2015). The different approaches by colleges creates a complicated system of credential options and students are often confused about what options would be most beneficial (Lumina Foundation, 2015). This lack of clarity for students contributes to the lack of information about the value of credentials after graduation (Johnson, 2016). This complicated system also necessitates strong advising for students to reap the full benefits of credential attainment (Lumina

Foundation, 2015). More research is necessary with regard why students choose to take IBC exams to demonstrate the benefit of embedding industry training in academics to college administrators and faculty as well as increase IBC credential attainment for students. CHAPTER 3 outlines the Delphi technique used in the study, the research design, and the study sampling used for the study.

CHAPTER 3 METHODS

Together with the academic credential, the IBC signals to potential employers that the student has passed a third-party assessment of skills deemed important to that particular industry (Dadgar & Weiss, 2012). Much like passing a CPA exam or national Nursing Exam (NCLEX), other industry-certifications are confirmation of a graduate's skillset in a given field (Bahr, 2015). Earning credentials benefits students because students who have IBCs have a better chance of employment at higher wages (Matheny, Chan, & Wang, 2015). What remains unclear is why students choose to take the IBC exam. Educators need an instrument to help measure why some students pursue IBCs, why others do not pursue IBCs, and what efforts can be made to increase IBC exam completion rates.

Statement of the Problem

Due to the technical nature of industry-based credential training, a majority of the industries represented in the literature include more technical trades like manufacturing, construction, cyber and computer occupations (Aragan, Woo, & Marvel, 2005; Barlett, et al, 2015; Castellano, Stone, & Stringfield, 2005). Of the credentials studied, there are significant returns for the students who graduated with industry-based credentials as well as academic credentials (Bahr, 2015; Stevens, Kurlaender, & Grosz, 2015). With regard to students who earn credits but not necessarily credentials, Bahr (2015) found earnings gains at all levels of community college education attainment.

There are benefits of industry-based or workforce training in specific occupations from an employer perspective (Bahr, 2015; Castellano, Stone & Stringfield, 2005)). The literature demonstrates a connection and general benefit for students who graduate with credentials (Bahr, 2015; Jacobson & LaLonde, 2013; Stevens, Kurlaender, & Grosz, 2015). There are differences in the manner in which colleges approach career and technical training (Bahr, 2015; Xu & Ran, 2015). Students are often confused about what credentials would be most beneficial (Johnson, 2016; Lumina, 2015; Rosenbaum & Rosenbaum, 2013). This lack of clarity for students contributes to the lack of information about the value of credentials after graduation (Johnson, 2016; Lumina, 2015). Therefore, a large number of students do not take advantage of aligned curriculum and take the national or international IBC exam (Johnson, 2016).

College administrators do not know why students are not completing more IBC exams. Administrators need an instrument to help them determine why students decide to take IBC exams. A large number of students do not take advantage of aligned curriculum and take the national or international IBC exam (Johnson, 2016). A lack of instrument to measure the attitudes of specific college populations contributes to the problem. This study used a methodological process to design an instrument and presented that instrument to students across a college system. The instrument is necessary for college administrators to measure the unique responses for their college population and therefore, they can prioritize and focus on solutions specific to their student body concerns.

Research Question and Propositions

The purpose for this study was to answer the following question: Why do students in career and technical education take industry-based credential (IBC) exams? The study was designed to use a Delphi to create an instrument to measure why students take IBC exams. In education, the value of industry-based credentials is prominent with educators and it is highly valued by employers (Bahr, 2015; Rosenbaum & Rosenbaum, 2016; Xu & Ran, 2015).

To measure the perceptions of students, I designed, created, and distributed a survey to participants and asked students to assess the value of industry-based credentials (IBC) and to assess what issues encourage them to take IBC exams. This study required a mixed methodology. Phase 1 of the study used the Delphi Method to develop a survey instrument to measure student attitudes. Phase 2 distributed the survey to students in career and technical fields as a Beta Test of the survey to measure attitudes about IBCs.

No instrument exists to measure why students take IBC exams. An instrument is needed so education leaders can measure their institutional student body to determine why students take IBC exams. I used a qualitative approach during the survey development stage to gather expert opinions and code the data to reach a consensus on what questions should be included in an instrument. The survey administration to students required a quantitative approach to gather enough data about student perceptions to be significant.

IBCs are beneficial to students and institutions. A core proposition that informed by study is that when students place a similar value on IBCs as

employers and educators, they choose to take IBCs. Institutions and students would benefit from having better information more readily available on IBC exam completion rates and rationale. Knowledge about what influences a student's decision to take an exam will help leadership decide how to increase exam rates.

Research Methodology

The research methodology for this study was divided into two stages: (Phase 1) the creation of an instrument via a Delphi, and (Phase 2) the Beta Test of that instrument with students as a Pilot Test of the instrument to determine why students take IBC exams. A Delphi was used to create a survey to measure the value students place on IBCs. To help students, leaders in higher education need more information on how to motivate students to take IBC exams.

The Delphi was used to create the survey instrument. The Delphi Method is used to achieve a consensus on real-world knowledge from subject-matter experts (Hsu & Sandford, 2007). The Delphi method was appropriate for this study because it is a methodology that uses the insights of subject matter experts (Grisham, 2008). Leaders in higher education do not adequately understand why students are not earning more industry-based credentials. This research used expert opinions to craft an instrument to measure the rationale students used when deciding to take an IBC exam.

The Delphi was designed to achieve one or more of the following objectives:

1. To determine or develop a range of possible program alternatives;

2. To explore or expose underlying assumptions or information leading to different judgments;
3. To seek out information which may generate a consensus on the part of the respondent group;
4. To correlate informed judgments on a topic spanning a wide range of disciplines, and;
5. To educate the respondent group as to the diverse and interrelated aspects of the topic. (Hsu & Sandford, 2007)

This study focused primarily on the second objective because I wanted to know the underlying assumptions students make that determines whether or not they will take an industry-based exam. Additionally, because IBCs are multi-disciplinary, the research was useful to correlate informed judgments across all CTE fields.

The Delphi was necessary to measure how students view IBCs for several reasons. To determine a broader generalization of student attitude, a large sample size is necessary. In addition, to determine attitudes on a specific trait or determination, Likert Scales are used, which are quantitative measures. This correlational, nonexperimental design is appropriate to answer the research question because it tries to determine the relationship between two or more variables (Lodico, et al., 2010). This study will not try to determine causation, but rather determine, through application of a quantitative statistical analysis, if a relationship exists between the variables (Kraska, 2010; Lodico, et al., 2010).

Even though, with this design, cause and effect cannot be determined because it would threaten the validity of the study, I did not try to determine cause and effect. I tried to determine if the expectations of students were realistic in terms of the value of IBCs. I tried to determine what issues influence a student's decision to take an IBC exam and if higher education leaders can do anything to positively affect and/or influence a student's decision to take an IBC exam.

Theoretical Population

The theoretical population is 1) educational leadership responsible for designing curricula; 2) instructors who use IBCs in courses; 3) all students currently enrolled in a college program that contains industry-based credential training; 4) those potential students interested in increased training in career and technical fields; and 5) employers who want to hire a skilled workforce. The population of interest includes those who will benefit. Students, employers and institutions will benefit from the findings of the study. Educational leaders can use the information to make institutional changes that will affect curriculum and policy changes that could impact a student's decision to sit for an IBC exam. Instructors will be interested in the findings of the study because the literature suggests that instructors have an influence over students and could help educate them about the possible income potential earned with IBCs (Aragon, Woo, & Marvel, 2005; Bragg & Reger, IV, 2000; Bragg, Reger, IV, & Thomas, 1997; Jacobson & LaLonde, 2013). IBCs are a benefit for students in terms of future earning potential (Matheny, Chan, & Wang, 2015). If students better understood why they decide to take IBC exams, perhaps more students will choose to take

IBC exams. Employers who want to hire a skilled workforce will benefit from the study findings (Bahr, 2015; Rosenbaum & Rosenbaum, 2016; Stevens, Kurlaender & Grosz, 2015).

Study Population

For Phase 1, the study population included all career and technical education (CTE) instructors at twelve community colleges within one college system. All CTE instructors were emailed the Round 1 survey. The study population of available instructors to answer the first round survey was 320 instructors. The study population was limited because the study was conducted over the summer and not all CTE instructors work in the summer. All surveys were completed electronically via Survey Monkey and included a plan to follow-up with those contacts who did not respond. For Phase 1 – survey development – instructors had 10 days to respond (Phillips, Phillips, & Aaron, 2013). Reminder emails were sent at day 5 and the day before the survey results were due. Research demonstrates that with electronic communication, 10 days is enough time to respond to the survey request and that multiple reminders are necessary to increase the response rate (Phillips, Phillips, & Aaron, 2013).

Sampling Frame

To contact the instructors, I received a list of instructors in all CTE fields within one community and technical college system. The first round questionnaire was emailed to all 320 CTE instructors. For the Delphi method, there is not an absolute number of experts necessary to design the instrument,

however, the average for Delphi studies is 12 to 20 experts that serve on a panel (Garston, 2014; Hsu & Sandford, 2007).

Sample

Of the 320 instructors who opened the first round questionnaire, 40 instructors participated in the first round of the study. After the open-ended questions were coded, the second round questionnaire was emailed to all 40 first round participants. Of the 30 that opened the email, 22 instructors responded to the second round questionnaire. For the Round 3 Alpha Test, all 22 instructors were emailed the final survey. Of the 22 contacted, 15 participated in the final round and seven instructors offered to Beta Test the instrument with their students as a Pilot Study.

Total sample size for Phase 2 – survey Beta Test administration – was comprised of community college students from different community colleges within one state system. The students were selected randomly through a link to the electronic survey by instructors who served on the Delphi Round 3 panel and who offered to send the Beta Test of the survey to their students. Using an electronic, mobile-friendly format was designed to increase response rate and number of contacts per instructor and per student (Phillips, Phillips, & Aaron, 2013). Along with each survey, instructors and students received an email describing the research and the importance of a response. The students are accustomed to receiving requests for survey responses for program development.

The study and research plan, methodology, and survey instrument was submitted to the Institution Research Board (IRB) at Louisiana Tech University.

To ensure participant awareness about the voluntary nature of the participation in the research study, participants were provided additional information via electronic communication and consent form prior to taking the survey.

Research Design

The Delphi is specific about the process used to create the instrument. This research followed the best practices established for the Delphi method. This method uses multiple rounds of questionnaires to collect data from a panel of experts and form a consensus on the issues presented (Grisham, 2008; Hsu & Sandford, 2007). Through multiple rounds, the study maintained the primary "characteristics inherent with using the Delphi technique: the ability to provide anonymity to respondents, a controlled feedback process, and the suitability of a variety of statistical analysis techniques to interpret the data" (Hsu & Sandford, 2007, p. 2). By maintaining these characteristics of the survey design model, it helped reduce the effects of "noise" which is defined "as the effects of dominant individuals which often is a concern when using group-based processes used to collect and synthesize information" (Hsu & Sandford, 2007, p. 2). The use of electronic surveys to collect the respondent opinions aided in collecting and soliciting honest feedback (Hsu & Sandford, 2007). Additionally, using multiple rounds to collect and disseminate feedback "allows each participant an opportunity to generate additional insights and more thoroughly clarify the information developed by previous iterations" (Hsu & Sandford, 2007, p. 2).

The participants for the survey design phase were college instructors and professors who are (1) subject matter experts in CTE fields and that (2) use IBCs in curricula development or have curricula mapped to IBCs either by course or by program. These instructors were selected from community colleges across several CTE disciplines including, but not limited to: cyber technology, allied health, nursing, mechatronics, advanced manufacturing, engineering technologies, business administration, and oil and gas production. Because IBCs are included in part of all these disciplines, the Delphi method was appropriate as it is "an option for complex and intertwined subjects that cross over disciplinary boundaries" (Grisham, 2008, p. 115). It is important to gather data from different fields to determine if certain programs have greater success with IBCs and if so, what best practices can be translated for other fields to increase student participation. The Delphi literature does not have exact criteria for selecting panel experts, however, generally:

> Individuals are considered eligible to be invited to participate in a Delphi study if they have somewhat related backgrounds and experiences concerning the target issue, are capable of helpful inputs, and are willing to revise their initial or previous judgements for the purpose of reaching or attaining consensus. (Hsu & Sandford, 2007, p. 3)

Hsu and Sandford (2007) note that the most qualified individuals are divided into three primary groups:

1. The top management decision makers who will utilize the outcomes of the Delphi study;
2. The professional staff members together with their support team; and
3. The respondents to the Delphi questionnaire whose judgements are being sought. (p. 3)

The experts should be highly trained in the areas of focus (Grisham, 2008). Collegiate instructors and professors who recognize the value of IBCs and who interact with students on a daily and repetitive basis are the most qualified to help craft the proper instrument to gauge student opinion on these issues. In this study, the faculty participants serve two roles (1) as the "professional staff members" and (2) as the "decision makers" who can implement the results of the survey (Hsu & Sandford, 2007). The panelists are stakeholders in the outcome of the study so that they can better help students succeed and find employment.

Role of Researcher

In this study, the role of the researcher was to prepare interview questions and code the results (Lodico, et al., 2010). In addition, I played "an interpretive role in the data analysis and writing of the report" (Lodico, et al., 2010, p. 161). Because I want to better understand student attitudes about IBCs, the questions were designed in a manner that provides for the best climate for college instructors to be open and honest in their responses.

In an effort to control for researcher bias, I used respondent validation in subsequent rounds of the Delphi to assure that the interpretation of survey

responses matched the intent of the respondents. Following the Delphi technique, each round disclosed the categories and responses of the group in the previous round and asked the panel of experts to comment on the priorities and responses of the group. Each round provided additional opportunities for respondents to clarify or change responses from the previous round in an effort to reach consensus. This multi-round approach helped control for researcher bias. In addition, I have provided an audit trail of survey responses from Round 1 in Appendix A to accommodate future researchers who want to build upon this research.

I work for a community college in the state where I conducted the research. I acknowledge that in my role, the potential funding implications for increasing IBC exams is important to my institution. Helping my institution and our student population is a primary reason why I wanted to do this research. However, it is important to note that I did not conduct any research for any of the Delphi Rounds or the Pilot Study on the college campus where I work.

Ethical Considerations -- The Belmont Report (1979) outlines the following three basic ethical principles: Respect for Persons, Beneficence, and Justice. Respect for persons refers to the protection of all human subjects and that they should be treated as autonomous agents including subjects with diminished capacity. The autonomous subjects have the capability to deliberate about personal goals and acting on those goals. To not respect the autonomy of the subjects is to deny the freedom of the subjects to act on their own considerable judgments. In total, Respect for Persons requires researchers to make sure that subjects enter into the study voluntarily and with adequate information. To make sure participants in the study know about the voluntary nature of the participation a consent form and explanation of the study was provided to students at the beginning of the survey.

Beneficence refers to the researchers' responsibility to make sure that human subjects are not only protected from harm, but that they make an effort to secure the well-being of human subjects. This concept has two general rules: "1) do not harm and 2) maximize possible benefits and minimize possible harms" (Belmont Report, 1979, p. 15). This concept extends beyond the human subjects to the entire enterprise of research. Researchers should recognize long-term benefits and risk to society at large based on this research and seek to minimize harm while maximizing benefits. This research could provide benefits to students if the value of IBCs can be determined and increased in career and technical education. The increase in the number of IBCs earned by students will translate to better wages and therefore, benefit students.

The third principle, justice, address the question of who should receive the benefits of the research and who should bear the burdens of the research (Belmont Report, 1979). This concept tries to assure that the research is equally distributed among the human subjects. An injustice occurs when a human subject is treated unfairly without due cause. To determine the equity of the research, several formulations should be considered including: to each person an equal share, to each person according to need, and to each person according to merit (Belmont Report, 1979). In this study, all participants received the same survey in the same format, which minimized any harm to human subjects and all subjects will be treated fairly.

The principal of anonymity refers to the personal identifying information of the subjects. To protect the identity of the human subjects, the researcher can decide to not collect the personal identifying information (birthdate, name, social security number, etc.) and instead use a numbering system to protect the identity of the human subjects and ensure the objectivity of the researchers. Confidentiality refers to the protection the researcher provides for the subjects' personal identifying information (PII). For this study, no PII was collected and survey responses were assigned unique identification numbers by the survey software—Survey Monkey.

Before surveys were distributed to instructors and students, the study was submitted to the Institution Research Board (IRB) at Louisiana Tech University. After receiving approval, the research study followed the plan prescribed in the Methodology and Research Design.

Data Collection and Analysis

The survey development process began with Round 1. This questionnaire contained open-ended questions designed to solicit specific information on the topic of IBCs (Hsu & Sandford, 2007; Grisham, 2008). The first round questionnaire is in Appendix B. Respondents were allotted 10 days to answer the initial questionnaire (Phillips, Phillips, & Aaron, 2013). The responses to the open-ended questions were analyzed. The results were coded into primary trends for consensus and incorporated into the Round 2 questionnaire.

For the initial Delphi Round, structural coding was used to analyze the qualitative data received from the open-ended questions on the survey. Structural coding was appropriate for the first round of the Delphi because it is question-based and suitable for open-ended survey responses (Saldana, 2016). Structural coding allows for the identification of text on broad topics (Saldana, 2016). Structural coding is beneficial to the Delphi Round 1 because the panel of experts were asked to identify multiple reasons why students choose to take IBC exams (Saldana, 2016). Additionally, structural coding provides an opportunity to determine frequencies based on the number of individual participants who mention the same response (Saldana, 2016). The code frequencies are listed within the results from each round of the survey. The code frequencies were developed from the number of times a reason was listed in the open-ended questions. The codes helped formulate the development of categories in the open-ended responses. Drawn from the participants' own word choice, the categories

presented a system for how questions in subsequent rounds could be constructed (Saldana, 2016).

The questionnaire for Round 2 was sent to all respondents asking them to review the summarized items based on Round 1 responses and rank-order the items presented to determine the priorities of the group (Hsu & Sandford, 2007). This round helped respondents see areas of agreement and disagreement on the topic and provide other opinions for thought (Hsu & Sandford, 2007). When respondents ranked their priorities, they were asked to provide a rationale for their responses. Consensus began to form in Round 2. The Delphi literature indicates that consensus is achieved when responses reach 80% of responses fall within two categories on a seven-point Likert Scale (Hsu & Sandford, 2007; Grisham, 2008). Another way to ensure consensus is to use the successive rounds to track the consistency of responses (Hsu & Sandford, 2007). The rationale expressed by the panelists was coded for categories and included in the subsequent survey round.

During Round 3 (the final round and Alpha Test of the survey), the items and ratings gathered during Round 2 were disseminated in a final survey formatted for student response. Panelists were asked to agree with the majority consensus or to further justify their rationale for remaining outside the consensus (Hsu & Sandford, 2007). The literature suggests that Round 3 will likely only show a slight increase in consensus (Grisham, 2008; Hsu & Sandford, 2007). This round was the last time for the panelists to further clarify their opinions. The number of rounds in a Delphi study vary but usually range from three to five

rounds and the number of rounds is indicated by how quickly the panelists reach a consensus on the issues surveyed (Hsu & Sandford, 2007).

After the initial survey round when the qualitative data were coded for emerging themes, quantitative analysis was used in subsequent rounds to determine consensus. For Delphi research, the most common statistics are those that measure central tendency and dispersion (Hsu & Sandford, 2007). Measurements of tendency are mean, median, and mode (Hsu & Sandford, 2007). Measurements of dispersion are standard deviation and inter-quartile range, which when combined present information concerning the collective judgments of respondents (Hsu & Sandford, 2007). The use of mean score based on a Likert-type scale is strongly recommended because it reflects the consensus of opinion (Hsu & Sandford, 2007). If there is clustering around two or more points, the use of the mode statistic is indicated (Hsu & Sandford, 2007). This statistical data were used to determine consensus and narrow down the priorities of the panel experts resulting in a survey suitable to distribute to students and measure their attitudes on the importance of IBCs and why they do or do not take IBC exams to earn the credential.

During the second phase of the study, the survey was sent to students registered in CTE courses. The survey results were analyzed using quantitative data analysis. Quantitative research summarizes results numerically (Lodico et al., 2010). This description of results through numbers helped determine relationships between variables. This study was created as a non-experimental design to describe whether a relationship exists between variables (Lodico et al.,

2010). Quantitative methods worked best because this study used several of the characteristics of a quantitative relationship study as defined by Lodico, et al. (2010) including: measurement of at least two variables thought to be related, data collected at one point in time, scores on each variable obtained for each individual, and correlations computed between the scores for each pair of variables using statistical tests.

Validity

Validity of an instrument is a fundamental element in the evaluation of the efficacy of that instrument. Validity measures to what extent an instrument measures what it intends to measure (Tavakol & Dennick, 2011). Content validity addresses the degree to which an instrument measures the proposed content area (Lodico, et al., 2010). In examining the content validity of the survey, faculty participated in the creation and testing of the survey questions through the Delphi Method process. In the Delphi Method process, content validity is established as experts determine that all areas of the content have been adequately covered (Lodico, et al., 2010). Through the two initial rounds and the Alpha Test round, the instructors had an opportunity to establish the areas of content surrounding IBCs, to express their opinions on the importance and to reach consensus about the rank order and the appropriateness of the themes covered in the Likert Scales (Lodico, et al., 2010).

Conclusion

A Delphi was designed to create an instrument that measures some of the rationale why students choose to take IBC exams. The theoretical population

includes those who will benefit from the findings of the study—students, employers, and institutions. In the Delphi, a panel of experts were contacted in subsequent rounds to form a consensus on the primary factors that influence student decision-making. The experts were solicited from the study population of available CTE instructors across one community and technical college system. The study population was limited to the available instructors who worked over the summer. Even though the requirements for the Delphi were met, the summer semester was not the ideal time to get widespread participation. The final Delphi Round was a Pilot Study with students to Beta Test the instrument. The students were selected by the instructors who participated in the initial Delphi Rounds. The Delphi technique is designed to establish content validity and to control for researcher bias. Research bias is controlled through subsequent rounds when the panelists are asked to reconfirm the opinions from the previous round and offer up changes, if necessary. If this is true, educators need to make an effort to fill the gap between student value and employer value. The results and data analysis are discussed in detail in CHAPTER 4 of the dissertation.

CHAPTER 4 RESULTS

Industry-based credentials benefit students, employers and institutions (Bahr, 2015; Bragg, Reger, & Thomas, October 1997; Jacobson & LaLonde, April 2013; Matheny, Chan, & Wang, 2015). Most of the IBCs issued are in technical industries like cyber technology, healthcare, industrial technology, and advanced manufacturing where third party national IBCs are valued (Aragan, Woo, & Marvel, 2005; Barlett, et al, 2015; Castellano, Stone & Stringfield, 2005). Of the credentials studied, researchers noted that there are significant returns for the students who graduated with industry-based credentials as well as academic credentials (Rosenbaum & Rosenbaum, 2016; Stevens, Kurlaender, & Grosz, 2015). With regard to students who earn credits but not necessarily credentials, Bahr (2015) found earnings gains at all levels of community college education attainment. What remains unclear is why students choose to take the IBC exam. Educators need an instrument to help measure why some students pursue IBCs, why others do not pursue IBCs, and what efforts can be made to increase IBC exam completion rates. An instrument is needed because each institution can use it to determine why students choose to take IBC exams and identify the applicable barriers for their student population.

Statement of the Problem

Institutional policy regarding industry-based credential (IBC) attainment and college administrators are studied more than individual student outcomes to encourage change at an institutional level rather than at a student level (Aragan,

Woo, & Marvel, 2005; Bragg & Reger, 2000; Xu & Ran, 2015). Alternatives to traditional academic training is important for workforce development (Bahr, 2015; Bragg, Reger, & Thomas, October 1997; Jacobson & LaLonde, April 2013).

The data on student success with IBCs and completion rates is incomplete (Bahr, 2015; Xu & Ran, 2015). There are significant benefits of industry-based or workforce training in specific occupations from an employer's perspective (Bahr, 2015). There is a general benefit for students who graduate with credentials (Bahr, 2015; Jacobson & LaLonde, 2013; Stevens, Kurlaender, & Grosz, 2015). A large number of students do not take advantage of aligned curriculum and take the national or international IBC exam (Johnson, 2016). An instrument to measure student opinion is needed. The lack of instrument contributes to the problem because colleges do not have a way to measure student populations. While the literature demonstrates trends in the student population, colleges would benefit if they could measure their own populations to strategically target a response to help increase exam rates among their students.

Research Questions and Propositions

The purpose for this study was to answer the following question: Why do students in career and technical education take industry-based credential (IBC) exams? The study used a Delphi to create an instrument to measure why students take IBC exams. As defined in CHAPTER 3, a Delphi is used to achieve a consensus opinion from a panel of experts within the topic area (Hsu & Sanford, 2007). The Delphi achieves consensus through multiple rounds of questions for

the expert panel (Hsu & Sanford, 2007). In career and technical education, the value of industry-based credentials is prominent with educators and it is highly valued by employers (Bahr, 2015; Bragg & Reger, 2000; Xu & Ran, 2015). However, the research is unclear if students see the same value in industry-based credentials that employers use when hiring graduates.

IBCs are beneficial to students and institutions. A core proposition that informed by study is that when students place a similar value on IBCs as employers and educators, they choose to take IBCs. Institutions and students would benefit from having better information more readily available on IBC exam completion rates and rationale. Knowledge about what influences a student's decision to take an exam will help leadership decide how to increase exam rates.

Methodology

A Delphi is used to achieve consensus concerning real world knowledge from subject matter experts (Hsu & Sandford, 2007). The Delphi is appropriate for this study because it is good for issues that require the opinions of subject matter experts (Grisham, 2008). I used the study results from instructors to develop an instrument to measure student attitudes. Additionally, because IBCs are multidisciplinary, the research will be useful to correlate informed judgments across all CTE fields.

Research Design

The Delphi method is specific about the process used to create the instrument. This research study followed the best practices established for a Delphi. This method uses multiple rounds of questionnaires to collect data from a

panel of experts and form a consensus on the issues presented (Grisham, 2008; Hsu & Sandford, 2007). Through multiple rounds, I maintained the primary characteristics of the Delphi technique: anonymity to respondents, controlled feedback, and statistical analysis techniques to interpret the data (Hsu & Sandford, 2007). By maintaining these characteristics of the survey design model, it helps reduce the effects of "noise" which is defined "as the effects of dominant individuals which often is a concern when using group-based processes used to collect and synthesize information" (Hsu & Sandford, 2007, p. 2). The use of electronic surveys to collect the respondent opinions aided in collecting and soliciting honest feedback (Hsu & Sandford, 2007). Additionally, using multiple rounds to collect and disseminate feedback allows each participant to create additional insights and clarify the information developed in previous rounds (Hsu & Sandford, 2007).

The respondents for the survey design phase were college instructors and professors who teach in career and technical education (CTE) fields. These subject matter experts also use IBCs in curricula development or have courses or programs mapped to IBCs either. These instructors were selected from community colleges across several CTE disciplines including, but not limited to: cyber technology, allied health, nursing, mechatronics, advanced manufacturing, engineering technologies, business administration, accounting, and oil and gas production. Because IBCs are included in part of all these disciplines, a Delphi is appropriate because it is used with complicated subjects that cross disciplines (Grisham, 2008). It is important to gather data from different fields to determine

if certain programs have greater success with IBCs and if so, what best practices can be translated for other fields to increase student participation. Collegiate instructors and professors who recognize the value of IBCs and who interact with students on a daily and repetitive basis are the most qualified to help craft the proper instrument to gauge student opinion on these issues. In this study, the faculty participants serve two roles (1) as the professional staff members and (2) as the decision makers who can implement the results of the survey (Hsu & Sandford, 2007). The panelists are stakeholders in the outcome of the study so that they can better help students succeed and find employment.

Analysis of Data

For Phase I, the survey development phase, all career and technical education instructors at twelve community colleges within one college system were emailed the Round 1 survey. All surveys were completed electronically via Survey Monkey and the number of participants who opened the survey and participated are included with each Round's results below. For Phase 1, survey development, instructors had 10 days to respond. Reminder emails were sent out before the survey results were due.

Code Development -- For the initial Delphi Study Round, structural coding was used to analyze the qualitative data received from the open-ended questions on the survey. Structural coding was appropriate for the first round of the Delphi because it is question-based and suitable for open ended survey responses (Saldana, 2016). Structural coding allows for the identification of text on broad topics (Saldana, 2016). Structural coding is beneficial to the Delphi Round 1 because the panel of experts were asked to identify multiple reasons why students choose to take IBC exams (Saldana, 2016). Additionally, structural coding provides an opportunity to determine frequencies based on the number of individual participants who mention a particular category (Saldana, 2016). The code frequencies are listed within the results from each round of the survey. The code frequencies were developed from the number of times a reason was listed in the open-ended questions. The codes helped formulate the development of categories in the open-ended responses. Drawn from the participants' own word choice, the categories presented how questions in subsequent rounds could be constructed (Saldana, 2016).

Presentation of Results

Phase I -- Delphi Study -- Round 1

The survey development process began with Round 1. This questionnaire contained open-ended questions designed to solicit specific information on the topic of IBCs (Hsu & Sandford, 2007; Grisham, 2008). A draft of the first round questionnaire is in Appendix B. Of the 320 instructors who opened the

questionnaire, 40 instructors responded. The respondents represented 11 different community colleges in Round 1 and 14 different career and technical disciplines. I analyzed the responses to the open-ended questions and I created categories from the consensus. The categories were color coded by question. Responses that included the same phrases or synonyms were included in the same category. Each participant was randomly assigned a number from 1 to 40. The participant numbers were used in the audit trail for all questions and categories. A complete audit trail for Round 1 is included in Appendix A.

The instructors were asked to list reasons why students do not take IBC exams. From the 40 responses to this open-ended question, four categories were identified.

TABLE 1 – Round 1, Question 3

Q3 Themes	**Financial Burden or Cost**	**Confidence in ability to pass exam**	**Not Required for the course or program**	**Lack of interest or value in IBC**
Participant Response	1, 2, 9, 11, 14, 18, 19, 24, 25, 28, 33, 35, 37, 38	16, 17, 22, 27, 31, 33, 37, 38	1, 3, 4, 28, 36, 39	9, 14, 19, 21, 34, 40

Among those categories, Financial Burden or Cost was mentioned 14 times. The second category that emerged with eight mentions centered around students' Lack of Confidence in the ability to pass the exam. This category also suggests that students do not feel academically prepared to take and pass the exam successfully. There was a tie between the third and fourth categories in the survey. The third category demonstrated that instructors feel students have a Lack of Interest in the

IBC because they have a misunderstanding about the value of IBC. The findings in this category were mentioned six times during this round of the survey. The fourth category with six mentions centered around the voluntary nature of IBC exams. Instructors responded that if the exams are Not Required for a course or program, students are less like to take the exam.

Another question asked instructors to list reasons why students choose to take an IBC exam.

TABLE 2 – Round 1, Question 4

Q4 Themes	Employability	Confidence in passing the exam	Required for the course or program
Participant Response	1, 3, 4, 9, 11, 13, 18, 20, 22, 23, 24, 25, 27, 30, 33, 34, 35, 38	2, 13, 14, 16, 17, 19, 21, 31, 35, 36	1, 6, 8, 9, 10, 26, 28, 32, 37

Three primary categories were developed from the responses to this question. Better Employability was named most often with 18 mentions from the group. The second most common category with 10 mentions was student perceived Confidence in Passing the Exam and acquiring the IBC. The third category, with nine mentions, was because the IBC exam is a Course/Program Requirement.

Instructors were asked about influences on students that impact their choice to take the IBC exam.

TABLE 3 – Round 1, Question 5

Q5 Themes	Financial Burden or Cost	Lack of interest or value in IBC	Lack of confidence in the ability to pass or Lack of academic preparedness	Lack of access to the IBC exam

Participant Response	1, 2, 9, 13, 14, 18, 19, 23, 24, 27, 28, 37, 38	1, 4, 11, 13, 22, 24, 33, 34, 35, 36, 40	9, 10, 17, 23, 26, 28, 31, 37	1, 16, 18, 21, 22, 27, 31, 37

Four primary categories were developed that were similar to the categories from the first question. Cost or Financial Burden was mentioned the most in the responses (13 mentions); Lack of Value in IBC attainment was mentioned 11 times; Lack of Confidence in the Ability to Pass/Lack of Academic Preparation was mentioned eight times; and Lack of Access to the IBC exam (transportation issues, poor time management, unsure about how take the exam) was the fourth category with eight mentions. The Lack of Access was a new concern that was developed in this question but was previously not mentioned as a concern.

Given those potential influences, instructors were asked what can be done to encourage students to take IBC exams.

TABLE 4 – Round 1, Question 8

Q8 Themes	**Instructors Emphasize the Importance for Employability**	**Make the IBC exam Mandatory**	**Incorporate Fees into Course or Program Fees**	**Engage Employers or Former Students to show value**	**Better Academic Preparation to Boost Confidence**
Participant Response	1, 3, 9, 14, 16, 17, 18, 19, 21, 23, 24, 33, 35	2, 4, 6, 8, 11, 16, 21, 22, 26, 30	13, 22, 25, 36, 37	5, 9, 22, 34, 40	16, 27, 28, 31

Five categories were developed from the 40 participants in response to this question. Instructor Emphasis on the Importance of the Exam and/or the Value of

the IBC for Future Employability was the most common response with 13 mentions. Making the IBC exam a Mandatory part of the Program or Course was the second most common response with 10 mentions. Incorporating Exam Fees into mandatory course fees was the third most common response with five mentions. Engaging Employers and Former Students to demonstrate the importance of the exams was tied as the third most common response with five mentions. Better Preparation to Boost Student Confidence in passing the exam was the fifth most common response identified with four mentions.

The next open-ended question asked, "What role does faculty play in influencing IBC exam preparation?"

TABLE 5 – Round 1, Question 9

Q9 Themes	**Very Important**	**Important – To provide Encouragement**	**Important – To academically prepare students for the exam**	**Not Important**
Participant Response	2, 3, 6, 9, 13, 16, 17, 19, 21, 22, 23, 24, 28, 34, 37, 40	1, 4, 5, 14, 18, 26, 27, 35, 40	8, 13, 14, 18, 30, 31, 32, 33, 36, 40	7, 11, 12, 15, 20, 39

Given the responses to the previous questions, it is not surprising that 34 of 40 instructors indicated that instructors play a Very Important or Important Role in influencing student exam preparation. Only six respondents felt that instructors played a reduced role or no role in exam preparation. Participants who felt that instructors play an Important Role listed positive reinforcement, encouragement, and motivation as some of the ways instructors can impact a student's decision to

take the IBC exam. Of those who felt instructors played a reduced role or no role, most felt that without it being a part of the course, their role is limited.

The final open-ended question in Round 1 asked instructors to share any other experiences and/or opinions about IBCs, academic programs, or other survey items not covered, but relevant to the conversation.

TABLE 6 – Round 1, Question 10

Q10 Themes	**Nothing to add**	**Increasing IBC Awareness and/or Education**	**Incorporating the Cost of Exam Fees into Course Fees**	**Making IBC Exam Mandatory**
Participant Response	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 24, 25, 27, 30, 31, 32, 34, 37, 39	14, 22, 23, 36, 38, 40	2, 26, 28, 33	28, 29, 35

Most of the participants did not add anything (28 participants either skipped the question or replied with nothing to add). Of those who gave a response, three categories were developed. Increasing Awareness/Education about the importance of IBCs was mentioned the most with six mentions. Incorporating the Cost of the Exam into the course fees was mentioned with the second largest frequency (four mentions) and Making the Exam a Requirement for the Course/Program was mentioned three times among the participants.

Delphi Study -- Round 2

The emerging categories from Round 1 were coded into primary trends for consensus and incorporated into the Round 2 questionnaire. The questionnaire for Round 2 was sent to all 40 Round 1 respondents asking them to review the summarized categories based on Round 1 responses and rank-order the items presented to determine the priorities of the group (Hsu & Sandford, 2007). This round helped respondents see areas of agreement and disagreement on the topic and provided other opinions for thought (Hsu & Sandford, 2007). When respondents rated or ranked their priorities (in odd number questions 1, 3, 5, 7, and 9), they were asked in open ended questions to provide a rationale for their responses or add other items for consideration (in even number questions 2, 4, 6, and 8). Consensus began to form in Round 2. The Delphi literature indicates that consensus is achieved at 80% (Hsu & Sandford, 2007; Grisham, 2008). Another way to ensure consensus is to use multiple rounds to measure consensus of the group (Hsu & Sandford, 2007). The rationale expressed by the panelists were coded to develop categories and were included in the subsequent survey round.

Forty emails were sent to the original respondents from Round 1. Of the 30 emails that were opened, 22 participants from Round 1 responded to the Round 2 questionnaire. With 22 participants in Round 2, the goal of at least 15 participants, set in Chapter 3, was met. While there is no specific answer as to how many experts serve on a Delphi panel, generally, 12-20 experts make up an adequate panel (Garson, 2014). For Delphi research, the most common statistics are those that measure central tendency and dispersion (Hsu & Sandford, 2007).

Measurements of tendency are mean, median, and mode (Hsu & Sandford, 2007). Measurements of dispersion are standard deviation and inter-quartile range, which when combined present information concerning the collective judgments of respondents (Hsu & Sandford, 2007; Brown, 2011). The use of a mean score based on a Likert-type scale is strongly recommended as it is good to demonstrate a consensus of opinion (Hsu & Sandford, 2007). The mean and standard deviation are listed for results in Rounds 2 and 3.

The participants represented eight different community colleges. The results from the Round 2 questionnaire are as follows:

TABLE 7 – Round 2, Question 1

Question 1: Rank the following reasons why students do not take IBC exams from the most important (1) to the least important (4).

	1	2	3	4	TOTAL	SCORE
Financial burden/cost of the exam	22.73% 5	18.18% 4	27.27% 6	31.82% 7	22	2.32
Lack of confidence in the ability to pass the exam	27.27% 6	45.45% 10	13.64% 3	13.64% 3	22	2.86
Not required to pass the course or program	18.18% 4	13.64% 3	40.91% 9	27.27% 6	22	2.23
Lack of interest/lack of perceived value in the credential	31.82% 7	22.73% 5	18.18% 4	27.27% 6	22	2.59

The results between Rounds 1 and 2 varied slightly among the group. In Round 1, Cost or Financial Burden was listed as the primary reason why students do not take IBC exams. However, when presented with all options in Round 2, Cost (M = 2.68; SD = 1.14) fell to third place and Lack of Confidence (M = 2.14; SD = 0.97) was listed as the primary concern (the second leading reason in Round 1).

In Round 2, Lack of Interest/Perceived Value (M = 2.41; SD = 1.19) was listed as the second highest priority. This category ranked fourth in the first round. The final and fourth ranked category influencing why students do not take IBC exams in Round 2 was Not Required to Pass the Course (M = 2.77; SD = 1.04). This was the third most often mentioned response in Round 1.

TABLE 8 – Round 2, Question 3

Question 3: Rank the following reasons why students choose to take IBC exams from the most important (1) to the least important (3).

	1	2	3	TOTAL	SCORE
Better employability/value the IBC	68.18% 15	22.73% 5	9.09% 2	22	2.59
Because it is required for the course/program	27.27% 6	36.36% 8	36.36% 8	22	1.91
Students have confidence to pass the exam	4.55% 1	40.91% 9	54.55% 12	22	1.50

The rationale for why students choose to take IBC exams were ranked the same between Rounds 1 and 2. Among the options, Better Employability (M = 1.41; SD = 0.65) was ranked first, greater Confidence to Pass the Exam (M = 2.50; SD = 0.58) was ranked second, and because it is Required for the Course or Program (M = 2.09; SD = 0.79) was ranked third. The low standards of deviation indicate a low variance in the scoring and a large consensus among the panel. The participants did not offer any additional reasons why students would choose to take IBC exams.

TABLE 9 – Round 2, Question 5

Question 5: Rank the primary influences on students' decision to take an IBC exam. 1=most common influence; 5=least common influence

	1	2	3	4	5	TOTAL	SCORE
Lack of financial resources	36.36% 8	13.64% 3	13.64% 3	31.82% 7	4.55% 1	22	3.45
Lack of access -- transportation, testing location, time, etc.	0.00% 0	13.64% 3	18.18% 4	18.18% 4	50.00% 11	22	1.95
Lack of confidence in preparation for the exam	18.18% 4	22.73% 5	27.27% 6	27.27% 6	4.55% 1	22	3.23
Lack of value in IBC attainment	27.27% 6	27.27% 6	9.09% 2	13.64% 3	22.73% 5	22	3.23
Lack of faculty encouragement	18.18% 4	22.73% 5	31.82% 7	9.09% 2	18.18% 4	22	3.14

In discussing the primary influences on students' decisions to take an IBC exam, both Round 1 and Round 2 top influence was Lack of Financial Resources/Cost (M = 2.55; SD = 1.37). In both Rounds, there was a tie in the second largest influence on student decision. In Round 1, Lack of Access and Lack of Confidence had the same number of mentions for the second largest influence on students. In Round 2, Lack of Confidence (M = 2.77; SD = 1.17) and Lack of Value (M = 2.77; SD = 1.54) tied for the second largest influence on students. While those categories had a tied overall score, the lower standard deviation for Lack of Confidence indicates that the panel had more consensus around that ranking because the variance of scores is slightly lower. Lack of Value in IBCs was the third largest influence in Round 1. In Round 2, Lack of Faculty Encouragement (M = 2.86; SD = 1.32) was listed as the third largest influence and Lack of Access (M = 4.05; SD = 1.11) was the fourth largest influence on

student decision to take an IBC exam. While rank fourth in terms of importance, the Lack of Access category had the smallest standard deviation indicating that the panel as a whole had a greater consensus listing this as the fourth most important category. Participants did not offer any additional influences on student decision to take an IBC exam.

TABLE 10 – Round 2, Question 7

Question 7: Rank the following ways to effectively encourage students to take IBC exams. 1=the most effective way; 5=the least effective way

	1	2	3	4	5	TOTAL	SCORE
Include as a course/program requirement	72.73% 16	18.18% 4	0.00% 0	4.55% 1	4.55% 1	22	4.50
Encourage faculty to emphasize the value of the credential	4.55% 1	31.82% 7	18.18% 4	22.73% 5	22.73% 5	22	2.73
Incorporate exam fees as course fees	9.09% 2	22.73% 5	27.27% 6	27.27% 6	13.64% 3	22	2.86
Engage employers and/or former students to emphasize the value of the credential	9.09% 2	22.73% 5	31.82% 7	22.73% 5	13.64% 3	22	2.91
Ensure better exam preparation to boost student confidence to pass the exam	4.55% 1	4.55% 1	22.73% 5	22.73% 5	45.45% 10	22	2.00

During the open-ended, Round 1 questions, participants ranked include as a Course/Program Requirement as the second most effective way to encourage students to take IBC exams. In Round 2, include as a Course/Program Requirement (M = 1.50; SD = 1.03) scored first with the lowest standard deviation indicated a consensus on the expert panel. In Round 1, participants felt

that Faculty Encouragement was the most effective way to encourage students to take the IBC exams. In Round 2, participants listed Faculty Encouragement (M = 3.27; SD = 1.25) as the fourth most effective way to encourage students to take IBC exams. In Round 2, participants listed outside Encouragement from Employers and/or Former Students (M = 3.09; SD = 1.16) as the second most effective way to encourage students. In Round 1, Employer Encouragement was the fourth most effective method listed. Incorporating Exam Fees (M = 3.14; SD = 1.18) scored midrange in both Rounds 1 and 2 as an effective way to encourage students. In both Rounds, Better Exam Preparation to boost student Confidence to Pass the Exam (M = 4.00; SD = 1.13) was listed last in terms of the most effective ways to encourage students to take the IBC exams.

TABLE 11 – Round 2, Question 9

Question 9: The role of faculty in a student's decision to take an IBC exam was ranked as follows: Very important -- serves as the primary encourager to take the exam (15 mentions); Important -- because they academically prepare the students to take the exam (10 mentions); Somewhat important -- because they can display personal IBCs and relay personal experience to encourage students to take the exam (9 mentions); Not important -- because they have a limited role in what the student ultimately decides to do (6 mentions)Do you agree with this ranking?

ANSWER CHOICES	RESPONSES	
Yes	95.45%	21
No	4.55%	1
Total Respondents: 22		

Participants agree in Rounds 1 and 2 that instructors play a Very Important or Important (M = 1.05; SD = 0.21) role in a student's decision to take an IBC exam.

Delphi Study -- Round 3 – Alpha Test

During Round 3, the final round, participants were sent the items and ratings gathered during Round 2. Panelists were asked to agree with the majority consensus or to further justify their rationale for remaining outside the consensus (Hsu & Sandford, 2007). Round 3 will likely only show a slight increase in consensus (Grisham, 2008; Hsu & Sandford, 2007). This round is the last time for the panelists to further clarify their opinions.

The final survey (formatted for student response) was distributed to all 22 respondents from Round 2 as an Alpha Test of the survey. Of the 20 emails opened, 15 participants responded to the final survey. Because the survey is structured for student response, only eight of the 15 participants responded directly to each of the survey questions in the Alpha Test round, but all 15 indicated a review of the survey as all answered the mandatory final question confirming their participation in the round. Additionally, eight reviewed the survey and answered the question regarding Beta Testing with students. Of the 15 responses, seven participants offered to Beta Test the final survey in current career and technical education course(s) representing six different career and technical disciplines.

TABLE 12 – Round 3, Alpha Test, Question 2

Question 2: Rank in order the following reasons why you would NOT take an IBC exam. 1=most important reason; 6=least important reason

	1	2	3	4	5	6	TOTAL	SCORE
It is too expensive	0.00% 0	0.00% 0	12.50% 1	62.50% 5	12.50% 1	12.50% 1	8	2.75
I feel academically unprepared to take the exam	12.50% 1	12.50% 1	25.00% 2	0.00% 0	25.00% 2	25.00% 2	8	3.13
I don't feel it will add value to my future career	12.50% 1	37.50% 3	12.50% 1	0.00% 0	25.00% 2	12.50% 1	8	3.75
No one has explained to me if the credential is important to me	37.50% 3	12.50% 1	25.00% 2	12.50% 1	0.00% 0	12.50% 1	8	4.38
I don't have access to a testing facility	0.00% 0	0.00% 0	25.00% 2	12.50% 1	37.50% 3	25.00% 2	8	2.38
The credential is not required in my course or program	37.50% 3	37.50% 3	0.00% 0	12.50% 1	0.00% 0	12.50% 1	8	4.63

During this final round, participants confirmed much of the consensus reached during Round 2. Listing the IBC as a Requirement of the Course or Program (M = 2.38; SD = 1.65) scored high in the third round. Participants felt that Cost was an important concern in both Rounds 2 and 3 (M = 4.25; SD = 0.83). Other categories measuring a student's view of IBCs as Valuable for Future Career (M = 3.25; SD = 1.71) followed Mandatory Requirement (M = 2.38; SD = 1.65) in terms of importance. Categories describing Faculty Encouragement (M = 2.63; SD = 1.65) and Lack of Access (M = 4.63; SD = 1.11) scored in the bottom of the

reasons why students choose to sit of IBC exams. Lack of Access scored at the bottom of Round 2 as well.

TABLE 13 – Round 3, Alpha Test, Question 3

Question 3: Please rate each element of the IBC exam process in terms of importance to you as a student.

	VERY UNIMPORTANT	UNIMPORTANT	NEITHER IMPORTANT OR UNIMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL	WEIGHTED AVERAGE
Cost of the IBC exam	0.00% 0	0.00% 0	50.00% 3	33.33% 2	16.67% 1	6	3.67
Location of the IBC exam	16.67% 1	16.67% 1	16.67% 1	33.33% 2	16.67% 1	6	3.17
Part of an academic course or program	16.67% 1	0.00% 0	0.00% 0	66.67% 4	16.67% 1	6	3.67
Future employment opportunities	16.67% 1	0.00% 0	0.00% 0	33.33% 2	50.00% 3	6	4.00
Academic Preparation	16.67% 1	0.00% 0	0.00% 0	50.00% 3	33.33% 2	6	3.83
Faculty encouragement	0.00% 0	0.00% 0	16.67% 1	66.67% 4	16.67% 1	6	4.00

Participants felt that when presented with the importance of Future Employment Opportunities (M = 4.00; SD = 1.41) as an option, students would list that as an important element in the decision-making process to take IBC exams. It tied with Faculty Encouragement, (M = 4.00; SD = 0.58) which also indicates that faculty have an opportunity to play an important role in emphasizing the value of IBCs for students (consistent with Round 1 question about role of faculty in student decisions). The low standard deviation for Faculty Involvement indicates a strong consensus on the panel regarding their role as faculty members. Supporting the faculty role, Academic Preparation (M = 3.83; SD = 1.34) scored third in the ranking of importance. Making an exam Mandatory (M = 3.67; SD = 1.25), Cost

(M = 3.67; SD = 0.75), and Location of Exam (M = 3.17; SD = 1.34), while still important, scored as the lowest three priorities when presented with all other factors. The Cost category falling to bottom of importance is a change from previous rounds, but this category has the second lowest standard deviation (SD = 0.75) indicating a low variance and consensus among the panel.

TABLE 14 – Round 3, Alpha Test, Question 4

Question 4: Based on your past and/or current experience as a career and technical education student, please indicate how strongly you agree or disagree with the following statements.

	STRONGLY AGREE	AGREE	NEITHER AGREE OR DISAGREE	DISAGREE	STRONGLY DISAGREE	N/A	TOTAL	WEIGHTED AVERAGE
I feel academically prepared to take IBC exams.	28.57% 2	42.86% 3	14.29% 1	0.00% 0	0.00% 0	14.29% 1	7	1.83
Industry-based credentials (IBCs) will add to my resume of skills.	42.86% 3	42.86% 3	0.00% 0	0.00% 0	0.00% 0	14.29% 1	7	1.50
I will make more money if I have an IBC.	14.29% 1	28.57% 2	28.57% 2	14.29% 1	0.00% 0	14.29% 1	7	2.50
IBC exams are too expensive for me to take them.	0.00% 0	14.29% 1	57.14% 4	0.00% 0	14.29% 1	14.29% 1	7	3.17
My instructor has explained to me the importance of earning IBCs for my career field.	42.86% 3	28.57% 2	14.29% 1	0.00% 0	0.00% 0	14.29% 1	7	1.67
I realize the value of IBCs for my future career.	42.86% 3	28.57% 2	14.29% 1	0.00% 0	0.00% 0	14.29% 1	7	1.67
I have access to exam testing facilities.	14.29% 1	57.14% 4	0.00% 0	14.29% 1	0.00% 0	14.29% 1	7	2.17
I understand IBCs are integrated into my academic courses and/or program.	28.57% 2	42.86% 3	14.29% 1	0.00% 0	0.00% 0	14.29% 1	7	1.83
I look to faculty as examples of success in my career field.	42.86% 3	42.86% 3	0.00% 0	0.00% 0	0.00% 0	14.29% 1	7	1.50

Question 4 was framed to gauge the students' confidence in personal preparation and understanding of IBC exams and the implications for personal certification achievement. During this Alpha Test, the instructor panel exhibited confidence in their abilities as they should because they are experts in their respective fields.

Therefore, while the strength of their answers add little value to the data analysis in terms of prevailing student issues regarding IBCs, the consistency is significant. Table 15 demonstrates the low standard deviation scores across the Likert Scale indicating that the responses are very close to the mean score. The low standard deviation scores indicate additional agreement among the panel regarding the topics included in the scale.

TABLE 15 – Round 3, Alpha Test, Question 4 Basic Statistics

Question 4	MEAN	STANDARD DEVIATION
I feel academically prepared to take IBC exams.	1.83	0.69
Industry-based credentials (IBCs) will add to my resume of skills.	1.50	0.50
I will make more money if I have an IBC.	2.50	0.96
IBC exams are too expensive for me to take them.	3.17	0.90
My instructor has explained to me the importance of earning IBCs for my career field.	1.67	0.75
I realize the value of IBCs for my future career.	1.67	0.75
I have access to exam testing facilities.	2.17	0.90
I understand IBCs are integrated into my academic courses and/or program.	1.83	0.69
I look to faculty as examples of success in my career field.	1.50	0.50

Like with Question 4, Question 5 is meant to gauge what barriers if removed would most likely increase the chance that students would take IBC exams. Because the instructor participants took this survey as an Alpha Test, their responses are not surprising and do not add to the research about which factors

impact student decision the most. However, the low standard deviation figures do indicate a consensus on the panel regarding the issues on the scale.

TABLE 16 – Round 3, Alpha Test, Question 5

Question 5: Please indicate how strongly you agree or disagree with the following statements--I would take the IBC exam if:

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE OR DISAGREE	AGREE	STRONGLY AGREE	N/A	TOTAL	WEIGHTED AVERAGE
the exam fee was paid.	0.00% 0	0.00% 0	0.00% 0	0.00% 0	85.71% 6	14.29% 1	7	5.00
I feel confident that I can pass the exam.	0.00% 0	0.00% 0	14.29% 1	28.57% 2	42.86% 3	14.29% 1	7	4.33
my instructor encourages me to take the exam.	14.29% 1	0.00% 0	0.00% 0	57.14% 4	14.29% 1	14.29% 1	7	3.67
employers in my field demonstrate value in my future career.	14.29% 1	0.00% 0	0.00% 0	42.86% 3	28.57% 2	14.29% 1	7	3.83
the exam was administered on campus.	0.00% 0	0.00% 0	0.00% 0	28.57% 2	57.14% 4	14.29% 1	7	4.67
the exam was part of my course or program.	0.00% 0	0.00% 0	0.00% 0	28.57% 2	57.14% 4	14.29% 1	7	4.67

Table 17 demonstrates the low standard deviation scores across the Likert Scale indicating that the responses are very close to the mean score. The low standard deviation scores indicate additional agreement among the panel regarding the topics included in the scale.

TABLE 17 – Round 3, Alpha Test, Question 5 Basic Statistics

Question 5	MEAN	STANDARD DEVIATION
The exam fee was paid.	5	0.00
I feel confident that I can pass the exam.	4.33	0.75
My instructor encourages me to take the exam.	3.67	1.25
Employers in my field demonstrate value in my future career.	3.83	1.34
The exam was administered on campus.	4.67	0.47
The exam was part of my course or program.	4.67	0.47

Phase II – Student Survey Beta Test Results

For the Beta Test, instructors from the Delphi Rounds volunteered to administer the survey to their current career and technical education students. Students were surveyed about the role of industry-based certifications (IBCs) in their respective programs of study and as those certifications apply to potential employment. Those programs include: Cyber Technology, Oil and Gas Production Technology, Industrial Technology, Advanced Manufacturing and Mechatronics, Accounting, Business, and Advanced Welding. Career and technical education programs were chosen because: (1) these programs have industry-based credentials embedded into their respective programs and (2) the industry partners and potential employers of students from these programs are interested in industry-based certifications placing an economic value on having certifications prior to employment. Twenty-five students Beta Tested the survey and participated in the Pilot Study. All responses where collected anonymously through Survey Monkey.

TABLE 18 – Student Survey, Beta Test, Question 3

Question 3: Rank in order the following reasons why you would NOT take an IBC exam. 1=most important reason; 6=least important reason

	1	2	3	4	5	6	TOTAL	SCORE
It is too expensive	28.00% 7	12.00% 3	8.00% 2	24.00% 6	12.00% 3	16.00% 4	25	3.72
I feel academically unprepared to take the exam	20.00% 5	24.00% 6	16.00% 4	12.00% 3	20.00% 5	8.00% 2	25	3.88
I don't feel it will add value to my future career	12.00% 3	8.00% 2	16.00% 4	32.00% 8	16.00% 4	16.00% 4	25	3.20
No one has explained to me if the credential is important to me	16.00% 4	12.00% 3	12.00% 3	8.00% 2	28.00% 7	24.00% 6	25	3.08
I don't have access to a testing facility	12.00% 3	36.00% 9	12.00% 3	8.00% 2	16.00% 4	16.00% 4	25	3.72
The credential is not required in my course or program	12.00% 3	8.00% 2	36.00% 9	16.00% 4	8.00% 2	20.00% 5	25	3.40

In the Beta Test Round, students listed No One has Explained if the Credential is Important to Me (M = 3.92; SD = 1.81) as the top reason why they would not take an IBC exam. Students ranked Future Career Value (M = 3.80; SD = 1.52) as the second biggest reason they would not take the IBC exam. Listing the credential as a Requirement for the Course/Program (M = 3.60; SD = 1.57) scored third. Both Cost (M = 3.28; SD = 1.82) and Lack of Access to the testing facility (M = 3.28; SD = 1.71) scored fourth. However, a lower standard deviation score

regarding access indicates a stronger consensus regarding that reason. Interestingly, feeling Academically Prepared (M = 3.28; SD = 1.82) scored last as a reason why students would not take an IBC exam. With this question, students indicate that external reasons—Career Value, Cost, Access—are more influential on their decision to take the exam than Academic Preparation. This could indicate that faculty have a significant impact on a student's decision to take the exam if they take the time to explain the importance of the credential and the career implications.

TABLE 19 – Student Survey, Beta Test, Question 4

Question 4: Please rate each element of the IBC exam process in terms of importance to you as a student.

	VERY UNIMPORTANT (1)	UNIMPORTANT (2)	NEITHER IMPORTANT OR UNIMPORTANT (3)	IMPORTANT (4)	VERY IMPORTANT (5)	TOTAL	WEIGHTED AVERAGE
Cost of the IBC exam	0.00% 0	12.00% 3	20.00% 5	24.00% 6	44.00% 11	25	4.00
Location of the IBC exam	4.00% 1	4.00% 1	28.00% 7	28.00% 7	36.00% 9	25	3.88
Part of an academic course or program	0.00% 0	0.00% 0	28.00% 7	36.00% 9	36.00% 9	25	4.08
Future employment opportunities	0.00% 0	0.00% 0	16.00% 4	16.00% 4	68.00% 17	25	4.52
Academic Preparation	0.00% 0	0.00% 0	16.00% 4	32.00% 8	52.00% 13	25	4.36
Faculty encouragement	4.00% 1	4.00% 1	12.00% 3	32.00% 8	48.00% 12	25	4.16

In line with Question 4, students ranked external motivating factors has important or very important elements in the decision to take an IBC exam. The top element was Future Employment Opportunities (M = 4.52; SD = 0.75). The second

highest element was Academic Preparation (M = 4.36; SD = 0.74). Categories surrounding Faculty Encouragement (M = 4.16; SD = 1.05), Required for Course/Program (M = 4.08; SD = 0.80), and Cost of the Exam (M = 4.00; SD = 1.06) all fell mid-range in the scale, but all indicate that the categories are important with scores of 4.00 or over and small standard deviations. The Location of the Exam (M = 3.88; SD = 1.07) scored as the least important of the categories listed.

TABLE 20 – Student Survey, Beta Test, Question 5

Question 5: Based on your past and/or current experience as a career and technical education student, please indicate how strongly you agree or disagree with the following statements.

	STRONGLY AGREE (1)	AGREE (2)	NEITHER AGREE OR DISAGREE (3)	DISAGREE (4)	STRONGLY DISAGREE (5)	N/A	TOTAL	WEIGHTED AVERAGE
I feel academically prepared to take IBC exams.	4.00% 1	24.00% 6	40.00% 10	24.00% 6	8.00% 2	0.00% 0	25	3.08
Industry-based credentials (IBCs) will add to my resume of skills.	20.00% 5	40.00% 10	36.00% 9	0.00% 0	4.00% 1	0.00% 0	25	2.28
I will make more money if I have an IBC.	8.00% 2	40.00% 10	48.00% 12	0.00% 0	4.00% 1	0.00% 0	25	2.52
IBC exams are too expensive for me to take them.	0.00% 0	44.00% 11	52.00% 13	0.00% 0	0.00% 0	4.00% 1	25	2.54
My instructor has explained to me the importance of earning IBCs for my career field.	8.33% 2	50.00% 12	29.17% 7	8.33% 2	4.17% 1	0.00% 0	24	2.50
I realize the value of IBCs for my future career.	12.00% 3	24.00% 6	44.00% 11	8.00% 2	8.00% 2	4.00% 1	25	2.75
I have access to exam testing facilities.	12.00% 3	52.00% 13	28.00% 7	4.00% 1	4.00% 1	0.00% 0	25	2.36
I understand IBCs are integrated into my academic courses and/or program.	12.00% 3	40.00% 10	36.00% 9	4.00% 1	4.00% 1	4.00% 1	25	2.46
I look to faculty as examples of success in my career field.	20.00% 5	32.00% 8	40.00% 10	0.00% 0	4.00% 1	4.00% 1	25	2.33

In the Pilot Study, students agreed with almost all the statements in the Likert Scale. Students scored I feel Academically Prepared to Take IBC Exams with a mean of 3.08 and a standard deviation of 0.98. This indicates that students feel neutral about their personal academic preparation. The largest consensus centered

around Cost with a mean score of 2.54 and a standard deviation of 0.50. This suggests that students believe IBC exams are too expensive. In line with the previous question, students were in strongest agreement about the Value of IBCs adding Resume´ Skills (M = 2.28; SD = 0.92). Following Resume´ Skills is Make More Money (M = 2.52; SD = 0.81) and Value of IBCs for Future Career (M = 2.75; SD = 1.05). The high agreement both in rating and standard deviations indicate that students realize that the IBCs do have value in the marketplace. The categories identifying the importance of Faculty Influence, Instructor Explained Importance (M = 2.50; SD = 0.91); IBCs are Integrated into Course/Program (M = 2.46; SD = 0.91); and Faculty as Examples of Success (M = 2.33; SD = 0.94)—all have low standard deviations and indicate agreement that faculty do play a role in the decision to take the IBC exam. Overall, the small standard deviations indicate a consensus among the students about the influence of these elements on the decision to take an IBC exam.

TABLE 21 – Student Survey, Beta Test, Question 6

Question 6: Please indicate how strongly you agree or disagree with the following statements—I would take the IBC exam if:

	STRONGLY DISAGREE (1)	DISAGREE (2)	NEITHER AGREE OR DISAGREE (3)	AGREE (4)	STRONGLY AGREE (5)	N/A	TOTAL	WEIGHTED AVERAGE
the exam fee was paid.	0.00% 0	0.00% 0	25.00% 6	29.17% 7	41.67% 10	4.17% 1	24	4.17
I feel confident that I can pass the exam.	4.00% 1	4.00% 1	36.00% 9	28.00% 7	24.00% 6	4.00% 1	25	3.67
my instructor encourages me to take the exam.	4.00% 1	4.00% 1	28.00% 7	32.00% 8	28.00% 7	4.00% 1	25	3.79
employers in my field demonstrate value in my future career.	4.00% 1	4.00% 1	32.00% 8	28.00% 7	32.00% 8	0.00% 0	25	3.80
the exam was administered on campus.	4.00% 1	4.00% 1	28.00% 7	32.00% 8	28.00% 7	4.00% 1	25	3.79
the exam was part of my course or program.	0.00% 0	4.00% 1	36.00% 9	28.00% 7	28.00% 7	4.00% 1	25	3.83

The last question in the survey was added to try and determine what barriers, if removed, would most impact a student's decision to take and IBC exam. Scoring highest was Cost (M = 4.17; SD = 0.82) with a low standard deviation indicating consensus among participants. Including the exam as Part of a Course or Program scored second highest with a mean of 3.83 and a standard deviation of 0.90. The midrange responses—Employers Demonstrate Importance in my Future Career (M = 3.80; SD = 1.06); Instructor Encouragement (M = 3.79; SD = 1.04); and Exam Administered on Campus (M = 3.79; SD = 1.04)—indicate a more neutral response about how these factors influence a student's decision to take an IBC exam. Feeling Confident to Pass the Exam, while still scoring in agreement with a mean of 3.67 and standard deviation of 1.03, scored the lowest in terms of influence over a student's decision to take and IBC exam. This response is

consistent with the student response in Question 5 about the neutral feeling surrounding Academic Preparation. Students indicate that they do not consider their personal preparation for the exam as a top reason to take the exam. This is good news for college leadership and faculty. It seems the data indicates that there are things that college administrators and faculty can do to increase exam rates.

The last question of the survey was an open-ended question and asked students if there were other reasons to consider regarding IBC exams. Only seven students responded. Four of the seven indicated "No Comment" or "N/A" as a response. Of the remaining three, one student indicated "They help get more jobs." Another student stated, "I really don't have any knowledge of the IBC at this time." The third student stated, "IBCs work similar to an additional degree no matter how involved. When done correctly the employer gets a more knowledgeable employee." This final student statement is a sentiment important for faculty to convey to students.

Findings

During Phase I of the Delphi, major categories developed in Round 1 and consensus formed through Rounds 2 and 3. Among the categories identified in Round 1, Financial Burden or Cost, Confidence in the Academic Ability to Pass the Exam, Lack of Interest or Value in the IBC, Faculty Encouragement, Not Required for the Course, and Lack of Access to Exam Facilities were the major categories that developed in the open-ended questions. Through Rounds 2 and 3 as consensus began to form, the rank order of the categories changed, but the

overall categories remained constant. As the study moved into Phase II – Student Pilot Study, the categories remained the same (the students did not have any additional barriers to add), but the importance and the affect that those categories have on student decisions varied from the experts' opinion in Rounds 1, 2, and 3.

Financial Burden or Cost

During Round 1, Financial Burden or Cost was listed as the top reason why students do not take an IBC exam. In the opening round, when asked why students do not take IBC exams, some of the participants explained, "due to financial issues"; "out of pocket expenses"; "because of money issues"; "unable to afford it"; and "exams are cost prohibitive." Later in Round 1 when asked about the top influences on a student's decision, the issue surrounding Cost scored as the highest influence. Participants noted that the largest influence could be, "financial costs of certification"; "having to pay to take a test"; "perhaps the cost of taking such exam"; and "out of pocket expenses." However, later in Round 1 when asked "How can students be encouraged to take IBC exams" faculty listed Incorporating the Exam Fees third as a way to encourage students to take the exam. In Round 2, after all the options were presented to the panel from Round 1, Cost fell to third as the most influential reason students choose to not take an IBC exam. This change in Round 2 is more consistent with the students' point of view in the Pilot Study. While students did agree that if Cost was removed as a barrier, they would be more likely to take an exam, it was not the biggest influence on their decision. Students rated Cost fourth overall in the reasons why they would not take an IBC exam. The results show consistency between both the panel of

experts and students that Cost is a factor in whether or not students take an IBC exam, however, it is important to note that it is not the primary factor in a student's decision. For college faculty and administration, finding ways to cover the cost of the exam either through mandatory fees or grant funds may help factor into some students' decision to take the exam, however, the findings suggest that there are other interventions that may work better.

Lack of Access to Exam Facilities

The lowest ranked category—lack of Access to Exam Facilities—was mentioned in all Rounds, but it was consistently listed by faculty and student participants at the bottom of the reasons why students choose to take an IBC exam. While this could be a legitimate concern for some and a factor that faculty and leadership could influence (by bringing testing facilities to campus), the study results indicate that this is not the most pressing issue for students. In Round 1, participants listed "access of test center"; "no transportation"; and "accessibility to the testing sites" as possible influences on why students choose to not take the IBC exam. In Round 2, Lack of Access was ranked as the fourth largest influence and while ranked fourth in terms of importance, the category had the smallest standard deviation (SD = 1.11) indicating that the panel as a whole had a greater consensus listing this as the fourth most important influence. In Round 3, Lack of Access to the exam facilities consistently scored last as an influence over a student's choice to take an IBC exam. Students agreed and in the Pilot Study. Students scored Lack of Access as the second to last reason why they would not take an IBC exam. Even though it was not scored last (Academic Preparation

scored last), a lower standard deviation score (SD = 1.71) regarding Access indicates a stronger consensus that it is not a strong influence over student decision.

Confidence in Academic Ability to Pass the Exam

In Round 1, the panel listed Lack of Confidence in Academic Ability to Pass the Exam as the second largest reason why students do not take IBC exams. This reason spoke to both the lack of confidence in students and the academic preparation provided by faculty. Faculty participants noted that students have a "fear of failure or no confidence in their ability"; "primary fear of failure"; "fear of taking the examinations"; and "fear of the unexpected and unknown." This Lack of Confidence is repeated later in the Round when asked about the greatest influence over a student's decision to take the exam. Participants explained the influence as "a lack of confidence"; "fear lack of preparation"; and "they do not feel the course adequately prepared them." However, in this later question within Round 1, Lack of Confidence fell from the second largest factor in a student's decision to the third largest factor. In Round 2, the panelists listed Lack of Confidence as the top reason why students do not take the exam and in Round 3, while still important, this reason dropped to a mid-scale reason. Interestingly, students during the Pilot Study listed Lack of Confidence of pass the exam and Academic Preparedness at the bottom or near the bottom of reasons why they would not take an IBC exam. Students were not concerned with their own perceived ability as a top influence or reason why to take the exam. This is good news for faculty and college leadership. If students will take the exam despite

their own feelings of preparedness, faculty and leaders can find ways to increase IBC exam participation outside of boosting student confidence.

Lack of Interest or Value in the IBC

The panelists listed a Lack of Interest or Value as the third (tied) biggest influence on whether or not students take IBC exams. In Round 1, participants stated that students "do not see the relevance and/or value"; "just do not want to take the time"; and "lose interest." Later in the survey when asked about biggest influences on students' decisions, participants listed a Lack of Interest/Value as the second largest influence. Participants explained that students, "don't understand the benefits"; have "misinformation or a lack of weight for the exam/credential"; and "they do not understand or care about the value and benefits of an IBC." In Round 2, Lack of Interest/Value was the second highest rating among the faculty participants. During Round 3, the faculty participants noted that having instructors Explain the Importance of the IBC was listed second among the actions faculty could take to increase IBC exam participation. Additionally, this ranking had a low standard deviation (SD = 0.75) indicating a low variance and high consensus among the panel.

Students agreed that Value was a key factor in determining whether or not to take an IBC exam. Students listed No One Explained the Value to Me and No Future Career Value as the top two reasons why they would not take an IBC exam. Later in the survey, students all agreed with the statements surrounding the Value of IBCs to a Future Career recognizing that it would add skills to a resume´ and lead to better employability. This is good news for faculty and higher

education leadership. Stronger emphasis on the value of IBCs whether it come from faculty, employers, or former students could have a positive impact on a student's decision to take an IBC exam.

Faculty Encouragement

The role of Faculty Encouragement may be the best news for faculty and higher education leaders on how to increase IBC exam rates. In Round 1, the participants—college faculty members—did not list Faculty Encouragement as one of the reasons why students do not take IBC exams. However, when asked what can be done to encourage students to take IBC exams, having instructors "emphasize the importance for employability" was the most common suggestion. Participants recommended that instructors could, "promote the benefit to [students] when looking for a job"; "point out the relevance, value, and requirements of the industry and how it relates to [students] specifically"; and "explain to students that IBCs give you more experience and allows companies to see that you have been trained in multiple processes." In Round 2, Lack of Faculty Encouragement was listed as the third largest influence. In the final Round 2 question, panelists agreed 21 to 1 that the role of faculty in a student's decision to take an IBC exam was either Very Important or Important. In Round 3, panelists listed Faculty Encouragement as an important reason why students choose to take IBC exams which indicates that faculty have an opportunity to play an important role in emphasizing the value of IBCs for students. The low standard deviation (SD = 0.58) indicates a strong consensus on the panel regarding their role as faculty members. Students agreed with the panelists'

observation. The category surrounding Faculty Encouragement fell mid-range in the scale but indicated that it was important with a mean score of 4.16 (the score 4 = important). Faculty Encouragement scoring high in all rounds indicates that students appreciate and listen to the views of faculty members and that faculty members themselves recognize the impact they could have over a student's decision to take an IBC exam. This factor is within the control of faculty and higher education leadership. It is a factor that faculty members and administrators can directly impact.

Not Required for the Course/Program

During Round 1, if the IBC is Not Required for the Course/Program participants felt that was the third (tied) most prevalent reason why students do not take the IBC exam. Some of the rationale listed in Round 1 includes: "not required for the class"; "not required for their career intentions"; "it is not required to work in the state"; and "it is not part of the curriculum." Later in the survey round, participants suggested Making the IBC Exam Mandatory as the second highest way to encourage IBC completion. Panelists suggested, "implement [the IBC] into the curriculum"; "make exam mandatory or incorporate into course material"; "make [the IBC] part of the curriculum and test as a group at the end of the semester"; and "it should be a bigger part of their grade." In Round 2, Not Required to Pass the Course/Program fell to the fourth and lowest reason for why students do not take an IBC exam. In ranking the most effective ways to encourage students to take IBC exams, in Round 2, the participants listed Making IBCs a Requirement as the top reason that would

encourage students to take the exam. In Round 3, the panelists were consistent and listed not required as the top reason that students do not take the exam. Additionally, instructors strongly agreed that students would be encouraged to take the exam if it was part of the course/program. Students scored Required as Part of a Course/Program third as the most influential reason why they do not take IBC exams. Students did rank Required for the Course/Program as an important reason to consider taking the exam. The good news for faculty and leadership is that they directly control whether or not an IBC exam is included as part of the curriculum for a course and/or program. This could be another way they can increase participation in IBC exam completion.

Conclusion

Through both Phases of the study, a survey instrument was created to measure the reasons why students choose to take or not take an IBC exam. The three Delphi Method rounds gave a panel of experts an opportunity to identify the primary factors why students may not take exams and that influence a student's decision to take the exam. Through the Delphi Rounds, Academic Preparedness, Cost, Employment Value, Faculty Encouragement, and Access were the primary reasons identified by the panel of experts and confirmed during the Alpha Test. Consensus formed in Round 2 with little difference between the rankings of the importance of the categories. The results were measured with a mean score and a standard deviation score. Most of the responses had a low standard deviation indicating that there was a low variance among the panel on the ranking of the

responses. This also indicates a strong consensus about the order of importance between categories.

During the Pilot Study round with students, students agreed that Faculty Encouragement and Cost played important roles in deciding whether or not to take an IBC exam. However, students did not place a high value on their own Academic Preparedness as a key factor in their decision to take an exam. Students' standard deviation scores were lower than the instructor panel indicating a strong consensus among the student group. This consensus indicates that while the students had a slightly different ranking, they did agree with the faculty panel on the primary factors that influence their decision to take an IBC exam.

The six primary categories identified during the Delphi phases present three themes that impact a student's decision to take an IBC exam and that give faculty and administrators a roadmap for improving IBC exam rates. This is good news for faculty and higher education administrators. CHAPTER 5 will further discuss the implications of the results for higher education.

CHAPTER 5 DISCUSSION

From the findings of the Delphi, I developed six primary factors that influence a student's decision to take an IBC exam. The instrument is needed because each institution can use it to determine why students choose to take IBC exams and identify the applicable barriers for their student population. This study created an instrument to help measure why some students pursue IBCs, why others do not pursue IBCs, and what efforts can be made by administrators to positively impact student decisions to increase IBC exam completion rates. The six categories comprise three key themes that impact student decision-making—Student Services Impact, Academic Instructional Impact, and Intrinsic Motivational Impact.

During Phase I of the Delphi, major categories were coded in Round 1 and consensus formed through Rounds 2 and 3. The categories identified in the Round 1 open-ended questions that impact student decision-making are: Financial Burden or Cost, Confidence in the Academic Ability to Pass the Exam, Lack of Interest or Value in the IBC, Faculty Encouragement, Not Required for the Course, and Lack of Access to Exam Facilities. Through Rounds 2 and 3 as consensus began to form, the rank order of the categories changed, but the overall categories remained constant. As the study moved into Phase II – Pilot Study, the categories remained the same (the students did not have any additional barriers to add), but the importance of the categories and the influence on student decisions varied from the experts' opinion in Rounds 1, 2, and 3. The categories that

surfaced in the findings are supported by the literature surrounding industry-based credential training. The six categories demonstrate three key themes that impact a student's decision to take an IBC exam—Student Services Impact, Academic Instructional Impact, and Intrinsic Motivational Impact.

Student Services Impact

Two categories identified in the Delphi Rounds—Cost and Lack of Access to testing facilities—both indicate that colleges can have a Student Services Impact on student decisions to take an IBC exam. Student Services departments within colleges can proactively decide to remove cost as a barrier for students. The decision to incorporate costs into course fees or to seek grant funding to cover the exam cost can positively impact a student's decision to take an IBC exam. In Round 1 when asked, "How can students be encouraged to take IBC exams" faculty listed incorporating the fees as a way to encourage students to take the exam. Covering the costs for the exam fees would be a way for colleges to start incentivizing students to take IBC exams. The findings of the study show consistency between both the panel of experts and students that cost is a factor in whether or not students take an IBC exam.

Additionally, the Student Services Impact can be minimized by addressing the Lack of Access to exam facilities. Colleges can begin offering the exams on campus making it easier for students to access the exam. Location of the exam center is only one possible way to attack this barrier. Simplifying the process to schedule and take exams is another key component of this addressing this barrier. Educating students about the exam process and requirements could help them feel

better about access. The literature showed that students are confused about the exam process (Johnson, 2016; Rosenbaum & Rosenbaum; 2016). This study confirmed the literature findings and suggests that if students have a better understanding about the process and requirements as a whole, the more likely they would take an IBC exam.

Academic Instructional Impact

Two of the categories identified in the findings—Faculty Encouragement and Academic Preparedness—demonstrate the Academic Instructional Impact that influence a student's decision to take an IBC exam. Of all the themes, the Academic Instructional Impact has the greatest potential to improve student exam participation. First, both categories within this theme are within the realm of the college administrators to control. As curricula designers, the college administrators can embed the IBC material into courses and require students to take the exam as part of the course. The college administrators can also prepare faculty to both emphasize the importance of the exam and academically prepare students to take the IBC exam. The findings of the study indicate that faculty underestimate their impact on student decision. However, the student findings counter that presumption listing Faculty Encouragement as the biggest influence on a decision to take an exam.

In addition to the categories presented in the findings that identified the largest barriers for IBC exams, the Academic Instructional Impact theme also encompasses the positive reasons students choose to take an IBC exam. When asked why students choose to take IBC exams, responses to the question linked to

the Academic Instructional Impact theme. These categories were consistent throughout the Delphi Rounds, Alpha Test, and Pilot Study. The panel of experts listed Better Employability, Requirement for the Course/Program, and student perceived Value or Confidence in Acquiring the IBC as the top factors influencing why students choose to take the exam. In Round 1, participants listed, "resume differentiator"; "career advancement"; "needed for employment"; and "pay raise with credential" as rationale for why IBCs help employability for students. Participants listed "the test fees are incorporated into the cost of the course"; "because it is required by the state"; "part of the curriculum"; and "requirement of the industry or state agency" as part of the second most influential theme impacting a student's decision to take an IBC exam. The third category centered around student confidence in passing the exam. Some of the comments included: "they see the value and relevance to their chosen paths of opportunities"; "students who actually take the examination are confident in their ability to pass it"; "understand the benefits of obtaining IBCs"; and "students that want IBCs are those that want to be more than just an employee." The consistency in which the participants ranked the categories in the same order of importance emphasizes the potential influence the Academic Instructional Impact has on student decision-making. Administrators and faculty can directly influence these categories working with employers to make sure students are educated about the opportunity for increased wages through IBC attainment. The consensus surrounding the reasons why students choose to take IBC exams is

important to faculty and higher education leaders because they can educate students on these aspects and possibly increase exam rates.

Intrinsic Motivational Impact

The Student Services Impact and the Academic Instructional Impact are both extrinsic motivating themes over which colleges can have direct influence. The final theme gleaned from the findings—Intrinsic Motivational Impact—illustrates the internal motivations of student decisions to take IBC exams. While these intrinsic factors are part of the decision-making process, faculty and administrators can still have an influence on this theme and boost IBC exam participation by addressing these concerns. Lacking Confidence in the Academic Ability to pass the exam and Lack of Value for the IBC for personal career success are two categories that explain the Intrinsic Motivational Impact theme discovered in the study.

Better Academic Preparedness is within the purview of the college faculty. Administrators should invest in the professional development and training necessary for college faculty to fully understand the objectives of the IBC and how to align those objectives with course learning outcomes. Together with the faculty expertise, this will offer students the information they need to take the IBC exam. Additionally, faculty can prepare students for the exam processes and format helping students to have greater confidence in their preparedness for the exam. Interestingly, students during the Pilot Study listed Lack of Confidence to Pass the Exam and Academic Preparedness at the bottom or near the bottom of reasons why they would not take an IBC exam. Students were not concerned with

their own perceived ability as a top influence or reason why to take the exam. If students will take the exam despite their own feelings of preparedness, faculty and leaders can find ways to increase IBC exam participation outside of boosting student confidence.

Similarly, if students have a perceived Lack of Value in the IBC and how the credential will impact their future, faculty and administrators can demonstrate the value to students. Working with advisory board industry partners and employers, faculty members can directly address this issue. Faculty members may not realize the impact that having employers present directly to the students could have on their decision-making. Former students can have a similar impact and help faculty tell the story to current students about how IBCs can impact their future. Students agreed that Value was a key factor in determining whether or not to take an IBC exam. Students all agreed with the statements surrounding the Value of IBCs to a Future Career recognizing that it would add skills to a resume´ and lead to Better Employability. Emphasizing these key benefits could be a way to influence the Intrinsic Motivational Impact that influences a student's decision to take an IBC exam.

Implications

The study added to the literature regarding data about why students choose to take industry-based certification (IBC) exams. The results show significant consensus around the primary themes that impact a student's decision to take the exam. There is a connection and general benefit for students who graduate with

credentials (Bahr, 2015; Rosenbaum & Rosenbaum, 2013). However, a large number of students do not take advantage of aligned curriculum and choose to not take the corresponding national or international IBC exam (Johnson, 2016; Rosenbaum & Rosenbaum, 2013). The barriers to students were unclear. This study helped to determine the barriers that might exist influencing a student's decision to take the exam. Using the study results, college leaders can work with faculty to address the identified themes and to increase the faculty's role in increasing student IBC exam rates.

Both faculty and student participants recognized the important role faculty plays in a student's decision to take an IBC exam. In Round 1, 34 out of 40 faculty participants indicated that instructors play a very important or important role in influencing whether or not a student sits for an IBC exam. Faculty participants felt that faculty could encourage and motivate students to take exams. In the Beta Test Round, student participants supported the faculty's role in their decision-making listing no one has explained the importance to me as the top reason why they do not take IBC exams. The most important reason why they would take an IBC is future employment opportunities. Students also agreed that I will make more money if I have an IBC and I realize the value of IBCs for my future career. There seems to be a disconnection for students between recognizing the importance for future career opportunities and actually taking the exam. My hypothesis that they did not recognize the value of IBCs is not entirely correct or incorrect. Students appear to recognize that employers value IBCs and that they would benefit them personally, but these reasons alone are not enough to

get students to take IBCs. Addressing the three themes identified in the study is key to improving exam rates. Across the three themes, the role of faculty in emphasizing the importance of the IBC and encouraging students to take the exam are key to increasing IBC exam rates. There are tangible steps colleges can make to address the themes and encourage students to take IBC exams. Faculty play a key role in each them. Addressing the barriers through professional development of faculty and better curricular alignment are the most direct ways colleges can affect change in the IBC exam rates.

Increasing industry-based credential (IBC) completion is important to higher education because for some, it could mean more state funding as those students are recognized as completers (Bahr, 2015; Louisiana BoR, 2017). Higher education leaders should encourage faculty and administrative staff to work to incorporate IBCs into the curriculum and the study results indicate that leaders should make those exams mandatory where possible. Additionally, leaders should invest in professional development for faculty to emphasize the critical role that faculty plays in a student's decision to take an IBC exam. The study clearly demonstrates that both faculty and student participants feel that faculty emphasis on the importance of the exam, faculty education regarding the importance of the IBC for future career opportunities, and faculty encouragement to pass the exam are essential factors in influencing students' decisions regarding IBC exams. This is good news for higher education leaders. Faculty can be encouraged to have an increased role in demonstrating the value of IBCs to students. The study also showed that students valued faculty opinion and

encouragement above their own confidence in their ability to pass the exam. Therefore, faculty should not necessarily place more value on academically preparing the students as much as educating students about the process and the importance of the credential.

Faculty in career and technical education fields can also use employer partnerships to demonstrate the value IBCs have in a given field. This is another no-cost example for higher education leaders as to how they can increase IBC exam rates. In terms of IBC exam cost, while not a high priority according to the student results, higher education leaders can mitigate the cost of the exams by incorporating the exam fees into course fees. While more research is necessary to determine the extent to which faculty members have to increase their role in encouraging students, the study results demonstrate concrete steps higher education leaders can take to improve IBC exam rates on their campuses.

Theoretical Context

The themes discovered in the study are consistent with the literature on industry-based credential (IBC) exams. The themes are interconnected and overlap addressing the concerns presented in the literature surrounding IBCs. The interconnected nature of the themes indicate that all three impacts should be addressed. CHAPTER 4 identified the six primary categories in the findings of the study. Those categories are linked relationally identifying three primary themes which give colleges insight as to how they can improve student engagement in IBC exams. The result is a roadmap for success regarding IBC exam participation rates.

Grounded in the cognitive engagement theoretical lens, the roadmap emerged through the categories and themes identified in the study findings. All three themes speak to the ways colleges can better engage students in sitting for IBC exams. Student Services Impact address the issues of cost and exam access identified in the study. By removing these barriers, student engagement in the IBC exam process could increase. The Academic Instructional Impact theme addresses faculty encouragement and curricular alignment. Both categories address engagement by (1) training the faculty to encourage students to take the exam and (2) using curricular alignment to integrate IBC objectives into the course and/or program. Both categories suggest increased engagement by mandating the exam or assisting faculty to promote the exam. Intrinsic Motivational Impact addresses the academic preparedness and IBC value categories. Though interconnected to the curricular alignment in the Academic Instructional Impact theme, academic preparedness is an intrinsic motivating factor that can be addressed by faculty to increase engagement. If the Academic Instructional Impact is addressed through curricular means, students should have a stronger feeling of internal, academic preparedness, thus increasing engagement. Finally, students recognized that engagement would be increased if potential employers in a given field value IBCs. The Intrinsic Motivational Impact theme addresses IBC value and if addressed by the administration and faculty, engagement should be increased. The interconnected nature of the themes helps explain how if addressed, the themes encompass all of the reasons indicated in the study why students choose to take IBC exams.

Research Context

The themes developed in the study are consistent with the literature on industry-based credential (IBC) exams. The themes discovered in the study address the concerns in the literature in distinct and intertwined ways. Using the themes to address these concerns is the best way for faculty and administrators to positively affect student decision-making about IBC exam participation. While few studies have looked directly at student outcomes, overall, the results from the literature indicate (1) that students are confused about the process (Johnson, 2016; Lumina Foundation, 2015; Rosenbaum & Rosenbaum, 2013; Nadelson, 2016); (2) that students and faculty recognize the benefit of IBCs to potential employers (Bahr, 2015; Dadgar & Weiss, 2012; Johnson, 2016; Matheny, Chan, & Wang, 2015; Rosenbaum & Rosenbaum, 2013; Stevens, Kurlaender, & Grosz, 2015); and (3) that students and faculty recognize the benefit to future careers (Bahr, 2015; Dadgar & Weiss, 2012; Matheny, Chan, & Wang, 2015). The themes developed in the study contribute to a better understanding of these outcomes and offer options for faculty and administrators to address the issues presented in the literature surrounding IBCs.

Students are Confused about the Process

To address the confusion around the IBC process, the themes from the study address this concern. The Student Services Impact demonstrates that students are confused about the actual processes and requirements for the exam. Colleges can have an influence over this impact by removing barriers like cost and access to exam facilities. Additionally, colleges can explain the process to

students and mitigate the influence this impact has on students. The initial premise surrounding the expansion and increased use of industry-based credentials (IBCs) centered around the complex, disconnected system of credentials (Lumina Foundation, 2015; Rosenbaum & Rosenbaum, 2013).

The findings in this study showed evidence that students are confused about IBCs and suggested that faculty could impact student decision. The Academic Instructional Impact suggests that through curricula changes requiring the IBC as part of a course or program and through faculty professional development, colleges can play a role in helping to explain the processes, benefits, and rationale surrounding IBC exam testing. Bahr (2015), Johnson (2016) and Xu & Ran (2015) who conducted studies on this topic all suggested that students are not educated enough about the value of IBCs for future wage earnings. Faculty and administrators can address this concern according to the study results. Johnson (2016) concluded that Master level students in project management courses were afraid of some of the requirements to take the certification. The graduate students "don't understand [the requirements] and immediately decide that obtaining a certification would be impossible even though a majority of our respondents were interested in obtaining a certification" (Johnson, 2016, p. 6). These results are similar to the responses from the Student Beta Test when students listed "no one has explained to me if the credential is important" as the top reason why they would not take an IBC exam. Students ranked this confusion about the importance of the exam over their personal academic preparedness suggesting that if students realized the value of the IBC,

they might take the exam even if they felt academically underprepared. This is a good signal to faculty and administrators suggesting that addressing the Academic Instructional Impact by increased education on the value of IBCs would increase IBC exam rates. Both faculty and student participants recognized the role of faculty encouragement in increasing exam rates. Given the Nadelson (2016) study results about the need for direction in the learning process, the participants in this study supported those results by suggesting that faculty have an important role in encouraging students to take the exam and in explaining the important role an IBC could have in the students' careers.

Additionally, the voluntary nature of IBC exams adds to the confusion surrounding IBC value. Both faculty and student participants noted that if the IBC is not required to pass the course/program, students are less likely to take the exam. The Nadelson (2016) study sought to determine how college students engage in self-determined learning. The researchers wanted to know the motivations, goals, and processes college students use when directing their own learning experiences (Nadelson, 2016). The study also demonstrated how college students not only accessed the information, but how they judged the information (Nadelson, 2016). Unlike in direct instruction where the teacher plays a key role in determining the value of information sources, on their own, college students may or may not have the skills necessary to decipher good information from bad information (Nadelson, 2016). If this is true, it would be difficult for students to determine on their own that sitting for an IBC exam is beneficial for their future. Addressing the categories identified in the Academic Instructional Impact theme

will demonstrate to students the importance of sitting for the IBC exam. Addressing this theme will also align curricula to prepare students for the exam and encourage faculty to promote the benefits of the exam.

In an effort to judge the skills of the participants, the Nadelson (2016) needed to determine the motivation, goals, and processes college students make in effort to find this information through self-determined learning. Nadelson (2016) noted that "with self-determined learning experiences, the responsibility of determining what source to access and the value and accuracy of the information is completely up to the student" as opposed to directed instruction. With self-determined instruction, students have "complete control of their learning and are responsible for making decisions in terms of direction for exploration, the supporting information sources, value of the information sources, and accuracy of the accessed information" (Nadelson, 2016). The Intrinsic Motivational Impact theme recognizes that students have internal influences over their decision-making process—academic preparedness and appreciating value of the IBC for future employment. While faculty and administrators may not see how they can have direct impact on this intrinsic theme, through education from industry leaders and others on the value of the IBC and through better curricular alignment, faculty and administrators can still have an indirect effect on internal factors that affect student decision-making.

Students and Faculty Recognize the Benefit of IBCs to Potential Employers

While students are confused about the IBC process and the personal rationale why they should take IBC exams, the study results are clear that both

faculty and students recognize the importance of IBCs to potential employers. Employers value IBCs and pay higher wages to employees who have IBCs in addition to or sometimes instead of an academic credential (Bahr, 2015; Dadgar & Weiss, 2012; DuPre & Williams, 2011; Jacobson & Lalonde, 2013; Rosenbaum & Rosenbaum, 2013; Stevens, Kurlaender, & Grosz, 2015; Xu & Ran, 2015). In the Delphi Round 1, faculty participants indicated that better employability was the number one reason why students take (or should take) IBC exams. Faculty also listed engage employers as a way to influence or encourage students to take IBC exams. Student participants listed future employment opportunities as the top influence on why they would take an IBC exam. This suggests that if students are aware that it will add to their personal career possibilities and if they are aware of the process surrounding the exam, they would be more likely to take the exam. Students scored IBCs will add to my resume of skills higher than any other factor. Addressing the value of the IBC through the Intrinsic Motivational Impact theme will built upon the study results linking better exam rates with potential employment. The study showed that the students would participate in more exams if they were assured of their value. Addressing this important theme will build upon the study findings and increase exam rates.

The study results also align with the human capital theoretical framework as both faculty and student participants see a value for employers in hiring students with IBCs. Human Capital Theory recognizes that trained workers are more prepared and therefore, more productive (van der Merwe, 2010; Walters, 2004). Additionally, more prepared workers are compensated at a higher wage

(Jacobson & Lalonde, 2013; Karpova, et al., 2016). In this study, faculty and student participants acknowledged that increased resume skills, employment opportunities, and making more money are important reasons why students should take IBC exams. It is clear that faculty and students recognize the potential for employers. Converting that potential to personal motivation for students seems to be disconnected from the research and the study results. To address this disconnection, college administrators and faculty should address both the Academic Instructional Impact theme and the Intrinsic Motivational Theme. Together these two themes work to bring the importance of the IBC into the classroom through a demonstration of the value, faculty encouragement, and academic alignment. Addressing the issues raised within these themes will connect the student perception about the potential value of the IBC for employers to the personal potential financial gains if the IBC is attained.

Students and Faculty Recognize the Benefit to Future Careers

Employees with industry-based credentials (IBCs) make higher wages (Bahr, 2015; Dadgar & Weiss, 2012; Matheny, Chan, & Wang, 2015; Rosenbaum & Rosenbaum, 2013; Xu & Ran, 2015). Higher wages are more beneficial to students and have significant returns in future career paths (Bahr, 2015; Rosenbaum & Rosenbaum, 2013; Stevens, Kurlaender, & Grosz, 2015). In this study, faculty and student participants both recognized the long-term career impact IBCs can have for students. Faculty participants listed importance for employability as the greatest way to encourage students in Round 1. Additionally, faculty listed engage employers and former students to show value

as a way to encourage students in Round 1. Faculty also listed better employability as the top reason why students currently choose to take IBC exams. In Round 3, faculty listed future employment opportunities as the most important reason for a student to take an IBC exam. This disconnect between what faculty believe to be true and what is conveyed to the students could be the missing piece as to why students do not participate in IBC exams. Addressing the Academic Instructional Impact would go a long way to improve this disconnect. Through better curricular alignment and faculty professional development, faculty could better appreciate the role they play in student exam rates and close the gap between knowing IBCs are valuable for student future employment and demonstrating that value directly to students.

Student participants agreed with the faculty assessment. The second largest reason why they would not take an exam is if the IBC did not have value in their future career. This supports the need to address the Intrinsic Motivational Impact demonstrated in the study. Students need to understand the value of the IBC in order to make the effort to take IBC exams. Students did recognize future employment opportunities as the most important reason why they would take an IBC exam. Students also agreed that IBCs will add to my resume of skills and realize the value of IBCs to my future career. Scoring slightly higher than student realization of the value in future career is my instructor has explained to me the value of the IBC to my future career. This final data point demonstrates again the connection between what faculty believe and how they demonstrate that belief to students. Students stated throughout the survey that faculty have a strong impact

on whether or not they take exam. If both faculty participants and student participants agree with the literature and see a value for future student careers, the participants also agree that faculty is the connection between raising awareness for students, explaining the process, and encouraging students to take the exam.

Discussion of Future Research

The study identified several reasons why students make the choice to take an industry-based credential (IBC) exam. There was consensus among both groups regarding the role of faculty in helping students make the decision to take an IBC exam. The extent to how much faculty need to be involved is not clear and deserves more research. There was consensus among both groups regarding the potential impact IBCs have on future careers and both groups recognized that employers give value to IBCs. More research should be conducted using the survey to get broader results. A larger sample size might result in a larger variance between the reasons students take an IBC exam and therefore, may give faculty and leadership a place to start in reevaluating faculty involvement, course requirements, and program requirements. The survey could also be used exclusively in one career and technical education program. The sample sizes were not large enough to make differentiations between the different programs of study. However, using the survey among a homogenous programmatic group of students could result in more concise rationale for that program of study. More research could be conducted testing the role of employers in affecting IBC exam rates. For fields that rely heavily on IBCs, those employers could have a big impact on student decisions if they were involved in classroom presentations,

internships, externships, etc. Again, this would be beneficial for homogenous programmatic groups of students within a single field of study. More research is needed on the disconnect between the student perceived value for employers, but the lack of personal value. Students understand that employers pay more for IBCs and are getting a better trained employee if they have an IBC, but students have a hard time translating that to personal motivation to take the IBC exam. The greatest room for future research is the role of faculty in impacting student outcomes. Higher education leaders would benefit from knowing how they could train and incentivize faculty members to encourage students to take IBC exams.

Conclusion

Through both Phases of the study, a survey instrument was created and tested to measure the reasons why students choose to take or not take an IBC exam. The three Delphi Method rounds gave a panel of experts an opportunity to suggest common reasons why students may not take exams and identify the primary factors that might influence a student's decision to take the exam. Through the Delphi Rounds, Academic Preparedness, Cost, Employment Value, Faculty Encouragement, and Access were the primary categories identified by the panel of experts and confirmed during the Alpha Test. During the Pilot Study with students, students agreed that faculty played an important role in deciding whether or not to take an IBC exam. However, students did not place a high value on their own academic preparedness as a key factor in their decision to take an exam.

These results demonstrate three distinct but interrelated themes surrounding IBC completion—Student Services Impact, Academic Instructional Impact, and Intrinsic Motivational Impact. Addressing these themes is the best way for colleges to improve IBC exam participation rates. This is good news for faculty and higher education administrators because administrators and faculty can have a direct impact on faculty involvement. Students are confused about what IBCs are available and if they would benefit their personal career choices. However, as a whole, faculty and students recognize that IBCs are valuable to employers and if valuable to employers, it should be valuable to students who want to work in those careers. Additionally, students overwhelmingly demonstrated that faculty encouragement and education on the value of IBCs could have a greater impact on IBC exam rates over and above personal academic preparedness. Finally, if college leaders can find a way to align more IBCs with curricula making it mandatory, students are far more likely to take the exam regardless of cost. College leaders should be encouraged by these results because more factors influencing a student's decision to take an IBC exam is within their control—curricula, employer engagement, faculty encouragement, education on the value of IBC—more than the internal student factors, academic preparedness, confidence in ability to pass the exam. This translates to action college leadership and faculty can take to improve IBC exam rates and therefore, increasing completion rates and possible funding for the institution.

References

Bahr, P. R. (2015). *The Labor Market Return in Earnings to Community College Credits and Credentials in California*. Retrieved from University of Michigan, School of Education: https://umich.app.box.com/Bahr-2014-earnings1

Belmont Report (1979). U.S. Department of Health and Human Services. *Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. Online

Boone, Jr., H. N. & Boone, D. A. (April 2012). Analyzing Likert Data. *Journal of Extension*. 50(2) p. 1-5. Retrieved from: http://www.joe.org/joe/2012april/pdf/JOE_v50_2tt2.pdf

Bragg, D. D., & Reger, IV, W. M. (2000). Toward a More Unified Education: Academic and Vocational Integration in Illinois Community Colleges. *Journal of Vocational Education Research, 25*(3). Retrieved from https://scholar.lib.vt.edu/ejouals/JVER/v25n3/bragg.html

Bragg, D. D., Reger, IV, W., & Thomas, H. (October 1997). *Integration of Academic and Occupational Education in the Illinois Community College System* (ED 418 757 JC 980 227). Retrieved from Illinois Community College Board: http://files.eric.ed.gov/fulltext/ED418757.pdf

Brown, J. D. (March 2011). Likert items and scales of measurement? *JALT Testing and Evaluation SIG Newsletter*. 15(1) p. 10-14. Retrieved from:http://jalt.org/test/PDF/Brown34.pdf

Dadgar, M., & Weiss, M. J. (2012). *Labor Market Returns to Sub-Baccalaureate Credentials: How Much Does a Community College Degree or Certificate Pay?* [CCRC Working Paper No. 45]. Retrieved from Community College Research Center, Teachers College, Columbia University: http://ccrc.tc.columbia.edu/publications/labor-market-returns-sub-baccalaureate.html

DuPre, C., & Williams, K. (2011). Undergraduates' Perceptions of Employer Expectations. *Journal of Career and Technical Education, 26*(1). Retrieved from https://scholar.lib .vt.edu/ejournals/JCTE/v26n1/pdf/dupre.pdf

Fredricks, J., Blumenfeld, P., & Paris, A. (2004, Spring). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, v74, n1. p. 59-109. Retrieved online: https://www.jstor.org/stabel/3516061

Garson, G. David. (2014). The Delphi Method in Quantitative Research. Asheboro, NC: Statistical Publishing Associates. ISBN: 978-1-62638-018-9.

Grisham, T. (2008, May). The Delphi technique: a method for testing complex and multifaceted topics. *International Journal of Managing Projects in*

Business, 2(1). pp. 112-130. Retrieved online: www.emeraldinsight.com/1753-8378.htm

Industry-Based Certification (IBC). (2015). Retrieved from http://www.laworks.net/PublicRelations/WIC_IndustryBasedCertification.asp

Jacobson, L. S., & LaLonde, R. J. (April 2013). *Using Data to Improve the Performance of Workforce Training*. Retrieved from The Brookings Institution: http://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/THP_JacobsonLaLonde_Brief2.pdf

Johnson, J. (2016). Faculty Scholarship Grant Final Report—PMP Certification [White paper]. Retrieved December 2017, Sullivan University.

Kansas State Legislature. 2014. Higher Education Coordination, State Board of Regents Performance Indicators, Chapter 74, Article 32, Section 2d. Retrieved from: http://kslegislature.org/li_2014/b2013_14/statute/074_000_0000_chapter/074_032_0000_article/074_032_0002d_section/074_032_0002d_k/

Kraska, M. (2010). Quantitative Research Design. In N. Salkind (Ed.), *Encyclopedia of Research Design* (pp. 1167-1171). Thousand Oaks, CA: SAGE Publications.

Likert, R. (1932). A Technique for the Measurement of Attitudes. In Woodworth (Ed.), *Archives of Psychology*, 22(140). p. 5-55. Retrieved from: http://www.voteview.com/pdf/Likert_1932.pdf

Litwin, M. (1995). *How to Measure Survey Reliability and Validity*. Thousand Oaks, CA: Sage Publications.

Lodico, M., Spaulding, D., & Voegtle, K. (2010). *Methods in Educational Research: From Theory to Practice* (2nd ed.). San Francisco, CA: John Wiley & Sons.

Louisiana Board of Regents. (2017). *Academic Affairs Policy 2.15. Definitions of Undergraduate Degrees and Undergraduate/Graduate Certificates*. Retrieved January 2018 from: https://regents.la.gov/divisions/planning-research-and-academic-affairs/academic-affairs/academic-affairs-policies-and-procedures/academic-affairs-policy-2-15/

Louisiana Workforce Commission. (2015). *Industry Based Certification as defined for Louisiana by LWC* [website]. Retrieved from http://www.laworks.net/PublicRelations /WIC_IndustryBasedCertification.asp

Lumina Foundation. 2015. *Connecting Credentials: Making the Case for Reforming the U.S. Credentialing System*. Retrieved from: http://connectingcredentials.org.

Matheny, C. J., Chan, H., & Wang, X. (2015). Assembling a career. *Community College Review*, *43*(4), 380-406. http://dx.doi.org/10.1177/0091552115597999

Merriam, S. (2009). *Qualitative Research: A Guide to Design and Implementation* (2nd ed.). San Francisco, CA: John Wiley & Sons.

Nadelson, L.S., et al. (2016). A World of Information at Their Fingertips: College Students' Motivations and Practices in Their Self-Determined Information Seeking. *International Journal of Higher Education, 5*(1), p. 220-231. Retrieved from: http://files.eric.ed .gov/fulltext/EJ1088720.pdf

National Conference on State Legislatures. 2015. Performance-Based Funding for Higher Education. Retrieved from: http://www.ncsl.org/research/education/performance-funding.aspx

Phillips, P., Phillips, J. & Aaron, B. (2013). *Survey Basics*. Alexandria, Virginia: ASTD Press. ISBN-10: 1-56286-809-8

Rockinson-Szapkiw, A. (2013). Developing a Quantitative Research Plan: Choosing a Research Design. [Power Point Presentation]. Retrieved from *The Doctoral Journey* on YouTube: https://www.youtube.com/watch?v=UywO2XuFuBA

Rosenbaum, J. E. & Rosenbaum, J. (2013, Spring). Beyond BA Blinders: Lessons from Occupational Colleges and Certificate Programs for Nontraditional Students. *The Journal of Economic Perspectives, 27*(2). pp. 153-172. Retrieved online: https://www.jstor.org/ stable/23391695

Smiley, W. & Anderson, R. (2011, Summer). Measuring Students' Cognitive Engagement on Assessment Tests: A Confirmatory Factor Analysis of the Short Form of the Cognitive Engagement Scale. *Research & Practice in*

Assessment, v6. p. 17-28. Retrieved from: https://eric.ed.gov/?q=motivational+theory&pr=on&ft=on&id=EJ1062738

Stevens, A., Kurlaender, M., & Grosz, M. (2015). *Career-Technical Education and Labor Market Outcomes: Evidence from California Community Colleges*. Retrieved from Center for Analysis of Postsecondary Education and Employment (CAPSEE): http://capseecenter.org/wp-content/uploads/2015/05/career-technical-labor-market-outcomes.pdf

Sullivan, G. & Artino, Jr. A. (December 2013). Analyzing and interpreting data from Likert-type scales. *Journal of Graduate Medical Education*. 5(4). p. 541-542. Retrieved from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3886444

Tavakol, M. & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*. Vol. 2. p. 53-55. Retrieved from: https://www.ijme.net/archive/2/cronbachs-alpha.pdf

Van der Merwe, A. (2010). Does Human Capital Theory Explain the Value of Higher Education? A South African Case Study. *American Journal of Business Education 3(1).* p. 107-118. Retrieved from: http://files.eric.ed.gov/fulltext/EJ1060335.pdf

Walters, D. (2004). The Relationship Between Postsecondary Education and Skill: Comparing Credentialism with Human Capital Theory. *The Canadian Journal of Higher Education, 34(2).* p. 97-124. Retrieved from: http://files.eric.ed.gov/fulltext/EJ720719.pdf

Washington State Board for Community and Technical Colleges. 2017. Credentials awarded Dashboard – Credential Data. Retrieved from: https://www.sbctc.edu/colleges-staff/research/data-public/credentials-awarded-dashboard.aspx

Xu, D., & Ran, X. (2015, September 2015). Noncredit Education in Community College: Students, Course Enrollments, and Academic Outcomes. *Community College Research Center*, 1-36. http://dx.doi.org/http://ccrc.tc.columbia.edu/presentation/noncredit-education-in-community-colleges-students-course-enrollments-and-academic-outcomes.htm

Appendix A – Round 1 Audit Trail

Q3:
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LEGEND Coding information:

Financial, cost, or budget information is highlighted in yellow.
14 mentions
Confidence in ability is highlighted in blue.
8 mentions
Not required is highlighted in green.
6 mentions
Lack of interest or lack of perceived value is highlighted in pink.
6 mentions

Q3 Themes	Financial Burden or Cost	Confidence in ability to pass exam	Not Required for the course or program	Lack of interest or value in IBC
Participant Response	1, 2, 9, 11, 14, 18, 19, 24, 25, 28, 33, 35, 37, 38	16, 17, 22, 27, 31, 33, 37, 38	1, 3, 4, 28, 36, 39	9, 14, 19, 21, 34, 40

Q4:	In your expert opinion, why do students choose to take the IBC exam?
	Open-Ended Response
1	Postion requirements. Resume differentiator.
2	Certification
3	Students know that the more IBC they have the more of a chance they will have to get hired
4	Improve employability
5	NA
6	It is part of the requirements of the program
7	N/A
8	Part of the curriculum
9	Students take the exam because it is a requirement of the industry or state agency. Also, some take the exam to enhance their salary and/or to make them more marketable in the field.
10	They have to take and pass to move on.
11	Career advancement
12	N/A
13	Needed for employment Additional accomplishment Pay raise with credential
14	They want the certifications and they plan on staying in this industry a long time.
15	Do not know.
16	They want the credential on their resume.
17	It documents a level of competence in their chosen field.
18	To get employed in their profession
19	Perhaps an instructor has informed them that there is some value in taking such an IBC exam.
20	to be able to work
21	They see the value and relevance to their chosen path of opportunities.
22	They want to have the IBC to demonstrate employability to employers.
23	I do not teach a course that offers an IBC, but I would imagine they choose to take it to add to their credentials for employment.
24	because it is required to get a job
25	increase salary upon passing
26	The test fees are incorporated into the cost of the course
27	To gain an advantage over those who don't
28	Because it is required to work in the State

29	N/A
30	IBC are becoming required for employment
31	The students who actually take the examination, are confident in their ability to pass it.
32	Nursing licensure is the reason for our program
33	in hopes of nailing a job quicker than without it
34	Students choose to take the exam for promotions and job opportunities.
35	Students understand the benefits of obtaining IBCs - great for a resume', puts them ahead of students without IBCs, could mean higher wages, etc.
36	The students that want IBC's are those that want to be more than just an employee.
37	Because it is required for employment in their chosen field.
38	Employability
39	I don't teach cte courses.
40	n/a

LEGEND – Coding Information

Better employability is highlighted in yellow.
20 mentions
Because it is required for the program is highlighted in blue.
9 mentions
Students perceive value or confidence in acquiring IBC is highlighted in pink.
10 mentions

Q4 Themes	Employability	Confidence in passing the exam	Required for the course or program
Participant Response	1, 3, 4, 9, 11, 13, 18, 20, 22, 23, 24, 25, 27, 30, 33, 34, 35, 38	2, 13, 14, 16, 17, 19, 21, 31, 35, 36	1, 6, 8, 9, 10, 26, 28, 32, 37

Q5:	What are some of the influences on why students choose to NOT take the IBC exam?
	Open-Ended Response
1	Time. Cost. Don't understand the benefit.
2	Out of pocket expenses
3	companies and other people not in their field are the biggest influences
4	Misinformation of a lack of weight for the exam/credential
5	NA
6	the students don't have that choice.
7	N/A
8	N/A
9	Some influences include financial burden and loss interest in the field.
10	Stop coming to class
11	Not advertised in a way that students can visualize the results of taking the exam.
12	N/A
13	Financial costs of certification No additional pay for holding the IBC
14	Hearing other people talk about how difficult the exam can be. Having to pay to take a test.
15	Do not know.
16	Timeframe.
17	A lack of self confidence
18	Cost of the associated examinations, personal factors (life/work balance) primarily determine if they take the exams
19	Perhaps the cost of taking such exam.
20	none except the IBC agency prohibiting
21	Immaturity, chaotic lifestyle, ignorant of industry requirements
22	Many students work and therefore won't take the time necessary to prepare for the exams outside of class. They do not know how to manage their time. The do not believe they are of value.
23	Fear of failure, cost???
24	Money Issues and it not being required for employment
25	N/A
26	if they failed to complete the course
27	Lack of funds, location of test center.
28	cost, not required, feel exhausted at the end of the their coursework and don't want to study anymore
29	N/A

30	no opinion
31	Fear Lack of preparation No transportation Lack of parental support
32	N/A
33	it does not provide that great of an advantage when it comes to job opportunities and pay
34	Students choose not to take the exam due to a lack of financial reward/gain. They believe the work (studying a passing examination and maintaining the license) is not worth the reward.
35	Other students who do not understand or care about the value and benefits of an IBC.
36	They do not believe they are important.
37	Cost, accessibility of testing sites, they do not feel the choose adequately prepared them
38	Financial
39	Don't know.
40	I think a lot of students are unaware that there are many great paying, engaging jobs that exist where a certificate is all that is required. Not to mention that there aren't many stackable certificate/credential programs that exist.

LEGEND – Coding information

Cost is highlighted in yellow.
13 mentions
Lack of access, transportation, time etc. is highlighted in blue.
9 mentions
Lack of confidence or preparation is highlighted in green.
9 mentions
Lack of value in IBC attainment is highlighted in pink.
11 mentions

Q5 Themes	Financial Burden or Cost	Lack of interest or value in IBC	Lack of confidence in the ability to pass or Lack of academic preparedness	Lack of access to the IBC exam
Participant Response	1, 2, 9, 13, 14, 18, 19, 23, 24, 27, 28, 37, 38	1, 4, 11, 13, 22, 24, 33, 34, 35, 36, 40	9, 10, 17, 23, 26, 28, 31, 37	1, 16, 18, 21, 22, 27, 31, 37

Q8:	How can students be encouraged to take IBC exams?
	Open-Ended Response
1	Be provided a complete picture of the benefits of doing so.
2	Implement it into the curriculum
3	explain to students that IBC give you more experience and allows companies to see that you have been trained in multiple processes. it also shows that you have completed some type of training
4	Make exam mandatory or incorporate into course material
5	Former students and employers talking to students
6	It is part of our program requirements to graduate
7	N/A
8	Make them part of the curriculum and test as a group at end of semester
9	Inform the students of the advantages for taking the exam. Also, request industry partners/recruiters to speak about how the exam would benefit them in the industry.
10	See question 3&4ma
11	Incorporate the exams in Canvas and provide it as a part of the course.
12	N/A
13	Incorporate Exam costs in course fees Schedule on-site testing
14	I like to explain that if they take the time and effort for the exam that it shows their employers that they know what they are doing and it gives them an opportunity to make more money than the person with no certifications.
15	Do not know.
16	I am contemplating giving the IBC at midterm in order to motivate students to do it. If they pass, they are done for the semester. If not, at least they have seen the test and can prepare for their retake.
17	By making them aware at the start of training of the importance an employer may place on seeing documentation that an applicant has achieved a level of competence (skill and/or knowledge)
18	It is reinforced consistently throughout the program the need to complete the IBC to practice in the field
19	Demonstrate the necessity of such an exam and the benefits one will receive from taking such an exam.
20	needed for work
21	Point out the relevance, value and requirements of the industry and how it relates to them specifically. Incorporating it as part of the student's grade has a positive influence, but still boils down to them seeing/not seeing the relevance and value vs temporal distractions.
22	It would have to be a bigger part of their grade. It is already charged as part of their fees for the course. An employer coming into the classroom to discuss the importance.
23	Promote the benefit to them when looking for a job.
24	by explaining the IBC make them more marketable than those without IBC
25	Include exam fees in tuition
26	make the test a requirement of the course

27	build their confidence, offer convenient access to a testing center.
28	Help them feel better prepared; teach them pride in having the certification; offer a certification exam prep course during the semester
29	Don't know
30	required
31	On-going test preparation, tests blitz, incentives, transportation provided, constant motivation and praise
32	No input from my professional standpoint
33	most employers will look more seriously at hiring an individual with an IBC
34	Recognition and reward from employers.
35	Instructors must present the value and benefits of IBCs to students in a way that helps them realize they need IBCs.
36	Have industry offer more pay for those that have them.
37	Incorporate exam costs into course fees. Therefore an exam able to be administered through the school, or at a local test center, can be taken by the student, paid by the school, from the course fees. Therefore the exam fees are covered by financial aid. Also, there must be local access to the certification exam.
38	Better information from partners such as SkillsUSA
39	Don't know
40	Advertisement and education on certificate-based careers and industry outreach to programs that are willing to work with the educational system.

LEGEND Coding information:

Include IBC as a mandatory part of the program is highlighted in yellow.
10 mentions
Instructors should emphasize the value of IBCs is highlighted in blue.
13 mentions
Incorporate exam fees into course fees is highlighted in green.
6 mentions
Engage employers or others to demonstrate importance is highlighted in pink
5 mentions
Better preparation to boost student confidence is highlighted in orange.
3 mentions

Q8 Themes	Instructors Emphasize the Importance for Employability	Make the IBC exam Mandatory	Incorporate Fees into Course or Program Fees	Engage Employers or Former Students to show value	Better Academic Preparation to Boost Confidence
Participant Response	1, 3, 9, 14, 16, 17, 18, 19, 21, 23, 24, 33, 35	2, 4, 6, 8, 11, 16, 21, 22, 26, 30	13, 22, 25, 36, 37	5, 9, 22, 34, 40	16, 27, 28, 31

Q9:	What role does faculty play in influencing IBC exam participation?
	Open-Ended Response
1	Gatekeepers of the information, should play a practical role in providing the full picture.
2	Positive reinforcement
3	faculty plays a huge role in influencing. I know that as an instructor most students will take all the advice the see and hear
4	Stress the importance of industry based credentialing
5	I display my IBC credintials
6	encouragement and explaining the results to the students
7	N/A
8	Making sure everyone in class gets registered for the exam on the date set by the instructor.
9	Faculty are the main influences for driving or steering the students to desire to continue learning about the field of study.
10	Mandatory
11	Without it being a part of the course, our role is limited. The cost of taking an exam must be a part of the tuition based program or included in the course materials.
12	N/A
13	Encouragement Facilitating Coordinating payment for exam
14	I incorporate the same style of test questions into my test. I also have to have them as part of my job description so I push how important it is to take the exams because it makes them more valuable of an employee.
15	Do not know.
16	Huge! We have to motivate them and find a way to make them successful.
17	presenting positives, offer encouragement, applying subtle or overt pressure depending on the individual
18	Students are given instruction for accessing the website sites and students are given instructions after course completion on how to enroll for the examinations. Time is spent in class walking them through the process. Additional assistance is provided to those in person or by phone if they have issues.
19	I believe faculty play an important role in influencing students to participate in an TBC exam.
20	none
21	Suggest, inform, require as part (20%) of course grade.
22	Faculty play a big role in emphasizing the importance of obtaining the IBC.
23	They should be the main promoter
24	A great role; my staff is very encouraging towards IBC's
25	major
26	they recommend for testing
27	explain the advantages having the cert as opposed to only having the degree when applying for a job.
28	Encouragement

29	Crucial
30	Faculty control curricullum
31	Serving as a facilitator of teaching and learning
32	Faculty is devoted to preparing students for state board by facilitating required learning
33	bringing in HR reps as guest speakers, former students, etc.
34	Faculty plays an essential role as they are the gate keepers and are responsible for motivating and coordinating the exams at the end of the semester.
35	A huge role - faculty must encourage with real-life stories.
36	To PROPERLY teach them and their importance in industry.
37	When faculty members do not encourage exam participation the student does not see the "buy-in" on the examination process, or the actual need. Why would a student take an exam they feel isn't needed.
38	Huge
39	Don't know
40	Faculty have to make the connections, do the paperwork and presentation, get the certificates or training they need, and create and teach the courses. Sometimes the work may be done for free if it is not supported by the department or administration.

LEGEND: Coding Information

Very important—serves as an encourager to take exams is highlighted in yellow.
15 mentions
Important—personal experience for encouragement is highlighted in blue.
9 mentions
Important—because they prepare students for the exams is highlighted in green.
9 mentions
No role or reduced role is highlighted in pink.
6 mentions

Q9 Themes	Very Important	Important – To provide Encouragement	Important – To academically prepare students for the exam	Not Important
Participant Response	2, 3, 6, 9, 13, 16, 17, 19, 21, 22, 23, 24, 28, 34, 37, 40	1, 4, 5, 14, 18, 26, 27, 35, 40	8, 13, 14, 18, 30, 31, 32, 33, 36, 40	7, 11, 12, 15, 20, 39

Q10:	If there is anything else you would like to share about your experiences and opinions on industry-based certifications, academic programs, or any item on this survey, please do so in the space provided below.
	Open-Ended Response
1	
2	State should allocate funds specifically for the IBC in a curriculum and be used for only that!!
3	
4	
5	
6	no
7	
8	
9	N/A
10	No
11	
12	Not at this time.
13	Nothing
14	There needs to be a process in place to identify professional certifications so the state schools can get credit for them.
15	
16	
17	
18	
19	no
20	N/A
21	
22	Faculty can point out the relevance, value, requirements of industry, require it as part of course grade, and sometimes the student still buys into the temporal distractions of youthfulness and does not care. Sad, but true.
23	Students do not put for the effort because they deem them unimportant. I will usually hear from them later on saying "I wish I had gotten that certification." They can see after they are in the workforce how it would have made a difference.
24	
25	
26	IBC exam/s should be cost effective based on starting salary for the IBC's obtained.
27	
28	We offer a voucher that is included in the purchase of the the curriculum access code, and make the Certification exam the final for the course.
29	I am always concerned when students don't want to take the exam. Generally, I feel that students shy away from any exam that it not required. Many students are not intrinsically motivated so if it is not a requirement; they are not interested.

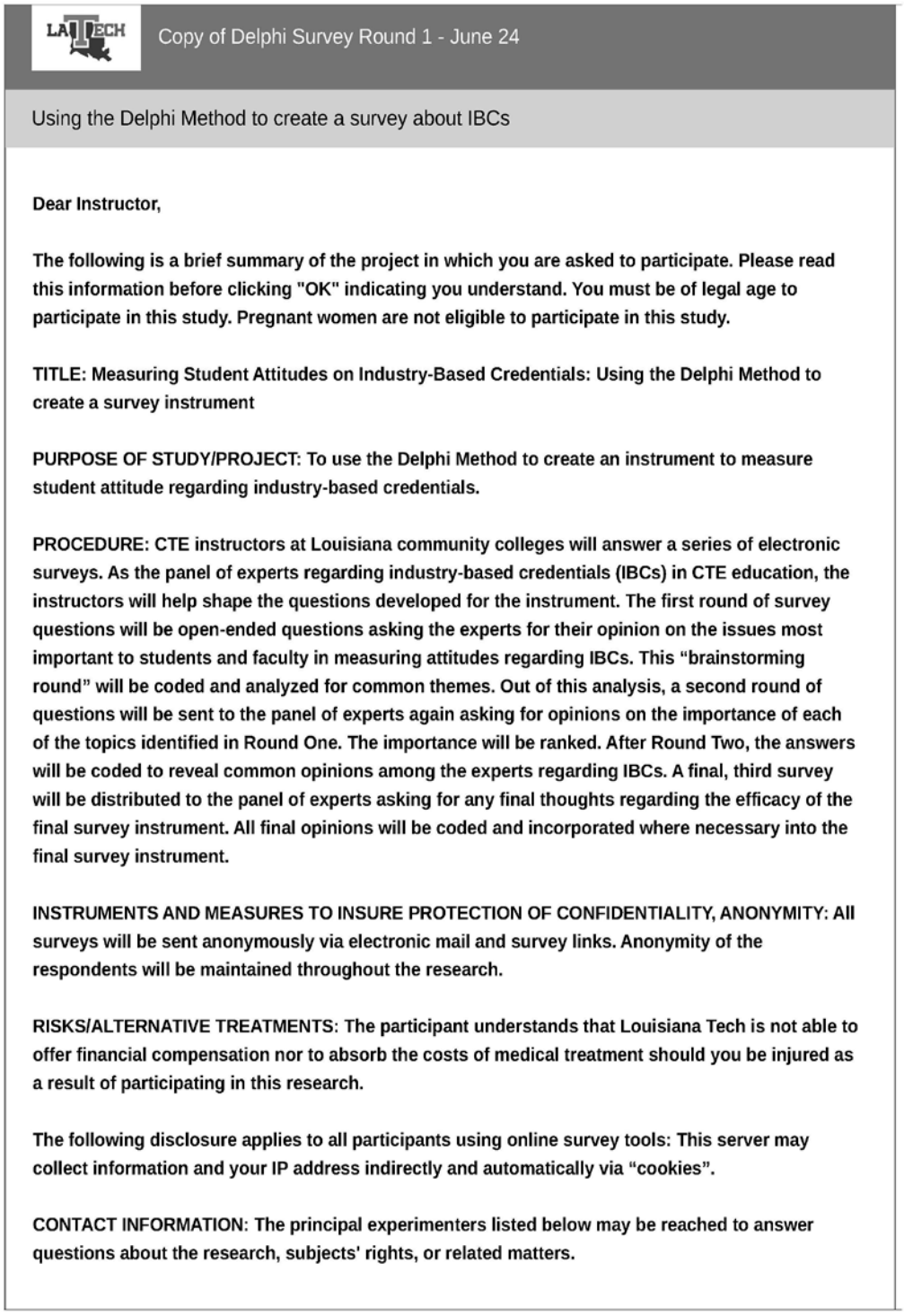
30	
31	no
32	
33	include cost in tuition
34	
35	I believe IBCs should be required of students in classes that offer them.
36	With my program we offer NCCER but it would be of great benefit too not only the students but colleges as well if we could offer OSHA 10, C4M, and any other safety credentials with NCCER Core since Core has a lot of each encompassed into it already.
37	
38	We need to use multifaceted, multimedia methods of engagement
39	Don't have any experience with ibc.
40	Please bring people to community colleges that are willing to show professors how to point students in the direction of certifications rather than the antiquated "degree only" form of education.

LEGEND: Coding Information

Nothing to add is highlighted in yellow.
9 mentions
Incorporating costs into course fees is essential is highlighted in blue.
4 mentions
Making IBC exams mandatory is highlighted in green.
3 mentions
Increasing education about the value of IBCs is highlighted in pink.
6 mentions

Q10 Themes	Nothing to add	Increasing IBC Awareness and/or Education	Incorporating the Cost of Exam Fees into Course Fees	Making IBC Exam Mandatory
Participant Response	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 24, 25, 27, 30, 31, 32, 34, 37, 39	14, 22, 23, 36, 38, 40	2, 26, 28, 33	28, 29, 35

Appendix B – Round 1 Survey



Copy of Delphi Survey Round 1 - June 24

Using the Delphi Method to create a survey about IBCs

Dear Instructor,

The following is a brief summary of the project in which you are asked to participate. Please read this information before clicking "OK" indicating you understand. You must be of legal age to participate in this study. Pregnant women are not eligible to participate in this study.

TITLE: Measuring Student Attitudes on Industry-Based Credentials: Using the Delphi Method to create a survey instrument

PURPOSE OF STUDY/PROJECT: To use the Delphi Method to create an instrument to measure student attitude regarding industry-based credentials.

PROCEDURE: CTE instructors at Louisiana community colleges will answer a series of electronic surveys. As the panel of experts regarding industry-based credentials (IBCs) in CTE education, the instructors will help shape the questions developed for the instrument. The first round of survey questions will be open-ended questions asking the experts for their opinion on the issues most important to students and faculty in measuring attitudes regarding IBCs. This "brainstorming round" will be coded and analyzed for common themes. Out of this analysis, a second round of questions will be sent to the panel of experts again asking for opinions on the importance of each of the topics identified in Round One. The importance will be ranked. After Round Two, the answers will be coded to reveal common opinions among the experts regarding IBCs. A final, third survey will be distributed to the panel of experts asking for any final thoughts regarding the efficacy of the final survey instrument. All final opinions will be coded and incorporated where necessary into the final survey instrument.

INSTRUMENTS AND MEASURES TO INSURE PROTECTION OF CONFIDENTIALITY, ANONYMITY: All surveys will be sent anonymously via electronic mail and survey links. Anonymity of the respondents will be maintained throughout the research.

RISKS/ALTERNATIVE TREATMENTS: The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

The following disclosure applies to all participants using online survey tools: This server may collect information and your IP address indirectly and automatically via "cookies".

CONTACT INFORMATION: The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

Jennifer H. Lawrence (318)364-7748 or jhl013@latech.edu

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters: Dr. Richard Kordal, Director, Office of Intellectual Property & Commercialization -- Ph: (318) 257-2484, Email: rkordal@latech.edu

BENEFITS/COMPENSATION: I attest with my electronic signature that I have read and understood the following description of the study, "Student Attitudes and IBCs", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study. I am over 18 years of age, and I am not pregnant.

1. Do you currently teach a course that is aligned to an industry-based certification (IBC)? (An industry-based certification is defined as a certification administered and awarded by a third party in industry.)

- ◯ Yes
- ◯ No

2. Do you offer an opportunity for students to take the IBC within or at the end of your course/program?

- ◯ Yes
- ◯ No
- ◯ N/A

* 3. In your expert opinion, why do students NOT take the IBC exam?

* 4. In your expert opinion, why do students choose to take the IBC exam?

* 5. What are some of the influences on why students choose to NOT take the IBC exam?

6. From the list provided, choose your academic program:

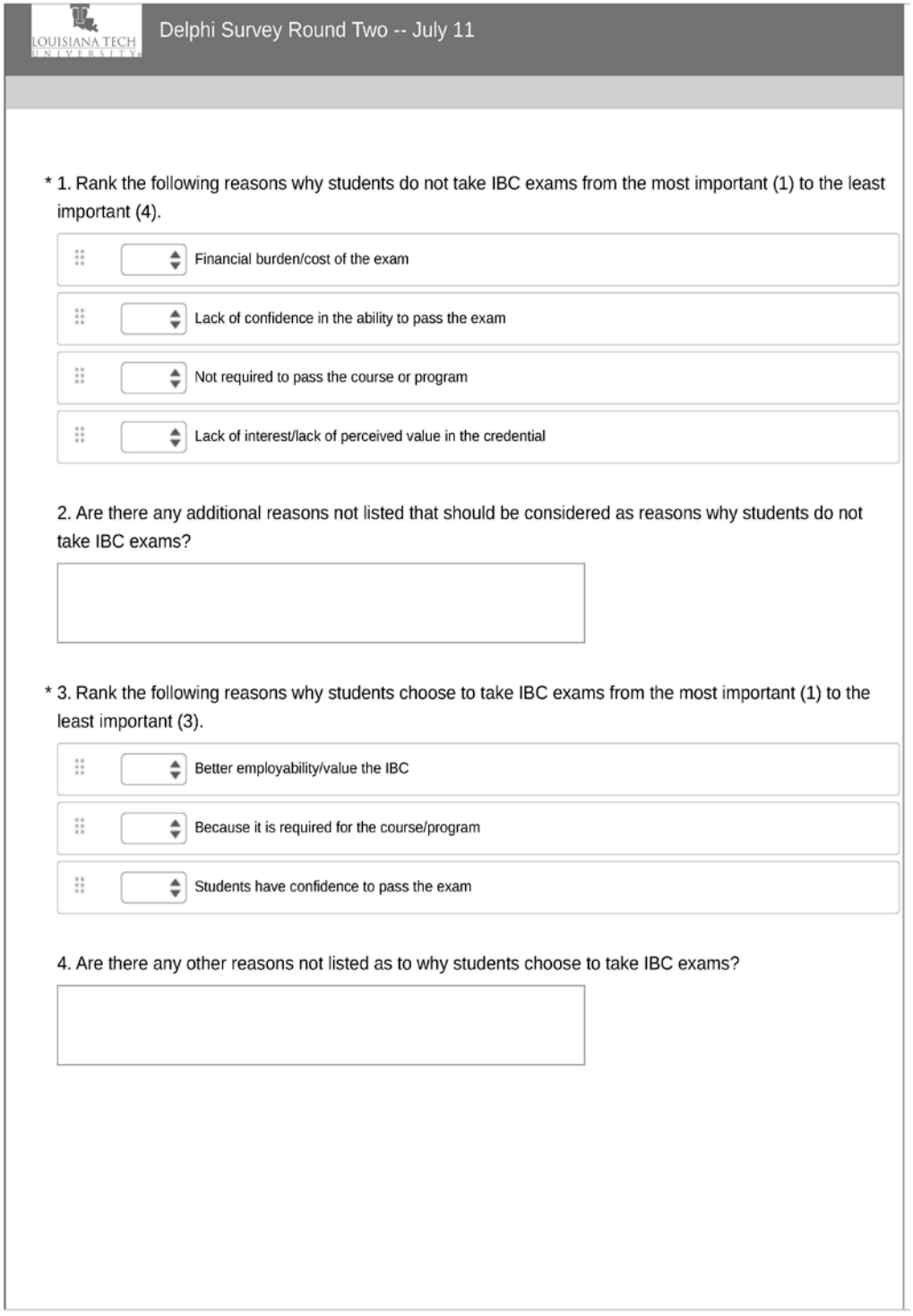
- ◯ Cyber Technology
- ◯ Advanced Manufacturing
- ◯ Industrial Technology
- ◯ Other (please specify)
- ◯ Oil and Gas Production Technology
- ◯ Allied Health
- ◯ Graphic Design/Communication Media

* 7. How can students be encouraged to take IBC exams?

* 8. What role does faculty play in influencing IBC exam participation?

9. If there is anything else you would like to share about your experiences and opinions on industry-based certifications, academic programs, or any item on this survey, please do so in the space provided below.

Appendix C – Round 2 Survey



Delphi Survey Round Two -- July 11

* 1. Rank the following reasons why students do not take IBC exams from the most important (1) to the least important (4).

- Financial burden/cost of the exam
- Lack of confidence in the ability to pass the exam
- Not required to pass the course or program
- Lack of interest/lack of perceived value in the credential

2. Are there any additional reasons not listed that should be considered as reasons why students do not take IBC exams?

* 3. Rank the following reasons why students choose to take IBC exams from the most important (1) to the least important (3).

- Better employability/value the IBC
- Because it is required for the course/program
- Students have confidence to pass the exam

4. Are there any other reasons not listed as to why students choose to take IBC exams?

* 5. Rank the primary influences on students' decision to take an IBC exam. 1=most common influence; 5=least common influence

- Lack of financial resources
- Lack of access -- transportation, testing location, time, etc.
- Lack of confidence in preparation for the exam
- Lack of value in IBC attainment
- Lack of faculty encouragement

6. Are there any other primary influences missing from this list?

* 7. Rank the following ways to effectively encourage students to take IBC exams. 1=the most effective way; 5=the least effective way

- Include as a course/program requirement
- Encourage faculty to emphasize the value of the credential
- Incorporate exam fees as course fees
- Engage employers and/or former students to emphasize the value of the credential
- Ensure better exam preparation to boost student confidence to pass the exam

8. Are there any other ways to effectively encourage students to take the IBC exam?

* 9. The role of faculty in a student's decision to take an IBC exam was ranked as follows:
Very important -- serves as the primary encourager to take the exam (15 mentions)
Important -- because they academically prepare the students to take the exam (10 mentions)
Somewhat important -- because they can display personal IBCs and relay personal experience to encourage students to take the exam (9 mentions)
Not important -- because they have a limited role in what the student ultimately decides to do (6 mentions)

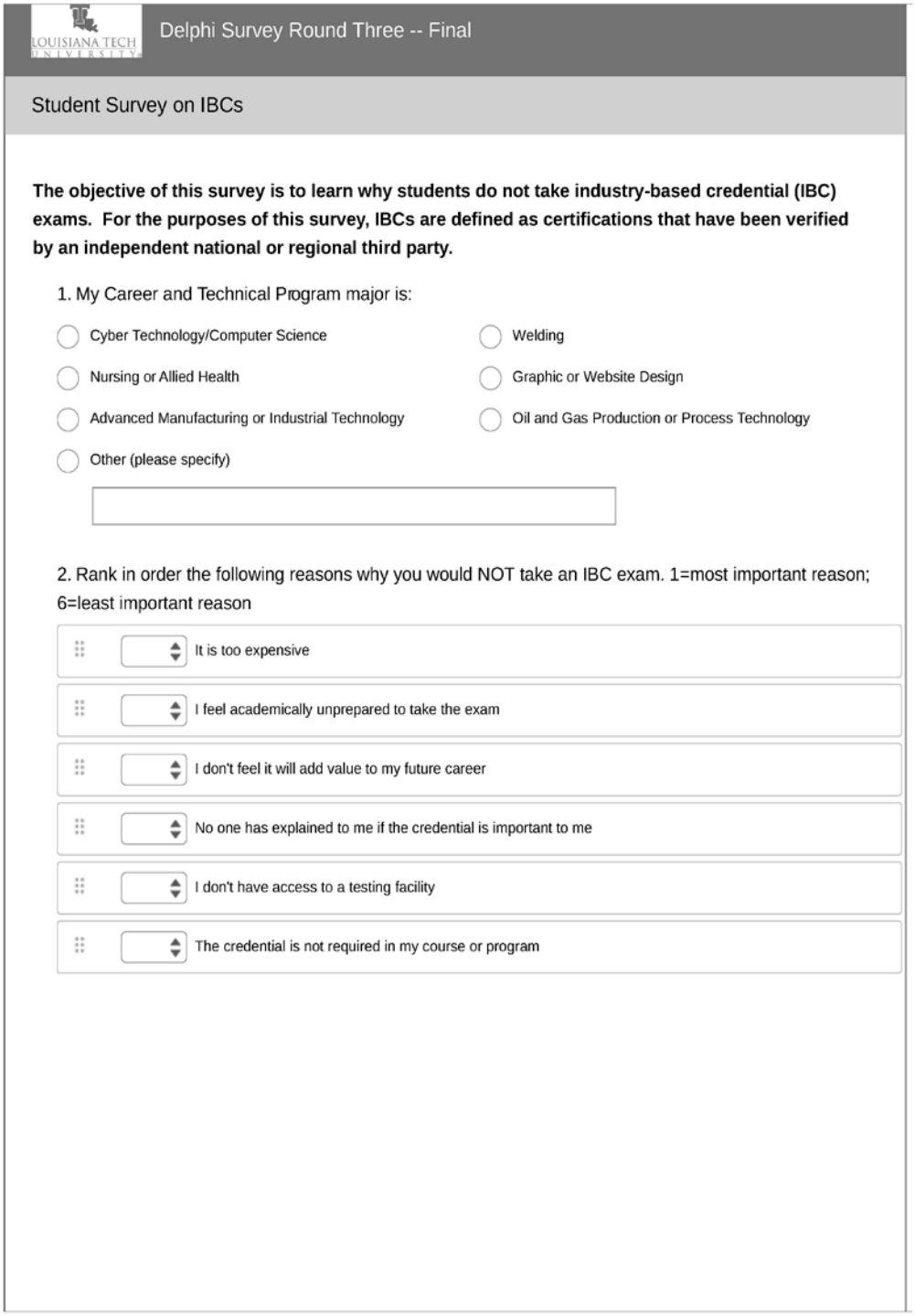
Do you agree with this ranking?

- [ ] Yes
- [ ] No

If no, please explain.

10. What additional thoughts or ideas do you have to help encourage students to take an IBC exam?

Appendix D – Round 3 Survey – Alpha Test



Delphi Survey Round Three -- Final

Student Survey on IBCs

The objective of this survey is to learn why students do not take industry-based credential (IBC) exams. For the purposes of this survey, IBCs are defined as certifications that have been verified by an independent national or regional third party.

1. My Career and Technical Program major is:

- Cyber Technology/Computer Science
- Welding
- Nursing or Allied Health
- Graphic or Website Design
- Advanced Manufacturing or Industrial Technology
- Oil and Gas Production or Process Technology
- Other (please specify)

2. Rank in order the following reasons why you would NOT take an IBC exam. 1=most important reason; 6=least important reason

- It is too expensive
- I feel academically unprepared to take the exam
- I don't feel it will add value to my future career
- No one has explained to me if the credential is important to me
- I don't have access to a testing facility
- The credential is not required in my course or program

3. Please rate each element of the IBC exam process in terms of importance to you as a student.

	Very Unimportant	Unimportant	Neither important or unimportant	Important	Very Important
Cost of the IBC exam	◯	◯	◯	◯	◯
Location of the IBC exam	◯	◯	◯	◯	◯
Part of an academic course or program	◯	◯	◯	◯	◯
Future employment opportunities	◯	◯	◯	◯	◯
Academic Preparation	◯	◯	◯	◯	◯
Faculty encouragement	◯	◯	◯	◯	◯

Other (please specify)

4. Based on your past and/or current experience as a career and technical education student, please indicate how strongly you agree or disagree with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree	N/A
I feel academically prepared to take IBC exams.	○	○	○	○	○	○
Industry-based credentials (IBCs) will add to my resume of skills.	○	○	○	○	○	○
I will make more money if I have an IBC.	○	○	○	○	○	○
IBC exams are too expensive for me to take them.	○	○	○	○	○	○
My instructor has explained to me the importance of earning IBCs for my career field.	○	○	○	○	○	○
I realize the value of IBCs for my future career.	○	○	○	○	○	○
I have access to exam testing facilities.	○	○	○	○	○	○
I understand IBCs are integrated into my academic courses and/or program.	○	○	○	○	○	○
I look to faculty as examples of success in my career field.	○	○	○	○	○	○

5. Please indicate how strongly you agree or disagree with the following statements--I would take the IBC exam if:

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
the exam fee was paid.	◯	◯	◯	◯	◯	◯
I feel confident that I can pass the exam.	◯	◯	◯	◯	◯	◯
my instructor encourages me to take the exam.	◯	◯	◯	◯	◯	◯
employers in my field demonstrate value in my future career.	◯	◯	◯	◯	◯	◯
the exam was administered on campus.	◯	◯	◯	◯	◯	◯
the exam was part of my course or program.	◯	◯	◯	◯	◯	◯

6. Please provide any additional comments or observations to add to the design of the survey instrument. Thank you for your help with this process.

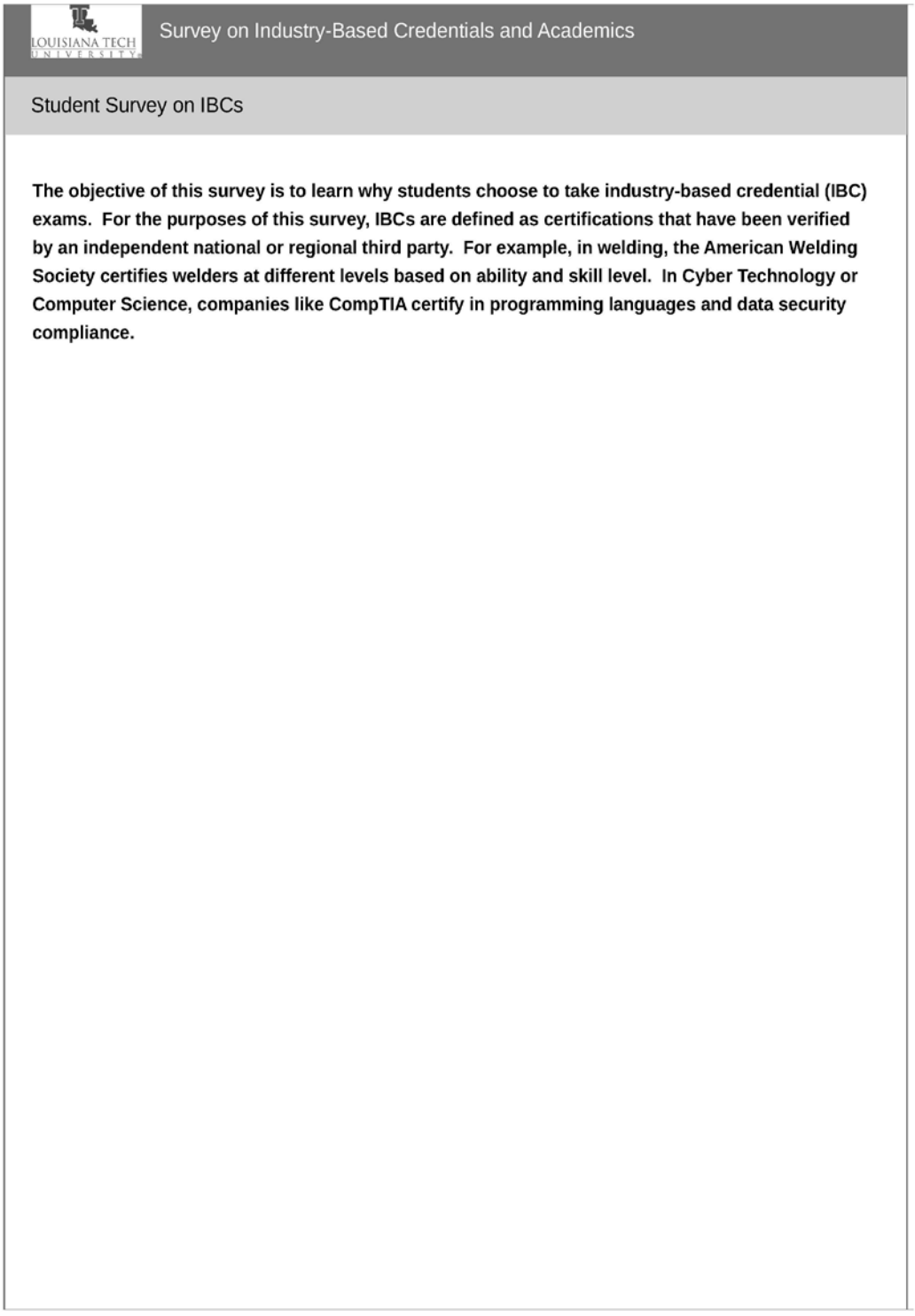
* 7. I am teaching or will be teaching a course involving an IBC and I would like to pilot test this survey with my students.

◯ Yes

◯ No

If yes, my email address is:

Appendix E – Student Survey – Beta Test



* 1. The SURVEY PROJECT: Career and Technical Education (CTE) students at Louisiana community colleges will answer an electronic survey. The survey results will be analyzed using quantitative data analysis. This survey is confidential, anonymous, and will not identify you personally. Participation in this survey is voluntary and you may discontinue at any time. By participating in this study, you are contributing to the primary research on determining how students feel about industry-based credentials in higher education. Your participation and opinions are highly valued and appreciated. All responses will be anonymous and the participants' identities will remain unknown to the researcher. All collected data will be stored on the principal researcher's computer secured with the password.

The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

I attest by clicking "yes" below that I have read and understood the description of the study, "Student Attitudes and IBCs", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study. I am over 18 years of age, and I am not pregnant.

CONTACT INFORMATION:

The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

Jennifer H. Lawrence (318)364-7748 or jhl013@latech.edu

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:

Dr. Richard Kordal, Director, Office of Intellectual Property and Commercialization at Louisiana Tech University -- 318-257-2484 or email: rkordal@latech.edu.

- [ ] Yes, I will participate in the survey.
- [ ] No, I will not participate in the survey.

* 2. My Career and Technical Program major is:

- ◯ Cyber Technology/Computer Science
- ◯ Welding
- ◯ Nursing or Allied Health
- ◯ Graphic or Website Design
- ◯ Advanced Manufacturing or Industrial Technology
- ◯ Oil and Gas Production or Process Technology
- ◯ Other (please specify)

* 3. Rank in order the following reasons why you would NOT take an IBC exam. 1=most important reason; 6=least important reason

- ⠿ ⬍ It is too expensive
- ⠿ ⬍ I feel academically unprepared to take the exam
- ⠿ ⬍ I don't feel it will add value to my future career
- ⠿ ⬍ No one has explained to me if the credential is important to me
- ⠿ ⬍ I don't have access to a testing facility
- ⠿ ⬍ The credential is not required in my course or program

* 4. Please rate each element of the IBC exam process in terms of importance to you as a student.

	Very Unimportant	Unimportant	Neither important or unimportant	Important	Very Important
Cost of the IBC exam	◯	◯	◯	◯	◯
Location of the IBC exam	◯	◯	◯	◯	◯
Part of an academic course or program	◯	◯	◯	◯	◯
Future employment opportunities	◯	◯	◯	◯	◯
Academic Preparation	◯	◯	◯	◯	◯
Faculty encouragement	◯	◯	◯	◯	◯

Other (please specify)

* 5. Based on your past and/or current experience as a career and technical education student, please indicate how strongly you agree or disagree with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree	N/A
I feel academically prepared to take IBC exams.	○	○	○	○	○	○
Industry-based credentials (IBCs) will add to my resume of skills.	○	○	○	○	○	○
I will make more money if I have an IBC.	○	○	○	○	○	○
IBC exams are too expensive for me to take them.	○	○	○	○	○	○
My instructor has explained to me the importance of earning IBCs for my career field.	○	○	○	○	○	○
I realize the value of IBCs for my future career.	○	○	○	○	○	○
I have access to exam testing facilities.	○	○	○	○	○	○
I understand IBCs are integrated into my academic courses and/or program.	○	○	○	○	○	○
I look to faculty as examples of success in my career field.	○	○	○	○	○	○

* 6. Please indicate how strongly you agree or disagree with the following statements--I would take the IBC exam if:

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	N/A
the exam fee was paid.	○	○	○	○	○	○
I feel confident that I can pass the exam.	○	○	○	○	○	○
my instructor encourages me to take the exam.	○	○	○	○	○	○
employers in my field demonstrate value in my future career.	○	○	○	○	○	○
the exam was administered on campus.	○	○	○	○	○	○
the exam was part of my course or program.	○	○	○	○	○	○

7. Please provide any additional comments or observations to help help faculty and staff better understand why students choose to take IBC exams. Thank you for your help with this process.