THE IMPACT OF A COHORT-BASED LEARNING MODEL ON STUDENT SUCCESS
WITHIN VOCATIONAL TECHNICAL CERTIFICATES AT A COMMUNITY COLLEGE

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Abstract

Workforce practitioners within community colleges are increasingly faced with pressures from business and industry to offer academic and career oriented programs targeted to the workforce needs of local industry. Most recently, there has been a call from both industry and the White House for community colleges to complete more students in technical vocational certificate programs as a solution to creating a much greater supply of middle-skilled workers locally and nationally. As community colleges struggle to meet the challenges of the mission of an open access institution, issues of academic preparedness and low rates of student completion make it difficult for the community college to function as an efficient supplier of qualified workers targeted to skill based, in-demand occupations. Research suggests cohort-based instructional models hold promise for increasing student completion rates through increased engagement and peer support structures embedded within a program of study. With many local economies forecasting deficits in the availability of qualified workers, understanding alternative instructional models yielding higher rates of completion may be critical to create a more efficient community college capability in meeting the workforce needs of a local economy. This mixed methods case study examined student completion and performance from two cohort-based technical certificates taught over a four-year period at a community college located in Upstate New York. By analyzing student completion as well as student and administrator perspectives, this case study examined how the cohort-based instructional model may be considered a more effective completion strategy by the community college in meeting the need for business and industry to have access to a greater supply of trained technical workers.

Keywords: Cohort-based education, structure hypothesis, student success, career pathways, completion agenda, middle-skills, skills gap, workforce development, community college labor market
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Chapter I: Introduction

Statement of the Problem

Educators working within community colleges in support of workforce development are increasingly faced with pressures from business and industry to innovate and deploy academic and career oriented programs targeted to the needs of industry (Leary, 2012). Most recently, there has been a call from both business and the White House for community colleges to graduate more students in industry relevant associate degrees and their embedded certificate programs in order to create an adequate supply of middle-skilled workers available to employers and aligned to the workforce needs of the local and national economy (Ferguson, Schwartz & Symonds, 2011; White House Summit Report, 2011). Middle-skills occupations are those that require education greater than a high school diploma but less than a four-year degree and are strongly aligned to community college programming (Ferguson et al., 2011).

Research Problem

As community colleges struggle to meet the challenges of maintaining the mission of an open access institution, issues of academic preparedness, the unique needs of an increasing non-traditional student population, and historically low rates of student completion make it difficult for the community college environment to function as an efficient supplier of qualified workers. Being unable to access a sufficient supply of qualified workers able to fill skill-based and technical occupations poses a significant challenge to a region seeking to support and grow industry sectors as part of its economic development strategy (Chen, 2014; Ferguson et al., 2011; O’Banion, 2011).
Justification for the Research Problem

Evidence of the inefficiency of the community college system in completing trained workers can be seen in examining national completion data where the average completion rate for first time, full time students earning an associate’s degree within three years’ time at a community college is 19.4% (The Chronicle of Higher Education, College Completion, 2015). Poor student retention and completion is a costly issue for both the student and society. In strictly economic terms, low rates of college completion lead to staggering costs to the taxpayer. As Schneider & Yin (2011) have noted from their research, nearly $4 billion in federal, state, and local taxpayer monies in appropriations and student grants between 2004 and 2009 went to first-year, full-time, community college students who dropped out (p. 2). In New York State, where the research site for this study is located, the total combined costs of attrition between the years 2004 through 2009 in state and federal grants to first year only community college students who did not continue to their second year was $290 million (p. 13). Additionally, there is the lost opportunity to the student who drops out of college without securing a degree as he or she is robbed of the personal economic benefit that is highly correlated to higher levels of post-secondary education (Carnevale, Smith, & Strohl, 2010). Finally, there is the lost opportunity for the employer in not having greater access to an adequate supply of workers trained in the skills needed to support their ongoing operations.

Previous research suggests cohort-based instructional models are effective in positively influencing student completion rates as well as enhancing the quality of student learning (D'Amico, Morgan & Robertson, 2011). The extant body of literature indicates cohort-based models are influential in increasing student engagement through embedded peer support systems which leverage the positive psychosocial dynamics of the group when compared to students
enrolled in non-cohort based programs (Fenning, 2004). With many local economies forecasting long term deficits in the availability of workers for their two-year middle-skilled and applied-Science Technology Engineering and Math (STEM) educated workforce, understanding the effectiveness of alternative instructional models and their student support systems as substantially impactful to the completion agenda is critical in creating a more efficient and effective community college workforce mission where much higher completion rates are needed in applied-STEM programs to adequately supply in-demand occupations in the local economy (Ferguson et al., 2011).

**Deficiencies in the Evidence**

Existing studies on cohort instructional models have primarily been focused on the use of instructional cohorts in graduate programs, incoming freshman and more recently with accelerated cohort based associate degree options within a few community colleges. However, given these application of cohort instructional models, there has been little discussion of linking the cohort instructional design elements explicitly to the community college workforce agenda as an important and effective strategy for increasing work ready students ready to fill in-demand technician level positions. Given the emphasis on the need for community colleges to educate more middle-skilled workers in a variety of 21st century technically oriented and applied-STEM occupations, there is the need to better understand if the results that cohort-based models have shown in their post-secondary applications can also be applied to technical vocational certificate programs as a specific educational response in the creation of a more efficient middle-skilled worker ready pipeline in support of a regional labor market (Ferguson et al., 2011; “Sector Strategies”, 2014).
Relating Discussion to the Audience

This case study seeks to examine the success of two cohorts within technical noncredit and credit-based certificate programs offered at a single community college in order to better understand how these cohort-based instructional models can be a more strategic option for a community college’s workforce function in responding to their community’s need to increase the number of middle-skilled technical workers that graduate from a community college’s workforce programs. The research questions this study seeks to answer are directly relevant to practitioner groups working within community colleges, the public workforce system, and economic development organizations, all of these groups are faced in their practice with the challenge and responsibility of ensuring that functional and reliable educational pathways exist within a regional economy that are capable of meeting the documented workforce needs required by local business and industry.

Significance of the Research Problem

Middle-skilled occupations are defined as those that require post-secondary education greater than a high school diploma but less than a four-year degree (Ferguson et al., 2011). Because the education and skills for middle-skills occupations are aligned so strongly to the workforce mission of the community college, some economists refer to the demand for middle-skilled workers and these occupations as the community college labor market (Sommers, 2009). With many local economies forecasting long term deficits in the availability of workers for their middle-skilled and Applied-Science Technology, Engineering and Math (STEM) workforce clusters, understanding alternative instructional models like cohort-based learning and their student support systems are critical to creating a more efficient community college workforce mission.
As already referenced, first time, full-time, community college students who drop out before their second year cost the United States nearly $1 billion in taxpayer money (Schneider & Yin, 2001). Beyond the monetary costs, a low college completion rate has also positions the United States as having the highest college dropout rate in the industrialized world, 57%, (Ferguson, Schwartz, Symonds, 2011) with only 13% of community college students completing an associate’s degree in two-year’s time (Chen, 2014). This significant inefficiency within the U.S. higher education system has unique workforce and economic development implications for community colleges due to their role as the primary educator and provider of the middle-skilled technician and applied-STEM worker to the labor market.

Long-term projections of the U.S. labor force indicate a growth for in-demand middle-skilled jobs, occupations requiring less than a bachelor’s degree, but more than a high school diploma (Ferguson et al., 2011; Neumark, Johnson, & Mejia, 2013). This demand coupled with the fact that the 1,132 community colleges in the U.S. represent 45% of all undergraduate enrollments and 42% of first time freshman (“AACC Fact Sheet”, 2014) suggests newer career-oriented instructional models able to achieve higher completion rates are needed within the community college to overcome these challenges. With such a low student success rate, community colleges are unable to complete an adequate supply of middle-skilled workers that are increasingly needed by business and industry (Auguste, Lund, Manyika, Mendonca, Ramaswamy, 2011; Ferguson et al, 2011; Welsh, 2011). With projections of the impending retirement of the baby boomer generation from the workforce in less than ten years’ time, gaps that have been documented in the supply of qualified middle-skilled workers, are likely to increase, with businesses finding it more difficult to staff their operations.
Case Study Context

The last decade has brought increased emphasis on the importance of a community college’s role as a key partner in a region’s overall economic and workforce development strategy (Ferguson, Schwartz & Symonds, 2011; White House Summit Report, 2011). The increased awareness, both locally and nationally, of a growing skills gap within industry for occupations requiring less than a bachelor’s degree, but more than a high school diploma – the so-called middle-skills gap – has become a dominant theme in conversations within the business community, among public leaders and within the workforce development community of practice. In response to these changes and to better support the research site’s role as a provider of workforce and career oriented programs to the regional economy, the Institution that is the focus of this case study embarked on an ambitious data project to quantify and estimate the likely middle-skills gaps across five key workforce clusters within the nine-county Finger Lakes regional economy. These workforce clusters included Advanced Manufacturing, Skilled Trades, Information and Computer Technology, Hospitality and Tourism, and Health Care.

In conducting this data project, a variety of labor market and workforce intelligence sources were used including the incorporation of the latest in workforce oriented big data services integrating decomposing both traditional and real time labor market data to the nine-county region. The primary goals of this data project were to quantify skill gaps in business and industry and provide direction for the development of new programs and delivery methods in order to increase the number of graduates in occupations where more qualified workers are needed. A highlight of this work was the creation of occupational gap analysis dashboards for several targeted occupations that were used by the research site’s workforce development division to identify and measure regional educational attainment through certificate and associate
degree completions against estimated annual openings for 23 middle-skills occupational groups. This effort was an attempt to measure the supply of workers being created through the region’s formal educational system against the estimated labor demand for occupations aligned to their respective programs. For a select number of occupational groups, the Institution was able to include a program-based economic impact analysis that provided an estimation of the marginal economic value that each student completion represented to the regional economy. This marginal value calculation was an attempt to assign an economic value to each completer from upskilling their skill set from one aligned to a high school level occupation to one aligned to a technician based middle-skilled occupation through the completion of one of the relevant community college’s programs.

Applying this labor supply versus labor demand measurement model to the Advanced Manufacturing industry cluster led to the observation that without a significant change in the completion rate at the research site it was unlikely that the Institution would be able to significantly close many of the gaps. One area that was most evident in terms of a deficit of workers produced versus the demand needed was in the area of Precision Tooling and Machining occupations. Table 1 shows the aggregated gap that was measured for regional machining graduates as part of this regional measurement project.
Table 1.0

2012 Regional Completions for Tooling & Machining Occupations in the Finger Lakes Region

<table>
<thead>
<tr>
<th>2012 Regional Completions</th>
<th>Estimated Annual Job Openings</th>
<th>Estimated Gap</th>
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<tbody>
<tr>
<td>72</td>
<td>231</td>
<td>-159</td>
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Note: For full report see [www.workforceforward.com/skillsgap](http://www.workforceforward.com/skillsgap)

The relevant dashboard in Table 1.0 guided the Institution to respond to the documented shortage in Tooling and Machining by creating a new cohort-based accelerated version of its 31-credit Precision Tooling Certificate as a direct response to this work. With this new 22-week intensive program format, the Institution was able to add a new option for students seeking a more structured and faster path to attain a SUNY academic certificate that was directly linked to a documented need within business and industry. As part of this new design model, job placement services were added as a program outcome. At the time of conducting this case study, in five years, five cohorts have been offered of the Accelerated Precision Machining program.

In addition to the accelerated Precision Machining program, the Institution also has had a cohort-based program offered based on Welding Fabrication. This program is also based on a cohort-based design model with similar structural components including: block scheduling, limited number of faculty teaching the entire program, active faculty and peer supports within the program, students taking the entire program as a defined group, and active job placement, post completion. In both cohort-based program formats, academic and noncredit applications, the cohort-based instructional models collectively have achieved over a four-year period, student completion rates in excess of 75% and job placement of graduates over 90%. These results warrant further investigation as the same 31-credit curriculum for Precision Machining offered in a traditional, non-cohort format has had an average 33% completion rate for first time, full time
students three years from beginning the program (Institutional Research Memo, 2014). Based on the relatively high student completion rates and job placement rates from these two instructional cohorts in comparison to non-cohort based students, the researcher decided a more thorough review of the potential for these models and how they have been implemented was warranted in order to discover more specifically why these models may be achieving consistently higher rates of success in terms of student completion rate and job placement. As a workforce administrator at the Institution of study, it is important to the researcher to better understand and evaluate how scalable and applicable these design models may be in addressing the historical challenges of low student completion rates within the community college. Furthermore, an instructional design that shows promise of yielding significantly higher completion rates when compared to traditional instructional formats has important implications for how the community college can use this model to address the emerging deficits in the availability of qualified middle-skilled workers to support industries within their local economy. The implications of this synthesis of cohort based education and middle-skilled labor studies is the development of a greater appreciation for the use of cohort-based instruction within a community college’s technical programming mission as an effective strategy for creating a greater supply of workers for in-demand, middle-skilled occupations as part of a region’s economic development strategy. It is out of this context that this mixed methods case study is being conducted.

**Positionality Statement**

This statement of positionality will analyze the potential biases of the researcher specifically as it relates to the study of cohort-based learning models as a more effective response by the community college system to supporting a regional economy’s workforce needs in seeking higher levels of graduates from technically oriented programs. In this statement of
positionality, I will outline the importance of my background, family upbringing and professional experiences as a workforce development educator in relation to motivation for study and potential biases toward the research topic. The strong interest in cohort-based learning as a much needed alternative instructional model has emerged from my fifteen years of practice as a post-secondary workforce practitioner. It is because of this strong interest and my belief that educators are front line agents in achieving authentic equity for all citizens in access to quality living-wage jobs through the open access career and technical education programs offered at a community college that I am pursuing this research.

**Author background.** Overcoming the challenges of low community college retention and completion rates for disadvantaged populations requires a holistic approach that seeks to understand, integrate and synthesize concepts drawing from the fields of applied economics, labor market studies, socio-cultural anthropology and educational research. Each of these fields relate to exposure to concepts at different stages in my working career and educational development. My previous roles in both industry (early career), and educational administration, in both the university and community college environment, has been focused largely on workforce and economic development issues, primarily working to create, design and offer programs that are targeted to career-oriented individuals for living wage occupations aligned to the needs of a local economy.

Concerns regarding work and economic security hold a deep meaning for me. My childhood experience of working in a family business and sharing in the responsibility of assisting the family to provide a living has left a strong impression on me and has familiarized me with concerns related to economic security from an early age. My upbringing also provided within me a strong sense of the power that work can have in creating economic well-being and
self-sufficiency. As a community college graduate, I worked full time while earning my associates degree over a three-year period before transferring into a four-year institution. Both of these experiences have given me a great deal of empathy and concern for the student entering an open access institution interested in accessing education that will prepare them for a career pathway leading to a better economic reality for themselves and their families. The personal doubts and anxiety that many students experience throughout their education and training journey are experiences with which I can identify. How will the student eventually arrive at the university or attain their career goal and obtain a living wage job are questions that for me get to the core of the mission of the workforce practitioner. These concerns are especially relevant and warranted in regard to issues of college completion within first generation or educationally and economically disadvantaged populations.

**Professional interest in education and economic development.** I relate to the term autobiographical prejudice used by Jupp and Slattery (2010) as an ongoing heuristic the researcher can use in managing their bias. My background growing up in a trades-related family business and attending community college as a part time student working full time influences me to favor the democratic values inherent in the community college philosophy of the open access institution. My close connection to middle-skilled, career focused pathways at a community college and the economic change these programs may provide disadvantaged audiences is a source for potential researcher bias that I must remain aware of in order to ensure that I conduct an objective measurement and evaluation of the effectiveness of cohort-based learning models per my research questions and the methodology of my research design.

My undergraduate study of socio-cultural anthropology has influenced how I see the problem of practice in regards to the need for culturally relevant peer support systems, which the
literature shows is indicative to the effective design of cohort-based learning communities. Exposure to the concepts of etic and emic analysis in the work of linguist Kenneth Pike and cultural anthropologist Marvin Harris provides a framework from which to understand the native or insider (emic) perspective versus the generalized (etic) perspective (Xia, 2013). In pulling from this analytical lens, strong parallels exist in Briscoe’s (2005) consideration of both seeing those studied as the other, and the process of othering populations by the researcher, as unconscious biases that can be mitigated through an emic perspective. In seeking to understand more effective approaches in creating relevant designs for educational programs targeted to the psycho-social needs of economically and educationally disadvantaged populations, I am predisposed to understand these efforts and interventions from the user’s perspective (emic) and experience. In taking this positionality I am mindful that I am not in any way the “native” or an authentic member of the instructional cohorts I am studying and as such, I must remain equally cautious of my strong interest in cohort-based education influencing an unintended holistic bias in the analysis of the literature in interpreting the results of my research.

Managing holistic and personal bias. Remaining aware, as a researcher, that I favor an emic analytic perspective, at least as an ideal, assists me in monitoring the existence of a potential lack of objectivity in my research and evaluation of cohort-based education. I agree with Parsons (2008), “positionality is a concept that acknowledges the complex and relational roles of race, class, gender, and other socially constructed identifiers in being” (p. 1129). Using this approach and acknowledging my bias of class, educational experience, ethnicity, religious and family life provides boundaries as to how genuine my understanding of the audiences can become. The dynamics of structural difference as articulated by Jupp and Slattery (2010) is an area I acknowledge as problematic in my focus on populations that have no similarity to my own
in terms of race, class or socio-economic status and I am similarly aware of both the structural and deficit understandings of difference in my bias, opinions and general approach.

In conclusion, in my statement of positionality, I have attempted to identify the specific biases as a researcher and a workforce practitioner that may influence the research of the effectiveness of cohort-based education as a more efficient completion strategy for the education of qualified technically oriented workers by community colleges. Though the risk of holistic and personal bias is always present for the researcher, following a purposeful and thoughtful research design centered on a mixed methods approach incorporating member checking and triangulation will ensure that an objective research study and the evaluation of its results is conducted and achieved.

**Research Questions**

This mixed methods case study is guided by research questions that seek to examine the impact of cohort based learning communities on student completion in vocational technical programs at a comprehensive community college located in Upstate NY. The first research question examines differences in the completion rates of cohort-based certificate programs compared to a traditional non-cohort based program at the research site. The second research question examines differences on time to completion for students graduating from technical vocational certificate programs in both cohort-based and traditional instructional formats. Question 3 examines how program instructional type in conjunction with student characteristics of gender and ethnicity may serve as factors in influencing student completion from these vocational technical certificates. Last, the fourth research question seeks to understand the influence of specific design structures common to the cohort-based certificate programs at the research site and that have been identified within the literature as being impactful to influencing
increased measures of student completion. The fourth research question goes beyond statistical significance and explores the perspective and experiences of students that have completed cohort-based programs as well as the administrators and faculty that implement, manage and teach these curricula. The fourth research question seeks to complement the case study’s quantitative focus in better understanding which structures were deemed most impactful to student success within the cohort-based programs taught at the research site by those most involved. The four research questions guiding this case study are as follows:

**RQ1: Differences in Completion Rate**

To what extent do the completion rates of students enrolled in a cohort-based vocational technical certificate programs differ from students enrolled in a non-cohort based vocational technical program?

**RQ2: Differences in Time to Completion**

To what extent does the time it takes students to complete a certificate program differ based on program instructional type?

**RQ3: Program Instructional Type, and Student Characteristics as Predictors of Student Completion**

Are differences in completion outcomes dependent on program instructional type independent of student characteristics such as gender and ethnicity?

**RQ4: Student, Administrative and Faculty Perspectives**

How does a cohort-based instructional model contribute to student completion and job placement as perceived by program administrators, faculty and students involved in these cohort-based programs at the research site?
Theoretical Framework

The theoretical construct informing and guiding this study is based on the model of student integration derived from Vincent Tinto’s (1975; 1993) seminal work and a theory that emerges from this work called the structure hypothesis as proposed by Scott-Clayton (2012) which is based on studies of the importance of structure within the body of literature on student engagement, learning communities and cohort-based education. The researcher has chosen these theoretical constructs as they directly relate to the necessity of supporting students through the specific psycho-social dynamics, and pronounced structure which describe and help explain the positive influences that have been associated with learning communities and cohort-based instructional models in the literature on post-secondary student success.

**Tinto’s student integration model.** One of the primary theories influencing learning communities in the contemporary literature is Tinto’s (1993) model of student integration. The Student Integration Model or SIM, as it is sometimes refereed to, originated from Tinto’s (1975) seminal work on the student departure model, *Dropout from higher education: A theoretical synthesis of recent research*, first published in 1975. This highly referenced model has evolved over a twenty-five-year period and has been further developed and refined by Tinto in subsequent publications (Tinto 1997) as well as built on and enhanced within the contemporary literature by a number of authors and researchers. Google Scholar reports Tinto’s 1975 publication is cited 6,087 times in the literature and over 10,000 times for the 1983 publication, *Leaving College*. The Student Integration Model (SIM) has evolved from its earlier iteration which focused on highlighting the commonalities of students who are most likely to drop out. Tinto (1975) pulled from both Durkheim’s (1951) analysis of social factors related to suicide and Spady’s (1971) application of Durkheim’s analysis to understanding why students drop out of
higher education. Tinto (1975) built on Spady’s application to higher education to articulate a more refined and holistic model in what is considered his seminal discussion of a model that seeks to understand student attrition.

The core of Tinto’s model of student integration (SIM) emphasizes that the key influencers on a student’s choice to persist or depart will be related to the quality of academic and social interactions they experience while in the college setting. Figure 1 is adapted from Tinto (1975) and illustrates the dynamics of academic and social integration central to the model.

![Student Integration Model (SIM)](image)

*Figure 1. Student Integration Model (SIM) reproduced from Tinto (1975).*

SIM seeks to structure positive academic and social interactions as part of the student’s post-secondary experience, in doing so, overcoming some of the triggers that have been associated with motivating students to quit college. An area that Tinto’s theory emphasizes is that the social system of the college, which consists of more than other students, extends to include relationships and interactions with faculty and administrative personnel (1975). This important relational and interactive understanding from SIM sets the basis for future emphasis in the literature on student completion and emerging development of the learning community model.
that is built on the understanding that purposive and structured social integration into and across curriculum throughout the entire student experience plays an important role in positively influencing student retention and completion. SIM as a theoretical framework developed within the literature on student engagement suggests and predicts that incorporating a purposive and integrative design across a student’s post-secondary experience will decrease the likelihood of students choosing to dropout (Tinto, 1975, 1993, 1997; Rosenbaum et al., 2006).

Since SIM was introduced, scholars have responded and expanded on Tinto’s model. In their studies, Shapiro and Levine (1999) and Tinto, Love, and Russo (1993), have found that students who participated in learning communities where purposeful academic and social integration were designed into the student experience, persisted at a higher rate than those students who did not enroll in curricula associated with a learning community. Additionally, the predictive validity of SIM has been tested in various institutional settings. Based on their studies, Pascarella and Terenzini (1978, 1979, 1980) showed that academic and social integration appeared to be influential for exploring the complex interactions of factors that affect student persistence or dropout decisions and also for predicting those students who are at risk (Manan, 2007). Pascarella, Smart, & Ethington (1986) and Bers & Smith (1991) in their studies of community college students, observed that both social and academic integration measures were significantly related to persistence. These contemporary studies have provided support for Tinto’s student integration model and the utilization of the integrative and structured design elements of learning communities as an effective vehicle to address the key factors that contribute to low student retention and completion in a community college.

In the last twenty years, Tinto’s Student Integration Model has directly influenced the emergence of the use of cohort-based learning communities at the community college as specific
strategy to address low rates of student retention and completion. As chapter two of this study will examine, structure is a key component that emerges within the studies and scholarly research on the effectiveness of cohort-based learning communities and the related positive influences they have shown in regard to higher rates of student retention and completion. Structure is implied in SIM as it is the primary way to facilitate social and academic integration both within the classroom and extracurricular. Integration of this type is atypical of the conventional academic model and its related student experience which still dominates the community college (Rosenbaum, Deil-Amen & Person, 2006; Scott-Clayton, 2012). In the last fifteen years, there has been a new focus that has emerged out of the theoretical framework of SIM that is focused on highlighting more explicitly the role structure plays implementing operations and experiences that facilitate the academic and social integration designed within a learning community and cohort-based instructional model that have been shown to influence student completion and retention.

The Structure hypothesis. A conceptual framework that has emerged from the student integration model and the related literature has been termed the structure hypothesis by author Scott-Clayton (2012) in a working paper published by the Community College Research Center (CCRC). Scott-Clayton defines the structure hypothesis as:

…community college students will be more likely to persist and succeed in programs that are tightly and consciously structured, with little or no room for individuals to deviate, even unintentionally, from a path toward completion, and with limited bureaucratic obstacles for students to circumnavigate. (Scott-Clayton, 2012, p. 1).

As noted by Scott-Clayton (2012), structure hypothesis emerges from the cumulative literature on Tinto’s (1975, 1993, 1997) student integration model and more recently as articulated in its

**Overchoice.** A primary theme in structure hypothesis as it relates to student success is based on recent behavioral research from the fields of economics, marketing and psychology which suggest that too much choice, or what is termed “overchoice” for students introduces complexity which may lead to psychological conflict causing delay or difficulty for decision making (Gourville & Soman, 2005; Scott-Clayton, 2012; Rosenbaum et al., 2006). Tversky and Shafir (1992) in their research describe the dynamic when psychological conflict occurs from a consumer faced with two or more equally perceived options from which to choose. The psychological conflict occurs from the likely outcomes from each choice being unclear and inadequate access to systems from which to alleviate the lack of clarity with additional information. In these situations, difficulty in decision making is likely. Tversky and Shafir state:

…when each option has significant advantages and disadvantages, people often experience conflict that makes choice aversive and compels them to delay decision and seek additional information or options. Thus, people are more likely to defer choice when [psychological] conflict is high than when conflict is low. (p. 358)

The recent research on the consequences of overchoice has direct implications for understanding the benefits of cohort-based learning communities and the value of the causal structure designed within them at a community college. Cohort-based instruction may be seen as a highly structured opportunity that assists the institution in eliminating unaligned options and choices from the student experience. Research by Rosenbaum et al. (2006) suggests that many college operations unnecessarily introduce complexity and obstacles for the student to navigate from a variety of hard to understand choices that many times are inherent to the traditional and bureaucratic
academic model of operation (Bailey, Badway & Gumport, 2001; Scott-Clayton, 2012). Navigating the obstacles present in the modern community college requires the student having a certain level of social know-how which is a set of skills and the knowledge that help students understand school procedures and the successful navigation of them (Bailey, Jaggars & Jenkins, 2015; O’Banion, 2006; Rosenbaum, et al.; Scott-Clayton, 2012).

Based on their study of fourteen two-year public and private colleges, Deil-Amen & Rosenbaum, (2003) found seven key obstacles that presented challenges for students:

1) Bureaucratic hurdles
2) Confusing and hard to understand choices
3) Students required to initiate many processes with little guidance provided by the institution
4) Limited counselor availability
5) Poor advice from staff
6) Slow detection of costly mistakes by the institution
7) Poor handling of conflicting demands (p. 114)

Rosenbaum, Deil-Amen & Person (2006) in their research suggest the need for college operations to address each of these obstacles which pose serious challenges to student success and contribute to what are historically low rates of student retention and completion within the community college system. They propose operational practices identified from their comparison of institutional and student outcomes between traditional public two-year community colleges and private two-year occupational colleges. The findings from their research indicated institutions at private two-year occupational colleges provided significantly more structure across their students’ experiences including offering integrated student academic and social supports
across a more limited number of programs that were highly aligned and linked to the labor market (Rosenbaum, Deil-Amen & Person, 2006). These more structured operational elements included integrating combination of procedures with curriculum structure, information systems, mandatory advising, peer cohorts and job placement (Rosenbaum et al., p. 19). The findings from Rosenbaum et al.’s study highly aligns with what Student Integration Model and Structure Hypothesis would suggest regarding the benefits of student experiences that are both integrated and highly structured in a college operation and avoid the dilemma of overchoice through the use of a more limited advising sequence of courses. Rosenabum et al. describe the dynamics created by such a highly integrated model where “hassle factors” created by the traditional bureaucratic operating model of the institution are eliminated through the “package effect” (Scott-Clayton, p. 25, 2012). The causal structure created at the institutional level by such a package effect is almost analogous to a description of the benefits attributed in the literature to the cohort-based learning community design model:

Even if students face strong pressures from work or family, they may find it difficult to walk away from an occupational college where many procedures operate: where they meet regularly with an advisor and a peer cohort, where their progress is closely monitored, where required courses are always offered at predictable times, where milestones come quickly, where most students complete degrees, where the college offers extensive job placement assistance and promises [and delivers] 95% job placement (p. 19).

As will be shown in the literature review in Chapter II of this study, this description is highly aligned to the research on the learning communities’ movement and specifically at a more programmatic level, cohort-based learning communities.
Based on the contemporary literature from researchers Bailey, Jaggars & Jenkins (2015), Gourville & Soman (2005), Rosenbaum, Deil-Amen & Person (2006), and Scott-Clayton (2012) the evidence is persuasive that students’ ability to make good decisions, or, as consumer choice theory suggests, not to make any decision at all, is likely to be adversely affected by several of the unaligned and bureaucratic factors present in the current community college operating model.

Decomposing student integration down to the specific structural interventions suggested by the literature on Student Integration Model and Structure Hypothesis, the following interventions outlined in Table 1 have been identified by the researchers discussed in this chapter as effective at reducing hassle factors and obstacles experienced by students participating in what can be characterized as the traditional, bureaucratic community college operating model (Bailey, Jaggars & Jenkins, 2015; Deil-Amen & Rosenbaum, 2003; O'Banion, 2011; Rosenbaum, Deil-Amen & Person, 2006; Scott-Clayton, 2012).
Table 1.1

*Structured-Based Solutions Implied by Structure Hypothesis*

<table>
<thead>
<tr>
<th>Improved access to information and navigation:</th>
<th>K-12 curriculum design:</th>
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<tr>
<td>• More intensive and intrusive advising</td>
<td>• Instructional program coherence</td>
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<td>• Use of technology to streamline bureaucracy</td>
<td>• Constrained curriculum</td>
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<td>• New York State’s Pathways in Technology (P-Tech) Early College</td>
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<td>High School program</td>
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<tr>
<th>Cohort-based Learning communities:</th>
<th>Integrated post-secondary and developmental curricula:</th>
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<tbody>
<tr>
<td>• Accelerated associate degree programs (ASAP)</td>
<td>• Washington State’s I-BEST program</td>
</tr>
<tr>
<td>• Accelerated academic certificates</td>
<td></td>
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<tr>
<td>• Stackable certificates/credentials</td>
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Structure Hypothesis does not suggest a quick fix to the complex and layered challenges posed by low college completion rates (Scott-Clayton, 2012). It does however suggest introducing a more holistic framework for implementing alternative designs for both student engagement and instructional models that have been supported both directly and indirectly within the scholarly literature. Cohort-based learning communities, the focus of this study, may be a viable option within the choices of interventions available to institutions to assist in creating the positive and supportive dynamics suggested by Student Integration Model and Structure Hypothesis. As Scott-Clayton (2012) has summarized, the observational evidence from the findings discussed in this section is very strong that community college students are often confused and sometimes overwhelmed by the complexity of navigating their community college experience (p. 25). The introduction of structure through the designs and interventions suggested by the types of solutions outlined in Table 1, including cohort-based learning communities, to reduce the
complexity of choice are compelling for the practitioner seeking better organizational models to address low completion rates in the community college. As a final discussion regarding theoretical framework informing this study, the researcher will now briefly discuss how these more purposeful and structured interventions informed by the literature and research have economic consequences for not just the students personally but also through the value a student completion brings in terms of filling an occupation that is needed to support industries access to a pool of qualified workers in the local economy.

**Theoretical framework’s relevance to regional economic development.** Over the last several decades, traditional economic development scholars and professionals have emphasized the theoretical concept of industry clusters and industry cluster strategy as the primary basis for understanding how to develop, rebuild, grow and maintain regional economies to ensure their competitiveness (Koo, 2005). The emphasis in this conventional construct where industries are the primary unit of analysis has been under-appreciated as to understanding the significant role that both the available supply of workers and the occupational structures have in supporting the regional economy and the industries clustered within it (Feser, 2003; Koo, 2005). An occupational-based understanding provides an important perspective for post-secondary educators in better understanding the importance of alignment of programming to the regional economy and the role that workforce focused college programming has in supporting the needs of industry by the creation of workers targeted to the needs of local industry (Feser, 2003; Koo, 2005; Ranney & Betancur, 1992). Theorists incorporating the occupational aspect in a region’s ability to provide a sufficient supply of qualified workers aligned for occupations that support industry clusters began appearing in the literature in the mid-1980’s. McKee & Froeschle (1985), Thompson & Thompson (1985), Theodore & Carlson (1998) and more recently Feser (2003) and
Markusen (2004) all argue for integrating an occupation-based analytical framework as a complementary unit of study to enhance industry cluster theory by providing an examination of regional economies from a perspective that includes access by industry to a sufficient supply of qualified workers.

Community colleges are the largest educator for middle-skilled and technical workers in the U.S. economy (Ferguson, Schwartz, Symonds, 2011). When the theoretical framework of Tinto’s Student Integration Model and Structure Hypothesis are synthesized to the concept of occupational-based analysis, a new understanding emerges that clarifies the importance of incorporating innovative and structured cohort-based learning models as part of the community college workforce mission for the purpose of significantly increasing the number of community college graduates from applied technical programs for the purpose of filling the relevant in-demand technician occupations within industry. By integrating an economic informed perspective of occupational based labor analysis into the Student Integration Model and Structure Hypothesis, a greater appreciation of the economic impact that each community and technical college may contribute to the regional economy can be assessed. Providing an applied-economics perspective on the importance of the completion agenda to industry clusters that depend on access to an ongoing and sufficient supply of qualified technical is essential to demonstrate the labor linkages that exist to curricula and their specific learning outcomes. As already discussed, the problem of students not completing their program of study creates a variety of challenges for both the student losing economic benefit from achieving a recognized credential to organizations not able to supply their operations with a sufficient number qualified technical workers. The full implications of a formal synthesis between Tinto’s model of student
success, structure hypothesis and occupational-based analysis will be discussed in Chapter II and Chapter V of this study.

**Summary**

In summary, this chapter has introduced and discussed the challenges faced by community colleges in meeting their unique mission as a primary provider of the technical and applied-STEM workforce to their communities. This study sets out to examine the promise that cohort-based instructional models and the integrated and structured learning community they create may have in regard to positively influencing student completion in vocational technical certificate programs offered at the community college. The theoretical construct posited in this chapter derives from Tinto’s (1975; 1993) Student Integration Model and is informed from its emergent derivative, Structure Hypothesis. This theoretical construct suggests the need to prioritize the creation and implementation of educational models that facilitate the academic and social integration through a variety of operational interventions emphasizing the importance of causal structure. As implied in this chapter’s discussion, the positive psycho-social dynamics cohort-based learning communities create for students happen through a highly structured learning environment in context to a holistic understanding of the critical influence of academic and social integration. Integrating this framework emphasizing integration and structure with the economic perspective that increasing student completion for work ready graduates suggests, a more holistic understanding of effective community college completion strategy targeted to the technical vocational student can be achieved. As this more holistic and integrated understanding continues to develop among workforce practitioners, its consideration may represent a more effective praxis for the fields of workforce and economic development as applied to the
understanding of the community college’s workforce and economic development mission within a local economy.

**Definition of Key Terms**

*Cohort-based Learning Community* – For purposes of this study, the cohort-based instructional model or learning community delineates either a credit or noncredit program of study offered at the research site that contains all of the following design elements: structured schedule of classes, cohort-based faculty model, embedded peer and faculty support mechanisms, and active job placement post completion. See Chapter III for a full discussion.

*Traditional Instructional Model* – The dominant form of instructional model within post-secondary education sometimes referred to as a cafeteria or self-service model (O’Banion, 2016). It can be distinguished from a Cohort-based Learning Community in that the Traditional Instructional Model requires the student to make the decision as to which classes to select and enroll. Additionally, the Traditional Instructional Model curricula lacks embedded and structured peer and faculty supports across courses in the program of study (Rosenbaum, Deil-Amen & Person, 2006; Scott-Clayton, 2012).

*Student Integration Model (aka SIM or student departure theory)* – A model of student persistence originated by Tinto (1975) emphasizing that the key influencers on a student’s choice to persist or depart will be significantly related to the academic and social interactions the student experiences while in the college setting.

*Structure Hypothesis* - The hypothesis that community college students will be more likely “to persist and succeed in programs that are tightly and consciously structured, with little or no room for individuals to deviate, even unintentionally, from a path toward completion, and with limited bureaucratic obstacles for students to circumnavigate” (Scott-Clayton, 2012). As
noted by Scott-Clayton (2012), structure hypothesis emerges from Tinto’s (1993) theory of student integration and most recently applied to community colleges through in the work by Rosenbaum, Deil-Amen & Person (2006), *After Admission: From college access to college success*.

*Industry Clusters* – “Industry clusters are groups of similar and related firms in a defined geographic area that share common markets, technologies, worker skill needs, and which are often linked by buyer-seller relationships. Firms and workers in an industry cluster draw competitive advantage from their proximity to competitors, to a skilled workforce, to specialized suppliers and a shared base of sophisticated knowledge about their industry” (http://www.oregonbusinessplan.org).

*Middle-Skills Occupations* - Middle-skilled occupations are defined as those that require post-secondary education greater than a high school diploma but less than a four-year degree (Ferguson et al., 2011).

*Program Completion Rate* – Each certificate program (cohort and traditional) analyzed in this study will be defined by both a gateway course that will delineate the start of each certificate program and the earning of a certificate that will define the end of each student’s program being measured in the study. The program completion rate of each certificate program will be computed based on dividing the total students earning a certificate by the total students enrolled in that same program’s gateway course.

*Student Performance* – A student’s cumulative grade point average earned at the time of completing their selected academic vocational technical certificate program as indicated by the student record data pulled from the research site’s Banner student information system. GPA will
only be calculated to include the courses required in the technical vocational certificate program’s advising sequence as defined in the research site’s Degree Works database.

*Time to Completion* – Time to completion is measured as the number of total number of terms a student takes to complete a program of study. The beginning term will be defined by a gateway course taken in the first term and the ending term will be defined as the earning of the relevant certificate as defined in the student information system. Time to completion will be calculated in reference to the U.S. Department of Education’s reporting scheme of 100%, 150% and 200% of time for a full-time student’s annual course load to complete the program.
Chapter II: Literature Review

With the intent on informing the research questions, the researcher has focused on a review of the literature relating to the impact of cohort-based instructional models on student completion when applied to vocational technical education at a community college. In exploring and examining the scholarly research, this review will examine studies relating to the efficacy of post-secondary instructional cohorts in building learning communities and creating a highly structured student experience with the embedded and integrated support systems that have been shown to yield higher rates of student completion. In discussing the importance of design, the researcher will draw on the theoretical framework of both student integration model and structure hypothesis in examining the literature and studies on cohort learning communities model’s impact on student success. In addition to examining the cohort-based instructional model, a review of the literature relating to the middle-skills labor market and the increased demand for middle-skilled workers will be discussed in order to provide an economic perspective that is relevant to understanding the mission of the community college in its functioning as a primary provider of the vocational technical workers to the U.S. economy (Ferguson, et al., 2011). This review of the literature will also include a brief examination of the literature pertaining to the career pathway framework and its support for the effectiveness of designing and offering technical curricula into more accessible and modularized certificates that better align to in-demand occupational skill sets. The purpose of briefly reviewing the career pathways concept in the context of cohort-based instructional models and the middle-skills labor market may be understood as an emerging practitioner framework that builds on, but also extends the understanding and implications of structure hypothesis as having relevance to the entire educational and career pathway rather than limiting its implications to a cluster of courses.
or a single vocational technical program offered in isolation from a larger construct of structure. As with cohort-based learning models, a career pathways framework which organizes and links education along a career progression has the potential to create a more efficient worker production system for a local economy as it extends the structure inherent in the cohort design onto the next level of educational opportunity.

This literature review will conclude with a consideration of how these literary themes synthesize to support a workforce practitioner framework of using cohort-based learning models designed within a career pathway structure as providing a more impactful strategy for achieving higher student completion rates within technically focused curricula linked to the local labor market. Achieving a higher rate of student completion from programs matched to in-demand occupations translates into more workers being created to supply a variety of technician centric and applied-STEM operations in a local economy. In conducting this study, the researcher is purposefully adopting an “applied economic” perspective for the purpose of understanding the potential advantages provided to the institution from adopting a structured cohort-based instructional design model and its potential as a more effective workforce completion strategy for achieving higher graduation rates of qualified technical workers ready to enter the workforce. It is the researcher’s aim to examine the support within the related literature that will allow a methodological consideration by workforce and economic development practitioners as to the viability of cohort-based instruction as a more effective strategic response by the community college’s workforce function in addressing the need to more efficiently and reliably create a greater supply of qualified technical workers for their local industry needs.
Development of the Learning Community Movement

Cohort-based education as a type of learning community can be traced to the reform movements in American higher education at the turn of the 20th century (Fink and Inkelas, 2015; Minkler, 2002). Educational philosophers and reformers such as John Dewey and Alexander Meiklejohn provided significant critiques of the Germanic model of higher education, and in doing so laid the philosophical foundation for the contemporary learning community movement (Fink and Inkelas, 2015; Jessup-Anger, 2015). Dewey as a pragmatist claimed that student learning ideally should be student-centered, active and characterized as experiential, applied, and connected to societal problems (Jessup-Anger, 2015; Nelson, 2001; Minkler, 2002). Meiklejohn expanded on Dewey’s concept of “education as a social enterprise” to include “stressing the importance of the continuity of context rather than through the unity of content” (Minkler, p. 47). Meikeljohn is credited with developing one of the first formal learning community programs in 1927 at the University of Wisconsin which became a blueprint for future iterations of the learning community model that followed at other institutions (Minkler, 2002). Joseph Tussman, Meikeljohn’s student, went on to further develop the learning communities’ concept, chronicled in the work Experiment at Berkeley. The Berkeley experiment is credited by scholars as launching the curricular reform in the 1970s which ultimately led to institutions like Washington State’s The Evergreen State College which has become a leader in learning community research through the formation of its’ Washington Center for Improving the Quality of Undergraduate Education (Fink and Inkelas, 2015; Minkler, 2002). According to Minkler (2015) learning communities at the community college level were first introduced by LaGuardia Community College in the late 1970’s and expanded to other schools in the early 1980’s such as Daytona Beach Community College and Seattle Central Community College (p. 47). By the early 2000’s
there were recorded over 40 community colleges listed on the learning community directory managed by the Washington Center for Improving the Quality of Undergraduate Education at Evergreen State College (Jessup-Anger, 2015; Minkler, 2002). By the mid 2000’s learning communities had evolved into a recognized model holding promise as an innovation for impacting the completion agenda with the Association of American Colleges and Universities (AAC&U) in their 2007 report entitled *College Learning and the New Global Century* highlighting learning communities as a high impact practice (Jessup-Anger, 2015).

As with many concepts, variations have been developed around the learning community and its application to different student audiences and types of institutions. Inkelas and Soldner (2012) through their research combined the various typologies that have emerged over the last several decades into one master typology. They suggest the following five-point typology as an integrated representative of a learning community model (as cited in Fink and Inkelas, 2015, p. 12):

1. Paired or clustered courses
2. Smaller cohorts among large enrollments, including learning communities
3. Coordinated or team-taught series of courses
4. Learning communities for special populations
5. Residentially based learning communities

Cohort-based learning models which have emerged from the learning communities movement have design elements that are very much rooted in the themes highlighted by Inkelas and Soldner’s (2012) five-point typology. An examination of Inkelas & Soldner’s typology reveals different expressions of structure, block scheduling and pedagogical influence of cohort-based design elements where the unit of focus are groups of students experiencing an integrated
structure across curriculum, support and faculty. Now that a brief history of learning communities has been reviewed and a basic typology defined, in the next section, a review of the literature around cohort-based education models as a type of learning community, their design elements and variations of format will be examined.

**Cohort-based Learning Model**

Fenning (2004) defines learning communities as “groups of individuals who come together to create shared purpose, to develop shared goals and knowledge, and to work together to create solutions to complex problems within the context of college programming” (p. 3). The development of a community within the context of higher learning has important psychological and social dynamics. Fenning notes when a learning community is created successfully it will facilitate both the creation of a caring and emotional learning climate and over time, allow for the development of synergy, where individuals learn to depend upon one another for academic support. The development of these support mechanisms has been shown to have implications for positively contributing toward student retention and success. The integration of social and academic supports in a highly structured format aligns with the theoretical framework of this study, Tinto’s student integration model and structure hypothesis.

As noted above, research indicates that cohort-based models are a type of learning community and are rooted in the development of the learning community movement (Goldman, 2012; Minkler, 2002). Cohorts in academic settings are defined with a strong element of structure in which groups of students will typically begin a program of study at the same time and take most if not all of their classes together (Glossary of Education Reform, 2014). Common elements of a successful cohort model include a strong emphasis on the group experience, the ability for students to rely on peer support mechanisms as well as the facilitating and building of
peer relationships directly within the learning environment (Fenning, 2004; Seed, 2008). According to Seed (2008), the effectiveness of cohorts has been documented in a variety of areas with research supporting the use of cohorts, as a valuable tool for retaining and helping students complete their program of study (p. 214; Goldman, 2012).

Seed (2008) in evaluating a study of cohort-based education for pre-service teacher preparation describes similar dynamics reported by students that were aligned to the outcomes of the learning climates described in Fenning’s (2004) research. By adapting an experiential learning model, Seed (2008) observed that cohorts of pre-service teachers had developed both trusting relationships and created an environment where participants developed long-term professional relationships. Seed notes the learning communities created in the pre-service cohorts had the effect of psychologically empowering teachers as “co-creators of knowledge by being co-learners” (p. 213).

**Accelerated cohort-based learning models.** The research around the time it takes a student to complete a degree program within a cohort-based curriculum supports an emerging understanding around the potential application of the cohort-based instructional model as a distinct strategy for addressing the low levels of completion within community colleges especially in connection with non-traditional audiences where time is the enemy of completion (Complete College America, 2011). From this perspective, the social and academic integration within cohort-based learning communities provides a platform from which to implement an accelerated curriculum and structure student experience for the benefit of positively influencing students to completing their program of study. Accelerating a cohort-based curriculum when applied to whole degree or certificates and not just a cluster of courses has begun to emerge as a recognized strategy for overcoming the challenges present in the traditional cafeteria model.
where students experience a relatively unstructured pathway without supports integrated into the instructional model (Bailey, Jaggars & Jenkins, 2015; Kolenovic, Linderman & Karp, 2013, Rosenbaum, Deil-Amen & Person, 2006). Kasworm (2003), based on a qualitative study of undergraduate students enrolled in accelerated cohort-based degree programs, found four key elements that must be present for an accelerated cohort to be effective (p. 18):

- **Structure**—the supportive learning world of the program
- **Relationships**—the quasi-familial relationships with fellow student learners
- **Student identity**—the beliefs of a specific student identity for effective learning and successful completion
- **Adult beliefs regarding learning**—paradoxical beliefs regarding engagement in accelerated degree program learning

Similar to Fenning (2004) and Seed’s (2008) work, Kasworm (2003) notes students’ perceptions of the added support mechanisms inherent in cohort-based learning models as an element that students identified specifically as beneficial to their success. The perception by students that the learning experience in the cohort-based program has been customized around the reality of the adult or non-traditional learner which many times includes juggling competing family responsibilities and work obligations is an important factor (Husson & Kennedy, 2003). In alignment with structure hypothesis, these design elements include schedules that are highly structured with the working student’s lifestyle in mind including an emphasis on curricula that is experiential and contextualized with a work-oriented, skill-based and applied focus. In addition to psychosocial and supportive elements of the learning community, a cohort-based instructional model provides structure and process that effectively “locks” or structures a student into full participation in the curriculum and “pushes” the group to completion of the program (Kasworm,
2003, p. 19). This design element sometimes referred to as block scheduling aligns with structure hypothesis which proposes that unstructured choice poses challenges to students and may permit them to take longer to complete or progress within a given program of study (Rosenbaum, Deil-Amen & Person, 2006; Scott-Clayton, 2012).

Goldman (2012), in studying first year undergraduate students at the University of Toronto noted that cohort-based programs influenced student engagement. These influences were found to indirectly affect other positive educational outcomes such as achievement, learning and success in accomplishing better grades, higher course completion rates and increased student retention from first to second year, and second to third year persistence (pp. 2-3). As with Seed’s (2008) pre-service teachers and Fenning’s (2004) adult learning communities, Goldman found similar psychosocial dynamics with cohort participants at the University of Toronto reporting a more positive self-identity and feeling more connected and motivated through access to the social support networks created by participation in the program.

*Accelerated study in associate programs (ASAP).* Most recently, the cohort-based learning communities model has been applied as a method to provide an accelerated option for students seeking associate degree programs within the community college setting as an explicit strategy to use cohort-based design structures to significantly increase student retention and completion for non-traditional students. The City University of New York’s (CUNY) Accelerated Study in Associate Programs (ASAP) was developed and launched in 2007 as a cohort-based learning community designed to improve graduation rates by providing a range of comprehensive support services to community college students in select majors and to progress students quickly to degree completion. Kolenovic, Linderman & Karp (2013) have noted that ASAP is grounded in Tinto’s (1993) notion of academic and social integration and its positive
influence on student persistence. Tinto argued that students who feel a strong sense of belonging and believe that they have a social and academic home in college are more likely to remain and complete their program of study (Tinto 1993, 1997; Kolenovic, et al., 2013). In their study of three year outcomes for ASAP students, Kolenovic, et al. found that after 2 years, 30% of ASAP students had earned a degree in comparison to only 11% of the traditional comparison-group students. Three years after enrollment, the difference in graduation rates favoring the ASAP cohort remained, with 55% of ASAP students having earned an associate’s degree as compared with 25% of the students enrolled in the traditional, non-cohort comparison group. Kolenovic et al.’s findings from their longitudinal study support the strengths of the cohort based model and its effectiveness positively impacting completion. Kolenovic et al. note of their findings:

[They] support the importance of integration (Tinto, 1993, 1997), institutional agents (Bensimon, 2007; Rendon, 1994), and intrusive supports (Karp, 2011; J. E. Rosenbaum et al., 2006) for community college students ASAP, as a whole, is a supportive, cohort-based program, so it’s positive influence on student outcomes supports these conceptualizations of student success (as cited in Kolenovic et al., 2013, p. 287). At the time of this study, the ASAP webpage on the CUNY website provides the following performance information for the program since its launch in 2007:

(http://www1.cuny.edu/sites/asap/about/):

There have been nine ASAP cohorts totaling 12,780 students admitted across seven participating CUNY colleges. The ASAP graduation rate is more than three times the national three-year graduation rate of 16% for urban community colleges (IPEDS). ASAP’s current cross-cohort three-year graduation rate is 53% vs. 23% for comparison group students. Since 2009, ASAP has admitted students with some developmental needs
(1-2 developmental course needs based on scores on the CUNY Assessment Test) who also graduate at significantly higher rates than non-ASAP comparison group students. After three years, 48% of ASAP students with developmental needs graduated vs. 21% of comparison group students with developmental needs.

These findings align well with positive program completion results from cohort-based certificates offered at the research site, more discussion of which will be provided in Chapter III of this study.

**Summary.** In summary, from a review of the literature on learning communities and cohort-based education models, it is evident that these approaches in both their accelerated and non-accelerated formats have been shown to be associated with a positive influence on key measures of student success. These include increased student retention, and a positive impact on both student completion and in the case of acceleration, the time it takes a student to complete a program of study. The review of the literature on cohort-based learning communities also revealed evidence that these models facilitate a variety of positive psychosocial dynamics which influence student perceptions of self-identity, connection to each other, and also the institution. Cohort-based education models as a more effective and efficient instructional model may be better understood in context of the possibility of them being organized within institutions along a larger structure of curricular organization called a career pathway framework. In the next section of this chapter, the researcher will examine the concept and design of what constitutes a career pathway and how its structure and design are complementary to the structure and supports that are inherent in a cohort-based learning community model.


Career Pathways Framework

Alssid, Gruber, Jenkins, Mazzeo, Roberts, & Stanback-Stroud, (2005) define a career pathway as a way of identifying a promising field and building the necessary competencies to be prepared for a well-paying, long-term career (p. 85). Table 2.0 summarizes the key elements that a career pathway model should include (Alssid et al., 2005; Sass, 2007; Pedersen, & Truman, 2007).

Table 2.0

Summary of Recognized Elements of a Functional Career Pathway

| An introduction to career opportunities in a region’s high-wage, high-demand employment sectors | Addresses the basic skills needed to succeed in postsecondary education and training |
| Incorporation of stackable credit certificates along an associate’s degree pathway | Internships, co-ops and employment as part of a curriculum |
| Continuing upgrade training | Social and academic supports throughout as necessary |

As Ferguson et al. (2011) expand on this concept and stress that the concept of a career pathway is centered on a series of connected education and training programs and student support services that enable individuals to secure a job or advance in an in-demand industry or occupation. Career pathways function as a bridge, linking secondary and post-secondary worlds along a pathway that is focused on easing and facilitating student transition from high school to community college; from pre-college courses to credit postsecondary programs; and from community college to university or employment (Ferguson et al.; Sass et al, 2007). Sass et al. emphasize the aspect of linkages in the career pathway model; no program is “terminal.” All programs have a “next step” along both the educational and career progression (p. 455). It is important to note
that as with cohort-based learning communities, a strong emphasis in this model is the structural component that allows a student or worker to move along a known ladder to the next step through the accumulation of work experience and acquiring additional education or training.

**Labor linking.** A primary element of creating linkages in the career pathway model involves the aspect of incorporating stackable certificates or the modularization of college curricula along a given career pathway (Ferguson et al., 2011; Saas et al., 2007). According to Saas et al., “the development of the college credit certificate contains the technical core of an associate’s degree and typically does not include general education courses” (p. 457). These certificates allow students to progress along the pathway in smaller discrete timeframes that allow the student to obtain in-demand skill sets that correlate to an existing job available in the economy. In the researcher’s practice as a workforce developer, a similar observation has been made in regards to the attraction of the college credit certificate as equal in qualification to the two-year degree from the perspective of local manufacturers. At the research site, credit certificates range between 24 and 30 credit hours which is approximately half of the 60-credit hour Associate of Applied Science (AAS) degree. As Sass et al. notes, the first 30 credits of a technical AAS program tend to contain most of the core technical courses in the two-year program with the second 30 credit hour sequence consisting of general education and some technical electives. Other than the Associates of Occupational Studies (AOS) degree, the technical academic certificates may represent some of the more concentrated sequence of courses for a technical curriculum.

**Modular curriculum.** A career pathway system built on modularized curricula and incorporating stackable credit certificates like the 30 credit sequences at the research site, creates linkages which ideally begin in secondary education, lead and align into the post-secondary
degree, and ultimately link to industry demand (Dare, 2006). Saas et al. (2007) describe this dynamic of multiple entry and exit points which are sometimes referred to multiple on and off ramps within the career pathway framework as facilitating the reality of the labor market with employers wanting their employees to be skilled and knowledgeable, as well as wanting them ready to work (p. 460). The multiple entry and exit points allow students and their future employers to match skill sets and positions with efficiency and precision (Ferguson et al., 2011; Saas et al.). In the vein of this understanding of the model, The National Governors Association (NGA) defines a functional career pathway as a systems approach providing:

- a clear sequence of coursework and credentials aligned with the natural paths of advancement in an industry, and often across similar occupations in related industries, for students, job seekers, and incumbent workers returning to school. When done right, career pathway programs engage regularly with employers in their target industry so as to constantly and accurately assess the skills and knowledge they need and re-calibrate curricula, programs, and credentials. They also coordinate among multiple education and training providers to build a complex of courses and credentials that impart and demonstrate qualifications from work readiness to advanced-level skills (“State Sector Strategies”, 2014, p. 15).

**Career progression.** Saas et al. (2007), Ferguson et al. (2011) and Dare (2006) all note a key design element of the career pathway model is its linear framework which directly matches levels of occupations to the respective skill sets that are required to be mastered by the student/worker in order for them to be qualified to progress to the next rung on the ladder. From this understanding, a career pathway framework provides a student as well as educators a clear blueprint as to the opportunities for advancement in a given field and other related fields as the
student continues along their chosen career path. Because of the strong link to in-demand occupations and the skill sets needed by industry, a functional career pathway system is a collaborative effort relying strong linkages and open lines of communication between industry and education. Torraco’s (2008) research of nine community college occupational programs revealed the contextualized and applied learning experiences, such as labs and work-based learning, served as both a primary linkage to industry and an effective format for providing students with the skills desired by employers seeking to hire graduates into skill based occupations within their organizations (pp. 219; 225).

Student engagement is an area in which the literature speaks to the positive effects that structure from a defined career pathway model offers in comparison to traditional instructional formats offered in the community college. Torraco (2008) found student perceptions from the inclusion of engaging and applied instructional elements such as internships, applied learning, and co-ops were positive motivators for students completing a program (pp. 227-228). Relative to other community college programs, the nine occupational programs incorporating a career pathways model examined in the Torraco’s study and Saas et al.’s (2007) study of Palm Beach Community College both noted high graduation and employment rates.

**Summary.** The literature regarding the career pathway model shows evidence for the framework being relevant and useful in engaging community college students in skill-based and applied middle-skilled occupational programming. Studies reviewed showed support for higher completion and placement rates for students enrolled in programming aligned to identified workforce demand within a career pathway system. The use of modularized degree certificates is also supported in the literature as serving as an alternative instructional model that may be more attractive to non-traditional audiences that benefit from having access to a stackable curriculum
organized along a defined pathway. In context of the earlier discussion of cohort-based learning communities, career pathways are a relevant and complementary organizational framework for supporting cohort-based instructional models. In the following section, a review of studies on the middle-skills labor market and labor supply and demand analyses for middle-skilled workers will be examined in light of the research interest of this study which is the creation of a more efficient workforce development mission in a community college through the adaption of cohort-based instructional models for vocational technical academic certificates that are aligned into a regional career pathway system.

**Middle-Skills Labor Market Gaps**

According to Skills2Compete (2011) middle-skills occupations are those “occupations that require post-secondary education greater than a high school diploma but less than a four-year degree” (p. 4). Middle-skills occupations occur across many industries spanning a broad array of occupations including, but not limited to: first responders, electricians, computer support specialists, health technologists, nurses and a variety of technician-level and skilled production positions in advanced manufacturing, including mechatronics, engineering technology, optics, manufacturing technology and tooling and machining (Carnevale, Smith, & Strohl, 2010; Ferguson et al, 2011). They differ from low skill occupations which require a high school diploma or less, and high skill occupations which require a four-year degree or higher (Carnevale, Smith, & Strohl, 2010; Ferguson et al, 2011). Middle-skills occupations have been called “community college occupations” as they predominantly include occupations aligned to a career pathway that is a part of an associate’s degree (many, part of an associate of applied science program) or a postsecondary vocational award, credential or certificate (Sommers, 2009). These diverse occupations that are predominantly part of an associate of applied science degree
pathway and the corresponding industry demand can be thought of as representing the community college labor market (Sommers, 2009)

In reviewing the peer-reviewed literature on the middle-skills labor market and the researcher having been immersed in reading and studying reports over the last eleven-years as a community college workforce practitioner, it is important to note that stated demand for middle-skills occupations will differ between regions and also will depend on which organizations or labor economists are conducting the analysis or forecast and the methodology employed. Most studies and analyses utilize data that is either directly or indirectly derived from the U.S. Bureau of Labor Statistics (BLS), the federal agency charged with projecting long-term future labor market demand for the U.S. economy (Sommers, 2009). Carnevale et al. (2010) in their analysis of BLS data and the near-team labor market indicated:

By 2018, the economy will create 46.8 million openings -13.8 million brand new jobs and 33 million “replacement jobs,” positions vacated by workers who have retired or permanently left their occupations. Nearly two-thirds of these 46.8 million jobs – some 63 percent will require workers with at least some college education (p.13).

A breakdown of the U.S. workforce by skill level follows (Carnevale et al, 2010; Ferguson et al, 2011).
Table 2.1

*New and Replacement Job Demand by Skill Category*

<table>
<thead>
<tr>
<th>Occupational Skill Category</th>
<th>Education Attainment</th>
<th>Percent of U.S Workforce</th>
<th>Number of Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Skill</td>
<td>High school or less</td>
<td>36%</td>
<td>17 million</td>
</tr>
<tr>
<td>Middle-Skill</td>
<td>Some college/Associate’s degree</td>
<td>30%</td>
<td>13.8 million</td>
</tr>
<tr>
<td>High-Skill</td>
<td>Bachelor’s degree or greater</td>
<td>33%</td>
<td>16 million</td>
</tr>
</tbody>
</table>

*Note.* Total Jobs Represented: 46.8 Million.

Middle-skills occupational pay varies, with some clusters of occupations paying better than others. Some middle-skills occupations pay quite well. Ferguson et al. (2011) found that “27 percent of people with post-secondary licenses or certificates, credentials *short* of an associate’s degree, earn more than the average bachelor’s degree recipient” (p. 3), which in the study was $55,000 a year.

In states like New York, the location of this study’s research site, middle-skills occupations are the largest category of the workforce and according to the BLS are projected to have the highest openings through 2018 (Skills2Compete, 2011, pp. 11-12)
Table 2.2

New York State Workforce by Category and Total Job Openings by Skill Level Through 2018

<table>
<thead>
<tr>
<th>Occupational Skill Category</th>
<th>Percent of Workforce</th>
<th>Total Job Openings by Skill Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>33%</td>
<td>34%</td>
</tr>
<tr>
<td>Middle</td>
<td>46%</td>
<td>39%</td>
</tr>
<tr>
<td>Low</td>
<td>21%</td>
<td>27%</td>
</tr>
</tbody>
</table>

D’Amico, Morgan, & Robertson (2011) note the relevance of the career pathway model in preparing workers for middle-skilled occupations when cohorts are aligned to select workforce clusters. D’Amico, et al. noted the connection between middle-skilled career pathways and alignment to a region’s workforce cluster strategy in increasing retention while ensuring program curriculum was relevant to the business environment and the recruitment needs of industry. In reviewing the literature on middle-skills workforce clusters, the following cluster categories are common to many of the analyses (D’Amico et al.; Ferguson et al., 2011; Neumark et al., 2013; Wilson, 2014):

Table 2.3

Common Middle-Skilled Workforce Clusters

<table>
<thead>
<tr>
<th>Advanced manufacturing (skilled production)</th>
<th>Travel, hospitality and tourism</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care</td>
<td>Transportation and logistics</td>
<td>Information &amp; computer technology</td>
</tr>
<tr>
<td>Skilled Trades/Apprenticeship</td>
<td>Construction</td>
<td>Applied Technologies</td>
</tr>
</tbody>
</table>
Measuring regional middle-skill gaps. The review of the literature indicates an emerging type of middle-skills labor market analysis where a measurement is conducted of the annual labor supply created through program completions (graduates) from post-secondary institutions (degree and nondegree) and compared with the estimated annual labor demand (job openings) for the relevant occupations mapped to those programs (Wilson, 2014). This measurement yields either a worker surplus or deficit estimation for the respective middle-skills occupations being measured for industry. This measurement practice typically aligns to a region’s workforce cluster framework (Wilson, 2014; “Sector Strategies”, 2014). Analysis of this type requires counting more than the graduates being generated from middle-skills credit programming that can be tracked via the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Wilson notes the analysis of a middle-skill labor market must also include a state or regional measurement of post-secondary non-degree credential attainment inclusive of non-degree certifications, licenses and certificates. Using a labor supply versus labor demand measurement for a region allows educators and policymakers to understand if a skill gap exists within a local economy using a quantitative approach (“State Sector Strategies”, 2014).

Workforce sector strategies and career pathways. Michael Porter defines clusters as “geographically proximate groups of interconnected companies and associated institutions in a particular field linked by customer, supplier, or other relationships” (D’Amico et al., 2011, p. 776). Sector strategies, in utilizing a cluster framework, function systematically in a regional economy in a similar way to that of a career pathway system as already discussed in this chapter. Like a career pathway system, sector partnerships engage employers within a single industry to address their common workforce needs (“State Sector Strategies”, 2014, p. 14). Career pathways organized along a cluster framework, work in a highly complementary way by “focusing scarce
resources within the educational system on the industries that provide high proportions of jobs
for their residents and on the role of a skilled workforce in a local economy” (p. 5). As Autor
(2014) notes the central determinant of the supply of skills available to an economy is the
education system and when used to address middle-skill gaps, career pathways directed by a
region’s sector strategy informed by a labor supply and demand analysis can be an effective
framework for guiding a community college’s response to the needs of their local industry
(D’Amico et al., 2011; Githens et al., 2012; “State Sector Strategies,” 2014). A model
summarizing the interplay between a career pathway system and a region’s industry clusters can
be graphically illustrated in Figure 2.
Figure 2. Sector partnership model adapted by researcher from “State Sector Strategies” (2014).

Summary. The review of the literature on the practice of measuring a region’s labor supply as created from a community college’s graduates for middle-skills jobs and comparing those program completions with the aligned occupations needed in an economy, is an avenue available for better guiding additional investments in educational programming and faculty where greater worker creation is needed to lessen local deficits in the availability of in-demand workers. Leveraging a middle-skills career pathway within an economy with the use of sector
strategies has promise for addressing skill gaps in the community college labor market in a data driven and informed way. The review of the literature supports utilizing this occupational based framework in conjunction with the higher yields of graduates from the adoption of cohort-based learning communities that are built on a career pathways model. These three complementary models working together hold promise to achieve both higher completion rates for students while also addressing the need for more skilled workers in high demand areas within the local economy.

**Conclusion**

In this chapter, a review of the literature has examined scholarly research relating to three complementary constructs, i.e., cohort-based learning communities, career pathways framework and measurement of the middle-skills labor market in a local economy. In conducting this review, the researcher has set out to explore and synthesize existing studies and discussions that would provide relevant background for addressing the four key research questions related to this study: 1.) To what extent do the completion rates of students enrolled in a cohort-based vocational technical certificate programs differ from students enrolled in a non-cohort based vocational technical program? 2.) To what extent does the time it takes students to complete a certificate program differ based on program instructional type? 3.) Are differences in completion outcomes dependent on program instructional type and student characteristics such as gender or ethnicity? And 4.) How does a cohort-based instructional model contribute to student completion and job placement as perceived by program directors/administrators and students?

If more students enrolled in cohort-based education and training programs complete their programs of study in greater numbers when compared to non-cohort programs it is reasonable, based on the evidence in the literature and this paper’s study, to consider cohort-based
instructional models as a more effective strategic option for community colleges to increase the supply of workers that are shown to be in-demand and needed to support their region’s industry clusters. Based on the review of the literature, there is strong evidence to support the use of cohort-based learning communities as an intentional instructional design strategy to create positive psychosocial dynamics that are linked to increased student persistence that have been shown in related studies to correspond with higher rates of completion. A review of the literature provided research that supports the career pathway framework as an impactful model in guiding the alignment of a community college’s programming to relevant middle-skills occupations that are documented as being in-demand within a region’s economy.

Linking and aligning the support within the literature reviewed suggests an integrated and structured framework for addressing both the middle-skills and economic development mission of the community college, while meeting the imperative to increase student retention and completion in order to transform the community college into a much more efficient educational system and middle-skilled workforce provider. Efficiency within the context of this model is defined as a measurable increase in first-time, full time students completing an academic or noncredit technical certificate program that aligns to an in-demand middle-skilled occupation. Programs aligned to the local labor market directly addressing skill gaps in the available supply of middle-skills workers make the community college a stronger primary workforce provider to the middle-skills labor market in their community.

The review of the literature supports a framework that actively integrates a region’s industry cluster strategy with a career pathway framework that consists of instructional cohorts aligned to in-demand occupations needed to supply local industry clusters with a sufficient supply of qualified workers. The efficiencies and alignment of a region’s educational resources
that are gained from integrating both a sector strategy and a career pathway framework to a cohort-based instructional model (both accelerated and non-accelerated delivery formats) suggest implications and promise for policy reform relating to a regional job strategy as well as economic and workforce development investment and post-secondary reform. Moving populations from a state of economic and educational disadvantage into a promising career path in an efficient way with high student success is a strategy that greatly increases the participant’s preparation to obtain and persist in a living wage job in the local labor market.

Though certainly not all community college students have the interest or aptitude for technically and applied middle-skilled careers, the literature suggests those that do may be better served through a cohort-based instructional model that is aligned to a career pathway framework. In this model, not only is the student more likely to complete their education, the businesses in the local economy are provided a greater supply of in-demand workers for the middle-skills economy. These observations and the evidences drawn from the literary threads reviewed in this chapter suggest alternative and compelling ways to augment the existing community college instructional model with a newer student and labor market centered approach. In pursuing this strategy, community colleges may be better able to fulfill their mission critical role of serving as a region’s primary workforce developer and able to achieve a greater measurable economic impact on the local economy through a more effective and efficient completion strategy.
Chapter III: Research Design

This chapter describes the design and purpose of this mixed methods case study which is to understand the impact of two cohort-based learning communities on both completion rate and time to completion for students enrolled within vocational technical certificate programs at a community college. This chapter includes the research questions and research propositions, a description of the research design as well as sections on the population and sampling, ethical consideration, data collection and analysis, validity, reliability, and generalizability.

Cohort-based Design Models Present in Certificates at the Research Site

The Cohort-based certificate programs at the research site have present in their design six structures that align to the literature and studies of Fink and Inkelas (2015) Deil-Amen & Rosenbaum, (2003), Rosenbaum, Deil-Amen & Person (2006) and Kasworm (2003) as reviewed in Chapter II. These studies align with the implications of the theoretical construct of SIM and Structure Hypothesis that these six design elements are associated with increased student completion and time to completion. The six design structures active in the cohort-based learning model at the research site include:

1. block scheduling of courses,
2. students experience the entire program as a defined group (peer cohort),
3. entire program of courses is taught with a limited number of dedicated faculty (faculty cohort model),
4. embedded in-class peer supports,
5. faculty support for students,
6. active job placement assistance, post-completion.
The two cohort-based programs that are the focus of this study include a 31-credit hour academic certificate in Precision Machining and a 360-hour non-credit Welding Fabrication certificate. Each of these programs have been offered over the last five academic years at the research site. Both cohort-based certificate programs include each of the six design structures, already identified, that are associated within the literature as elemental to a cohort-based learning community. Cohort-based students self-select and enroll in each program as a whole and do not register into courses individually or select their own courses. The Precision Machining program curricula is identical to the traditionally taught, non-cohort option except that the cohort-based program is block scheduled into a 22-week experience. Unlike the traditionally taught Precision Machining program, each of the two cohort certificates examined in this study require a student to complete the entire program of courses and provide no mechanism for students to fall behind by taking less courses in any given term. Students that need support are provided in-class and after class supports by faculty, staff or peers as well as having access to professional tutoring. A group of up to three dedicated faculty teach all of the 22-week Precision Machining program courses and two dedicated faculty teach the Welding program courses. The goal of both cohort programs is to have students complete the certificates on time and achieve placement with a local employer in a relevant technical role. The 31-credit Precision Machining program is Title IV eligible while the non-credit Welding Fabrication program is offered on a self-pay basis with personal credit based educational loans available to students. As referenced in Table 3.0, over the 2012 – 2015 academic years, 272 students have successfully completed the Welding Fabrication program and 68 have completed the 22-week Precision Machining program.
Research Design

The research design for the quantitative portion of this mixed methods case study is guided by the framework used in causal-comparative research. Causal-comparative research describes conditions that already exist and is characterized as a retrospective research approach. Causal-comparative research methods attempt to describe reasons and conditions for why differences between groups may exist (Fraenkel, Wallen and Hyun, 2014). The quantitative analysis is framed on what Fraenkel, et al. classify as a type 3 research design. A Type 3 comparative-research approach explores the consequences on multiple dependent variables of an intervention or independent variable. As a retrospective research design, this approach utilizes what can be termed an *ex post facto* approach (Latin for “after the fact”) since both the effect and the alleged influences from the independent to the dependent variables have already occurred and must be studied in retrospect (Fraenkel et al.) The researcher in the quantitative portion of this case study explored the measurable influences of cohort-based design models on student completion and time to completion for students enrolled in cohort and non-cohort types of vocational technical certificate programs taught at a comprehensive community college in Upstate, New York.

The qualitative research portion of this mixed methods study utilized both focus group and survey based research methods to explore a participant perspective from students, administrators and faculty that were involved within the two cohort-based programs. The description of these qualitative research methods that were employed in this study are provided in following sections.
Justification

The theoretical construct that guided this study is based on Tinto’s (1975; 1993; 1997) Model of Student Integration and Structure Hypothesis. These constructs associate cohort-based learning communities with measurable differences in student completion when compared to instructional formats that do not contain these structured supports for students. The literature on student engagement and success has shown that learning community and cohort-based instructional models have been impactful particularly with students recruited from historically underrepresented populations where educational and economic disadvantages persist. As an administrator working in the institution of study, the researcher had access to five years of completion, performance and demographic data for students enrolled in vocational technical certificate programs consisting of both cohort-based and traditional instructional formats. Because of the researcher’s interest in comparing multiple programs’ completion data for both types of instructional formats, an experimental or quasi-experimental approach would not be feasible given the limited time and resources available to establish multiple experimental cohort-based instructional groups from which to measure and compare differences in student success. Given that two cohort-based certificate programs structured on a learning community design model have been offered over a four-year period at the institution of study, it was more feasible and practical that a case study be chosen as the best approach to both study and explore the possible influence of the cohort-based learning model’s impact on student success at the research site.

Research Questions

**RQ1: Differences in Completion Rate**

To what extent do the completion rates of students enrolled in cohort-based vocational
technical certificate programs differ from students enrolled in a non-cohort based vocational technical program?

**RQ2: Differences in Time to Completion**

To what extent does the time it takes students to complete a certificate program differ based on program instructional type?

**RQ3: Program Instructional Type, and Student Characteristics as Predictors of Student Completion**

Are differences in completion outcomes dependent on program instructional type independent of student characteristics such as gender and ethnicity?

**RQ4: Student, Administrative and Faculty Perspectives**

How does a cohort-based instructional model contribute to student completion and job placement as perceived by program administrators, faculty and students involved in these cohort-based programs at the research site?

The first two research questions explore whether there are significant differences between student completion rate and the time it takes students to complete their certificate program based on instructional type. The third research question explores beyond a significant difference in student completion by instructional type and uses logistic regression to test how the cohort-based model and student demographic data may serve as an effective predictor of student completion. The fourth research question examines student, administrator and faculty perceptions of each of the six design structures identified as part of the cohort based learning model examined in this study and how they report their influence on student success. Based on a review of the literature on student engagement, Tinto’s Student Integration Model and Structure Hypothesis, the
following research propositions have been formulated in alignment with the first two research questions of the study.

Research Propositions

*Research Proposition 1*: Students enrolled in a cohort-based model at the research site will have higher completion rates than students enrolled in the non-cohort program when controlling for student background, program faculty, and student enrollment process.

*Research Proposition 2*: Students enrolled in a cohort model at the research site will complete their program of study in less time than students enrolled in a non-cohort program when controlling for student background, program faculty, and student enrollment process.

Research proposition 1 and 2 express an expectation within the quantitative portion of this case study’s analysis that the presence of increased structure and student supports will have a positive influence on student success. The research propositions extend from the review of the literature that characterize cohort-based learning communities as groups of individuals who attend a highly structured program with a strong emphasis on the group experience, the ability for students to rely on embedded peer and cognitive support mechanisms as well as the facilitation and building of peer relationships within the learning environment (Fenning, 2004; Seed, 2008). In this study the structured design elements of experiencing instruction in a group setting that stays together throughout the entire program also includes the presence of active job placement post-completion. Based on studies from the literature on student engagement, the structured cohort-based design elements were expected to provide a more effective learning environment as predicted and informed by the study’s theoretical framework, Student Integration Model and Structure Hypothesis. As such, the research propositions are directional in their
positive orientation with an expectation that a significant difference in student completion and
time to completion would be measurable from the influence of the cohort-based learning
community.

The third research proposition is as follows and extends from expectations laid out in
studies of SIM and Structure Hypothesis:

*Research Proposition 3:* The cohort-based design structures present in the cohort-based
Precision Machining certificate are expected to positively impact student completion
independent of the variables *ethnicity* and *gender*.

Given the research that has been shown within the literature that support structures benefit
student engagement particularly for non-traditional students from economic and educationally
disadvantaged backgrounds when a cohort-based design is integrated into a program of study, it
was expected that the cohort-based instructional groups within this study that integrate authentic
cohort-based design structures would test for a stronger ability to predict student performance
and completion when evaluated against the traditionally taught, non-cohort Precision Machining
certificate program.

**Population and Sampling**

The target population of the study was all students enrolled in vocational technical
certificate programs at a community college. These included 1.) Precision Machining Cohort-
based Certificate, 2.) Welding Fabrication Cohort-based Certificate, 3.) Traditional, non-cohort
based Precision Machining certificate (see Table 3.0). The accessible population was all students
enrolled in vocational technical certificate programs at the research site, a public comprehensive
community college located in Upstate New York, over five academic years (2011/12 – 2015/16).
The research site was selected by the researcher for two reasons. First, as a comprehensive
community college it had a large catalog of credit and noncredit vocational technical certificate programs. Second, the researcher as an administrator employed at the research site, had access to five years of student completion and performance records necessary to conduct this study. The proposed study utilized a sampling frame that analyzed five years of non-experimental completion and performance data at the research site for students enrolled in both Precision Machining and Welding Fabrication vocational technical certificates. This case study comprised of a statistical analysis of outcomes in relationship to demographic data of gender, ethnicity, and qualitative data acquired through survey and focus groups of students, administrators and faculty.

For statistical analysis. The accessible population will be categorized into three comparison groups for the purpose of the study in alignment with both the research questions and the three categories of the independent variable, Program Instructional Type:

1. Students enrolled in the vocational technical certificate program, Precision Machining, taught using a cohort-based 22-week instructional model,

2. Students enrolled in noncredit vocational technical certificate, Welding Fabrication programs that have been taught using a 20-week, 360-hour cohort-based communities model and,

3. Students enrolled in academic vocational technical certificate programs taught using a traditional cafeteria style non-cohort based instructional model.

Table 3.0 displays the program breakdown across the five years of student enrollment data.
Table 3.0

*Enrollment for Vocational Technical Certificates by Comparison Group AY ’11/’12 - ’15/’16*

<table>
<thead>
<tr>
<th>Traditional Certificate Program</th>
<th>AY ’11/’12</th>
<th>AY ’12/’13</th>
<th>AY ’13/’14</th>
<th>AY ’14/’15</th>
<th>AY ’15/’16</th>
<th>Total Five Academic Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM02 Precision Tooling Cert</td>
<td>27</td>
<td>39</td>
<td>58</td>
<td>43</td>
<td>35</td>
<td>202</td>
</tr>
</tbody>
</table>

**Cohort-Based Certificate Programs**

<table>
<thead>
<tr>
<th>Program (non-credit)</th>
<th>Total</th>
<th>27</th>
<th>61</th>
<th>63</th>
<th>63</th>
<th>61</th>
<th>275</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welding Fabrication Cohort-based Program</td>
<td>27</td>
<td>61</td>
<td>63</td>
<td>63</td>
<td>61</td>
<td>275</td>
<td></td>
</tr>
<tr>
<td>Precision Machining Program (credit)</td>
<td>0</td>
<td>15</td>
<td>19</td>
<td>26</td>
<td>9</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td><strong>Total credit &amp; noncredit cohort certificates</strong></td>
<td>27</td>
<td>76</td>
<td>82</td>
<td>89</td>
<td>70</td>
<td>344</td>
<td></td>
</tr>
</tbody>
</table>

**Student Sample Used for Study**

<table>
<thead>
<tr>
<th>AY ’11/’12</th>
<th>AY ’12/’13</th>
<th>AY ’13/’14</th>
<th>AY ’14/’15</th>
<th>AY ’15/’16</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>115</td>
<td>140</td>
<td>132</td>
<td>105</td>
<td>546</td>
</tr>
</tbody>
</table>

*Note.* AY = academic year

Student and program data for the Precision Machining and Welding Fabrication cohort-based comparison groups were qualified for membership in those groups based on those programs containing all of the following six cohort design elements: block scheduling of classes, students taking all of their courses together as a defined cohort of students, limited number of faculty teaching in the cohort, embedded peer and faculty support mechanisms and the presence of active job placement services, post completion. For purposes of the analysis, all students that were sampled at the research site were categorized under the independent variable into three comparison groups and will be analyzed for significant differences between the comparison groups for program completion rate and time to completion based on the three categories of the independent variable, *Program Instruction Type*.

As a convenience sample, the student data represents all of the relevant accessible population of students enrolled in one of the three vocational technical certificates at the research site during the academic years 2011/12 – 2015/16. It is disclosed by the researcher that because the sample has not been selected at random from the larger target population of community
college students outside of the research site, it may not be representative of all target population students enrolled in vocational technical certificates at community colleges (Fraenkel, et al., 2014). To control for this weakness that is characteristic of studies utilizing convenience sampling, a large sample size, \( n = 546 \) will be used for the initial data pull in addition to providing descriptive statistics on student demographic data including age, gender, and ethnicity (refer to Table 4.1 and 4.2 for demographic data by comparison group). Including these data will allow the reader to judge if the convenient sample appears to be reasonably homogenous and representative to other comprehensive community college student populations enrolled in vocational technical programming (Fraenkel, et al., 2014). It should be noted that socio-economic status was not found to be consistently present in the student data to allow for this variable to be included in the case study.

**Qualitative analysis.** In addition to the statistical analysis of student data as outlined above, the researcher sought to balance a strictly retrospective statistical analysis of outcomes in relationship to program and demographic variables with qualitative input directly from both cohort-based student graduates as well as the administrators and faculty that were responsible for managing and conducting the cohort-based programs. The qualitative analysis addressed the fourth research question of this case study: How does a cohort-based instructional model contribute to student completion and job placement as perceived by program administrators, faculty and students involved in these cohort-based programs at the research site?

**Student survey.** To facilitate student perspectives on the six design elements of the cohort based learning model at the research site, an eleven-question online survey was distributed to all cohort-based students that had completed either the Welding Fabrication of the Precision Machining certificate program during the five academic years of focus. The total
A subsample of cohort-based students surveyed was \( n = 344 \).

**Focus group.** To facilitate input on how administrators and faculty perceive and judge cohort-based design structures active in their programs, a focus group was conducted by the researcher of seven program directors and faculty that have been involved in facilitating the cohort-based programs relevant to the study. Conducting focus group research facilitated a deeper understanding of the student experience in regards to how the six design elements of cohort-based instruction and the cohort-based model overall has influenced student success.

**Ethical Consideration**

In accordance with ethical research practices concerning protecting human subject participants, the study followed the guidelines of the Internal Review Board (IRB) procedures of Northeastern University and the research site, a public community college. The researcher anticipated and secured a IRB Category II expedited review. All student records included in the five-year convenience sample were anonymized at the researcher’s request by the research site’s Institutional Research Office prior to the dataset being released to the researcher. This process ensured only anonymized data was used within the study and, as recommended by the National Institutes of Health (NIH), afforded a full measure of protection for of all student data contained and analyzed within the research. In regards to protection of participants in the survey and focus group, the researcher used oral and written consent per guidelines of the Northeastern University’s IRB Office so that transparency as to how research would be used and what would be done with the information collected and issues of confidentiality of that information was fully disclosed to the research participants prior to agreeing to participate in the study. As noted, in order to protect the anonymity of respondents’ information, a numerical coding scheme was used to substitute for participant’s identities. All interview records, participant and survey data was
kept confidential and secure within a locked and secure location with only anonymized summary
data being shared within the study.

**Data Collection**

Data collection in the proposed study is a non-experimental analysis (Fraenkel, Wallen
and Hyun, 2014) of five academic years of student completion and performance data from two
cohort-based and one traditionally taught vocational technical certificate program offered at the
research site, a comprehensive community college within the State University of New York
(SUNY) system. The convenience sample was obtained by querying the research site’s Banner
student information system and included both student demographic, course completion and
performance data. Student biographical and background data originated in Banner through the
Institution’s application process and included student’s age, gender, ethnicity, and financial need.
Additionally, course completion, course grades and certificate earned status was also included as
part of the Banner query.

The estimated size of the convenience sample of vocational technical students enrolled in
one of the three programs was \( n=546 \). A gateway course was identified as necessary for each of
the three comparison groups within this case study to identify and define the beginning of each
student’s declared program. After a gateway course was imposed on the convenience sample the
total students to be included in the study for all three comparison groups dropped to \( n=388 \).

A multiple-year descriptive data analysis was conducted focused on a term by term and
composite completion rate per comparison group for the full five-academic years. Chi square test
for independence was used to determine whether the overall completion rate of the three
comparison groups was statistically different for students between group membership. Effect size
was also tested to determine how strong of an association may be suggested by a significant chi
square test between completion rate one of the three categories of the independent variable, *Program Instruction Type*. Significance levels of the independent variable, *Program Instruction Type*, will be examined to determine the extent to which its relationship with the dependent variables are statistically significant at the 95% confidence level. As stated, because the researcher has access to a large sample of relevant vocational technical certificate students at the research site, a convenience sample provides an efficient data collection method for establishing a baseline of completion and demographic data to address the first research question of the proposed study and to provide additional demographic data from which to conduct the logistic regression to test prediction of *Program Instruction Type* and other demographic variables relevant to the third research question.

A second phase of data collection followed the analysis of the convenience sample of non-experimental student data. The second phase of data collection sought to address the fourth research question of the study which was to understand the perspective of students, faculty and administrators in regard to the influence of the six design elements from the cohort-based certificate programs examined within this study. Data collection for this phase of the research consisted of disseminating a post-completion survey that explored how students perceived and judged the importance of cohort-based design elements on influencing student’s persistence and completion. Given that the researcher was unable to locate an existing validated instrument aligned to the fourth research question of the study, the researcher created a survey.

The self-developed instrument consisted of seven Likert-based questions which were designed to solicit student perceptions on the primary design elements that have been shown to be common among cohort-based programs within the studies contained in the literature on student engagement, completion and cohort-based instruction. In alignment with the fourth
research question of the study, the post-completion question set asked completers to judge and self-report the influence on their completion and persistence of the following design elements and variables: 1.) block scheduling of courses, 2.) students experiencing the program as a defined group, 3.) entire program of courses being taught with a limited number of dedicated faculty (faculty cohort model), 4.) embedded in-class peer supports, 5.) in-class faculty support for students, 7.) active job placement assistance post-completion. Each of the seven survey questions were formatted and structured utilizing a five-point Likert scale. Likert scales work well in measuring participants’ attitudes, perceptions, or behavioral items. Likert items will be treated as ordinal data and summarized using descriptive statistics. The choice of using a five-point Likert scale with a neutral choice has been chosen to avoid “a forced decision” (Leung, 2011). Definitions of key terms is a best practice in survey research and will be provided as part of each question to avoid ambiguity as to respondent’s understanding of each design element (Fowler, 2014). In addition to the seven Likert items, four open ended questions were asked to allow students to provide unstructured input regarding their own experience in participating in their cohort-based certificate program. A referenceable copy of the survey instrument is included in Appendix D of this study.

To facilitate input from program directors and faculty responsible for administering and instructing cohort-based certificate programs related to the study, the researcher conducted a ninety-minute focus group based on the Likert-based items that were used for the post-completion online student survey. As Fraenkel, Wallen and Hyun (2014) note, focus groups are a type of interview and the role of the focus group moderator is especially critical in terms of “facilitating interaction between group members, drawing out differing perspectives, and keeping the session focused” (p. 455). For the purpose of this study, the researcher served as focus group
moderator and facilitator. Carey & Smith (1994), Nyamathi & Shuler (1990) and Sharts-Hopko (2001) have noted that the main advantage of focus groups over other research methodologies is that focus groups produce authentic data by participants that is greatly enhanced by the atmosphere of dynamic group interaction which characterizes this approach of research. Discussion within the focus group was audio recorded and the application of thematic coding to the transcript for analysis. Including both student and administrator perspectives as part of the research design and methodology of this study added a deeper dimension and complemented the ex post facto analysis of the first phase of data collection.

**Data Analysis**

**Preparation and transformation.** All data was analyzed using Statistical Package for Social Sciences (SPSS), version 23.0. The five years of student demographic and completion data was loaded in anonymized format by the researcher into SPSS. The data was presented using descriptive statistics, and analyzed with inferential statistics through the analysis of chi-square test of independence and logistic regression using output from SPSS. To facilitate these analyses, the independent and dependent variable data was screened, transformed and recoded as necessary to conform each variable to the definition necessary to successfully test the research propositions in alignment with the study’s four research questions.

The independent variable, Program Instructional Type (*PrgmType*) was a categorical variable requiring recoding in SPSS consisting of assigning the following three levels: 0 - traditionally taught Precision Machining credit certificate, 1 - cohort-based Precision Machining credit certificate, and 2 - noncredit cohort-based Welding Fabrication certificate. The three dependent variables related to both RQ1 and RQ2 include student Certificate Program Completion Rate (*ComplRate*) and Student Time to Completion (*TimeRate*), both of which were
treated as continuous variables. Both Certificate Program Completion Rate and Time to Completion new variables created within SPSS to facilitate the analysis. Each anonymized student record included the courses that define the certificate program course sequence students were enrolled during the five years of focus for the study. Each certificate program (cohort and traditional) was defined by both a gateway course that delineated the start of each certificate course sequence and the earning of a certificate as indicated in the Banner student information system that defined the end of each student’s program being measured in the study. Both the gateway course and the earning of the certificate were data that was available to the researcher from the convenience sample. The completion rate of each certificate program cohort was computed based on dividing the total students earning a certificate by the total students enrolled in that same program’s gateway course to arrive at a program completion rate.

**Descriptive statistics.** Descriptive statistics including measures of frequency, central tendency and dispersion as a form of data analysis enables the researcher to meaningfully describe data with numerical indices or in graphic form (Fraenkel, Wallen, & Hyun, 2014). Student biographical and ethnicity for academic years 2011/12-2015/16 were analyzed in support of the study. This data was sourced as part of the convenience sample obtained from the research site’s research office. Descriptive statistics including the means, standard deviations, and percentages calculated for the sample will be utilized in guiding the data analysis. As a mixed methods case study, it is important that each comparison group only differs on the independent variable and not due to extraneous variables that are outside the study’s hypothesis and research questions.

**Inferential Statistics.** Inferential statistics as a form of data analysis, determines how likely it is that results based on a sample or samples are similar to results that would have been
obtained for the entire population (Fraenkel, et al., 2014). Once the data was screened, transformed and recoded as necessary and students had been selected from the convenience sample, chi square test for independence and logistic regression was calculated on the variables in order to address research questions while testing for how Program Instructional Type may predict a student’s program completion.

**Research question 1.** In order to address the first research question, chi square test for independence was used to determine if a significant association exists between the dependent variable, completion rate, and each of the two categories (cohort-based and traditional) of the independent variable, Program Instructional Type. Chi square test for independence is a method that allows the researcher in this case study to assess whether an association exists between a cohort or non-cohort instructional type and student completion. Calculating the Chi-Square statistic and comparing it against a critical value from the Chi Square distribution allows the researcher to assess whether the association seen between the variables in a particular sample is likely to represent an actual relationship between those variables in the population (Muijs, 2011; (“Using the Chi Square Statistic in Research”, 2017).

In order to use the Chi Square Statistic in SPSS, the researcher checked the data for the following three conditions: 1) the dependent and independent are either nominal or ordinal (not continuous), 2) no value in either variable is less than 1, and 3) no more than 20% of the values should have an expected value less than 5 (Muijs, 2011). Once the data was checked that each of these assumptions were met, a Chi Square Statistic was applied to the variables in assessing the association between Program Instructional Type and Student Completion. In addition to calculating the Chi Square Statistic, the strength of a significantly assessed relationship between the two variables will also be measured through the use of the phi coefficient. The Chi Square
Statistic does not answer how strong the relationship between is between the two variables measured may be (Muijs, 2011). In calculating and interpreting the phi coefficient, the following cut-off points will be used: <0.1 weak, <0.3 modest, <0.5 modest, <0.8 strong and ≥0.8 very strong (Muijs, 2011).

**Research question 2.** The second research question compares the time it takes a student enrolled and matriculated in one of the three comparison groups to reach completion in his or her vocational technical certificate over the five academic years of the study. Descriptive statistics was used to examine completion rates for all three comparison groups. For the two cohort-based programs student completion data was filtered and summarized from student records data for both Welding Fabrication and Cohort-based Precision Machining for each program cohort by academic year (refer to Table 4.3 and 4.4). Each program cohort completion rate was then calculated by dividing the total students enrolled in the gateway course within the student’s first matriculated term by the number of students that received a certificate earned status as indicated in the research site’s Banner student information system. Because the traditionally taught non-cohort Precision Machining program allows for students to fall below a full-time course load and still continue in the program, student completion rate was calculated and categorized at 100%, 150% and 200% of term in alignment with the standard used by the U.S. Department of Education to measure post-secondary completion rates. In order to present a fuller examination of the traditional non-cohort students’ completion rate, non-completers from the traditionally taught Precision Machining program were also categorized by term in order to calculate the number of terms non-completers within this comparison group persist before dropping out during the five academic years of this study. These data for the traditional non-cohort comparison group are presented in Tables 4.5 and 4.6.
**Research question 3.** Logistic regression measures the relationship between a categorical dependent variable and one or more independent variables by estimating probabilities using a logistic function (Muijs, 2010). What distinguishes a logistic regression model from the linear regression model is that the dependent or outcome variable in logistic regression is binary or dichotomous (Hosmer, Lemeshow, Sturdivant, 2013).

Logistic regression in this study was used to examine potential influences on student outcomes by specific variables of interest in the model, in this case program completion vs. non-completion. For research question three, only the two comparison groups relevant to the Precision Machining curriculum were compared. The predictor variables included *Program Instruction Type, Gender, and Ethnicity* as predictors for the dependent variable *Program Completion*. In order to facilitate a logistic regression analysis, the variable *Program Completion* was transformed from a continuous variable into a binary dummy variable based on a pass/no pass coding. Logistic regression was calculated on how the categorical predictor variables, *Program Instruction Type, Gender* and *Ethnicity* were able to predict *Program Completion rate* within the cohort and non-cohort Precision Machining comparison groups.

In order to use logistic regression, the researcher checked the data for the following assumptions: 1) the dependent variable is dichotomous, 2) the dependent variable is coded such that P(Y=1), or the factor level I of the dependent variable should represent the desired outcome, 3) Only the meaningful variables should be included in the model, 4) independent variables are linearly related to the log odds, and 5) large sample sizes are used (Hosmer, Lemeshow, & Sturdivant, 2013). Once the relevant data was checked that each of these assumptions were met, the logistic regression model was applied to the variables in SPSS addressing the second research question.
**Research question 4.** Understanding student and administrative perceptions on the influence of cohort-based design elements provides a participant perspective that is complementary to the statistical analysis of the student completion and performance data. In alignment with the third research question, students, administrators and faculty will be invited to participate directly in this study through the incorporation of the qualitative research methods of online surveys and focus groups.

**Student survey.** Students that successfully completed a cohort-based program during the five academic years of this study at the research site were invited to participate in a post-completion survey. In order to establish reliability of the survey, the instrument was developed in conjunction with a panel of experts from the institution, administrators and faculty familiar with student engagement and survey research to establish face validity prior to the deployment of the survey to the total number of cohort-based students (Fowler, 2014; Fraenkel, Wallen, & Hyun, 2014). The survey used Qualtrics survey software to facilitate the distribution with participants’ anonymized data pre-populated into the survey software. A letter of invitation to participate in the study was emailed to the student’s personal email account on record in the Banner information system. Per guidelines by the Northeastern University’s IRB Office, responding to the email invitation and clicking on the unique student survey link constituted a written informed consent to participate in the research. A follow up email invitation was sent seven days after the first invitation to those students that had not responded.

**Focus groups.** In addition to surveying students, the researcher conducted and moderated a focus group session for administrators and faculty of the two cohort-based programs at the research site. Focus groups are useful in complementing and providing further explanation to statistical information in a research study and have the advantage of giving deeper insight and
understanding of attitudes and opinions that may not be ascertained through surveys or statistical methods alone (Breen, 2006; Krueger, 2000). The researcher followed best practices for focus groups as outlined by Krueger (2000) which include progressiveness of 5-7 open ended questions based on the following category types: opening question, introductory questions, transition questions, key questions and ending question. A bidirectional digital recorder was used to record the focus group discussion and the online application Rev.com was used to provide a transcription of the session’s recording in preparation for thematic coding to help identify the most important themes, the most noteworthy quotes and any unexpected findings (Breen, 2006).

The researcher used the qualitative software package Maxqda to assist in the thematic coding process and annotation of focus group participant responses. Axial coding was the methodology used to identify themes within participant responses by assigning each one a reference number for purposes of analysis as to frequency of response. As Breen (2006) notes, coding may be assigned to both the sentence and to groups of sentences to assist in objectively tallying responses into themes that can be counted in terms of their frequency and commonality across the participants both within and between focus group sessions.

The researcher also was guided by a six-step procedure for conducting a coding process referenced by Creswell (2015) and based on Tesch (1990) and Creswell’s (2007) research to ensure that both description and themes contained in the transcript data were captured and categorized in a way that provided for the most accurate and complete analysis. In order to validate the findings from the coding process the researcher employed Triangulation which is a process of corroborating evidence from different individuals, types of data, or methods of data collection in descriptions and themes in qualitative research (Creswell, 2015). Member checking of the transcript and coding results with a session participant from the focus group was utilized to
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check for accuracy of the researcher’s account of each session’s discussion. Employing the use of a focus group as a qualitative research method allowed the researcher to better ascertain how the six design elements of the cohort-based instruction model and the cohort model overall was perceived and judged by administrators and faculty in addressing the fourth research question of this study and provided context for the statistical analysis in support of the first three research questions.

Validity, Reliability and Generalizability

Validity. Internal validity within quantitative and qualitative research is achieved when a researcher’s methodology has been able to account for both quantitative and qualitative differences in data not due to some other unintended, extraneous variables outside the scope of the intended study (Fraenkel, Wallen and Hyun, 2014). In context of this research study, the researcher identified two primary threats to internal validity within the study. The first threat to validity involved not controlling adequately for similar student populations across each of the comparison groups. Having substantially different student profiles as measured by socio-economic, gender or ethnicity would likely introduce extraneous variables in the study that could obfuscate understanding the independent variable’s relationship to the dependent variables. As described in the earlier section, this threat will be actively managed through the use of descriptive statistics to ensure each comparison groups student demographics are reasonably consistent and represent a similar student body.

A second threat to validity was the threat that the identification of a cohort learning model is authentically and similarly functioning across those certificates based on this instructional type. Variances between cohort-based certificates within the five years of the data would pose a threat to internal validity by either masking or reducing the relationship of the
cohort-based instruction type on both student completion and performance. This threat to validity was addressed by the researcher carefully documenting that all of six cohort-based learning design elements identified within the literature were active within each of the relevant certificate programs being measured in this study. This included ensuring that the faculty from the cohort-based and traditional taught version of the Precision Machining curricula were similar in terms of qualifications, as well as industry and teaching experience. Given that each Precision Machining faculty were a part of the same department and had taught the program in both formats, this threat specific to Precision Machining was mitigated. As with faculty qualifications and teaching experience, careful documentation of active design elements for the cohort-based comparison groups reduced the threat of the research not capturing authentic influence of the cohort based learning model on student’s completion when compared with the traditional, non-cohort comparison group. Additionally, the use of member checking and Triangulation by the researcher throughout the conducting and analyzing of results from the administrator/faculty focus group involved in cohort-based programs at the research site assisted the researcher in controlling for validity.

**Reliability.** Reliability in quantitative research refers to the extent to which measures, scores and calculations are free from measurement error and distortions to the true measurement (Muijs, 2011). A threat to reliability in this study was the use of self-reported student background data which was used to test for parity in student demographics across the comparison groups. Self-reported data can contain incorrect or incomplete classifications in terms of socio-economic background, gender or ethnicity. Inaccurate or incomplete student background and demographic data could pose a threat to accurately identifying predictor variables through the test of logistic regression. To control for this threat, the researcher relied on the research site’s institutional
controls of multiple forms and cross checking in order to assume a reasonable rate of accuracy and completeness within the student record data from which the convenience sample was drawn to conduct the study.

**Generalizability.** The ability to generalize findings from a sample to the target population of a research study is a critical measure of quantitative research. As Fraenkel, Wallen and Hyun (2014) note, causal-comparative research is limited in that it is useful for identifying relationships between variables, but it does not fully demonstrate cause and effect in the way experimental research is able to do. This is because in experimental research it is possible for the researcher to authentically manipulate the experimental variables to control for any extraneous variables that may interfere with the study and its tests. Because full control is not possible in retrospective research like the mixed methods approach of this study, the results of the quantitative analysis which was based on a convenience sample should be interpreted with some caution as to their findings being fully generalizable to the target population which is all community college students enrolled in vocational technical certificates. The researcher managed this limitation through the use of a large as possible sample of students. Given that the researcher extended the well referenced Student Integration Model and the emergent Structure Hypothesis as outlined in Chapter II to career and technical community college students, beginning first with a non-experimental approach that can be later followed with experimental research provides the groundwork for future experimental or quasi-experimental investigation into the effectiveness of cohort-based learning models on student success in vocational technical certificate programs taught at a community college.

**Limitations.** Limitations attributable to qualitative research methods such as survey and focus group research intended for the second phase of this study involved the risk of total
nonresponse, item nonresponse and refusal to participate (surveys and focus groups) from members of the sample (Fraenkel, et al., 2014). A significant amount of nonresponse, refusal or low response from students completing one of the two cohort-based programs could create partial gaps in participant experiences or yield such a small sample that the results of the findings could be different than if a larger response rate was achieved. This threat was managed by having access to the complete five academic years of data for students enrolled in cohort-based programs. Soliciting participation from the total number of cohort-based students during the five-year period of this study increased the likelihood of achieving a larger response rate to the survey which did result in a stronger representation of students’ self-reported perceptions of the cohort-based learning model’s impact on their success in completing their certificate program.

**Summary**

In summary, in this mixed methods case study a sample of student data from a comprehensive community college was analyzed retrospectively over five academic years to determine if significant differences could be shown in the completion rates between comparison groups defined by the three levels of the independent variable, Program Instruction Type. In addition to testing for significant differences in the dependent variable Completion Rate, the researcher tested for the association of these variables influence on student success based on the whether a program was taught in either a cohort vs. non-cohort instructional format. It is the hope of the researcher that the results of this study will contribute to a greater understanding among workforce development practitioners as to whether or not a cohort program model applied to a vocational technical certificate program might contribute to increased rates of program completion as well as time to completion.
Chapter IV: Research Findings

The purpose of this research study was to examine the influence of a cohort-based learning model on student completion within two vocational technical certificates that have been offered over a five-year period at a comprehensive community college located in Upstate NY. As a mixed methods design, this study has been guided by four research questions. The first three research questions involved statistical analysis and the fourth question involved qualitative methods in the form of a post-completion student survey and a focus group conducted to capture administrative and faculty perspectives on the impact of the cohort-based instructional model. The four research questions that guided this study were as follows:

**RQ1: Differences in Completion Rate**

To what extent do the completion rates of students enrolled in a cohort-based vocational technical certificate programs differ from students enrolled in a non-cohort based vocational technical program?

**RQ2: Differences in Time to Completion**

To what extent does the time it takes students to complete a certificate program differ based on program instructional type?

**RQ3: Program Instructional Type, and Student Characteristics as Predictors of Student Completion**

Are differences in completion outcomes dependent on program instructional type independent of student characteristics such as gender and ethnicity?
RQ4: Student, Administrative and Faculty Perspectives

How does a cohort-based instructional model contribute to student completion and job placement as perceived by program administrators, faculty and students involved in these cohort-based programs at the research site?

The results of this study have yielded support for the positive influence and potential improvement that a cohort-based learning model may have on increasing student completion within vocational technical certificates taught at a community college when compared to similar curriculum taught in a non-cohort, traditional format. In this chapter, the researcher has organized the presentation of the findings into four sections corresponding to each of the four research questions.

Difference in Completion Rate

The first research question examined differences in the completion rates of cohort-based certificate programs compared to traditional, non-cohort based programs at the research site. To test whether a statistical difference exists, student completion records were compared over a five-year period for two versions of a 31-credit Precision Machining program taught in two formats, an accelerated 22-week cohort-based format, and a traditional, non-cohort format. Additionally, a cohort-based non-credit, 360-hour, 20-week Welding Fabrication certificate was also included in the test as a third comparison group since that program also contains the six cohort-based design elements and as such, is relevant in serving as a reference for cohort-based program completion rate.

Student demographic profile of each program. A student demographic breakdown for each of three comparison groups based on ethnicity, age and gender is provided in Tables 4.0 and 4.1.
Table 4.0

*Student Ethnicity by Comparison Group*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Precision Machining Cohort-Based</th>
<th>Precision Machining Traditional</th>
<th>Welding Cohort-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Asian</td>
<td>6% (4)</td>
<td>0% (0)</td>
<td>0.4% (1)</td>
</tr>
<tr>
<td>Black/African American</td>
<td>23% (16)</td>
<td>5% (2)</td>
<td>2.2% (6)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>7% (5)</td>
<td>0% (0)</td>
<td>2.5% (7)</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>1% (1)</td>
<td>0% (0)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>3% (2)</td>
<td>2% (1)</td>
<td>1.5% (4)</td>
</tr>
<tr>
<td>White</td>
<td>59% (41)</td>
<td>93% (41)</td>
<td>53.5% (147)</td>
</tr>
<tr>
<td>Unknown/Declined to State</td>
<td>0% (0)</td>
<td>0% (0)</td>
<td>40% (110)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100% (69)</strong></td>
<td><strong>100% (44)</strong></td>
<td><strong>100% (275)</strong></td>
</tr>
</tbody>
</table>

Table 4.1

*Gender and Age per Comparison Group*

<table>
<thead>
<tr>
<th></th>
<th>Cohort-Based Precision Machining</th>
<th>Traditional Precision Machining</th>
<th>Cohort-Based Welding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>96% (66)</td>
<td>93% (41)</td>
<td>83% (227)</td>
</tr>
<tr>
<td>Female</td>
<td>4% (3)</td>
<td>7% (3)</td>
<td>7% (20)</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>10% (28)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
<td><strong>44</strong></td>
<td><strong>275</strong></td>
</tr>
<tr>
<td>Mean Age</td>
<td>37</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>12.26</td>
<td>9.63</td>
<td>14.48</td>
</tr>
<tr>
<td>Mode</td>
<td>26</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Min. Age</td>
<td>19</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Max. Age</td>
<td>65</td>
<td>60</td>
<td>63</td>
</tr>
</tbody>
</table>

As is evidenced from Tables 4.0 and 4.1, white males make up the majority of students in all three comparison groups with male gender rates ranging from 96% for the cohort-based Precision Machining, 93% for the traditionally taught Precision Machining certificate and 92%
for the cohort-based Welding certificate (not including unknown gender count). The Cohort-based Precision Machining program had the most diverse student demographics and the only comparison group with representation for each of the four categories of ethnicity captured through the research site’s application process. African-American representation was the highest for the cohort-based Precision Machining program at 23% compared to only 5% in the same curriculum taught in the traditional format. It is noted that for the cohort-based Welding Fabrication program, 40% of students declined to state an ethnicity and 10% declined to state a gender. That being the case, it is possible more ethnic and gender diversity may be present within the Welding Fabrication comparison group than what is available in the student completion records used for this study. The cohort-based Precision Machining certificate also had the oldest mean student age at 37 years old compared with 28 years and 30 year for the traditional Precision Machining and cohort-based Welding Fabrication certificates respectively.

Chi-square test of independence found a significant difference in the completion rates, \( \chi^2(2, N=388) = 93.06, p < .01, \varphi = .49, \) of the two cohort-based programs in comparison with the traditionally taught, non-cohort Machining program. The large effect size being measured was significant at the \( \alpha = .01 \) level suggesting a fairly strong association group and completion rate. Table 4.2 summarizes Completion Rates for each of the three comparison groups.
As noted in Table 4.2, the traditionally taught program yielded completion rates of 47.7% compared to a 76.8% completion rate for the same curriculum taught using a cohort-based instructional model. The cohort-based Welding Fabrication program had an extremely high completion rate at 96.7%.

**Differences in Time to Completion**

The second research question sought to examine differences in time to completion for students graduating from technical vocational certificate programs taught in either a cohort-based or traditional instructional format. Table 4.3 and 4.4 present the completion rates over five academic years per cohort for both the cohort-based Precision Machining and Welding Fabrication.
Table 4.3

*22-week Cohort-based Precision Machining Certificate Completion Rates*

<table>
<thead>
<tr>
<th>Term</th>
<th>Student Completion Rate % (total initial enrollment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2013</td>
<td>87% (15)</td>
</tr>
<tr>
<td>Spring 2014</td>
<td>79% (19)</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>64% (14)</td>
</tr>
<tr>
<td>Summer 2015</td>
<td>67% (12)</td>
</tr>
<tr>
<td>Summer 2016</td>
<td>88% (8)</td>
</tr>
</tbody>
</table>

Table 4.4

*360-hour, Non-credit Cohort-based Welding Fabrication Certificate Completion Rates*

<table>
<thead>
<tr>
<th>Term</th>
<th>Student Completion Rate % (total initial enrollment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2011</td>
<td>100% (9)</td>
</tr>
<tr>
<td>Spring 2012</td>
<td>100% (15)</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>100% (31)</td>
</tr>
<tr>
<td>Spring 2013</td>
<td>100% (30)</td>
</tr>
<tr>
<td>Fall 2013</td>
<td>94% (32)</td>
</tr>
<tr>
<td>Spring 2014</td>
<td>94% (31)</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>100% (31)</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>97% (32)</td>
</tr>
<tr>
<td>Fall 2015</td>
<td>93% (30)</td>
</tr>
<tr>
<td>Spring 2016</td>
<td>94% (31)</td>
</tr>
</tbody>
</table>

As a non-cohort based certificate, the traditionally taught version of the Precision Machining program is not based on the six design elements or their structures which defines the cohort concept which is the focus of this study. Students self-register for classes within the advising sequence and may stop out or reduce their class schedule to part time from term to term during their enrollment at the institution. Table 4.5 provides the number of terms students within the traditionally taught Precision Machining curriculum have taken to reach an institutionally recognized state of completion over five academic years. As a one year certificate (2 terms),
reference to percent of completion is also provided. Table 4.5 tabulates the number of terms that non-completers enrolled without achieving graduation.

Table 4.5

*Time to Reach Program Completion – Traditionally Taught Precision Machining Certificate*

<table>
<thead>
<tr>
<th></th>
<th>Completion at 100% of Expectation or 2 Terms</th>
<th>Completion at 150% of Expectation or 3 Terms</th>
<th>Completion at 200% of Expectation or 4 Terms</th>
<th>Total Completers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completers</td>
<td>67% (14)</td>
<td>19% (4)</td>
<td>14% (3)</td>
<td>100% (21)</td>
</tr>
</tbody>
</table>

Table 4.6

*Number of Terms Non-Completers Enrolled in Traditional Precision Machining*

<table>
<thead>
<tr>
<th></th>
<th>1 Term</th>
<th>2 Terms</th>
<th>3 Terms</th>
<th>4 Terms</th>
<th>Total Non-Completers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Completers</td>
<td>17% (4)</td>
<td>48% (11)</td>
<td>26% (6)</td>
<td>9% (2)</td>
<td>100% (23)</td>
</tr>
</tbody>
</table>

**Instructional Type, and Student Characteristics as Predictors of Student Completion**

Question 3 examines how program instructional type and student characteristics of gender and ethnicity may serve as predictors for student completion within the cohort-based and traditional, non-cohort Precision Machining certificate programs at the research site. For the ethnicity variable, a new category called “other” was created by collapsing across the four ethnic categories of 1) Asian, 2) Two or More Races – Mixed Race, 3) Hispanic and 4) American Indian/Native Alaskan. The creation of the new variable “other” was to overcome a low count of students identifying with these categories which would prevent measurement within the binary logistic regression model (see Table 4.1). Combining four of the six ethnic categories contained within the student data into a new merged ethnic “other” category allows for an odds ratio to be
examined with the larger ethnic categories of African-American and White students. The overall logistic regression model was significant, $\chi^2 (4, N=344) = 18.292, p < .001$. The variables ethnicity, and instructional-type were also significant in predicting student completion. The output of the logistic regression model is summarized in Tables 4.7 through 4.11.

Table 4.7

Logistic Regression - Instructional Type, Gender and Ethnicity on Student Completion

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (1)</td>
<td>.180</td>
<td>1.001</td>
<td>.032</td>
<td>1</td>
<td>.857</td>
<td>1.198</td>
</tr>
<tr>
<td>Ethnic</td>
<td>11.843</td>
<td></td>
<td></td>
<td>2</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Ethnic (1)</td>
<td>-3.00</td>
<td>.874</td>
<td>11.823</td>
<td>1</td>
<td>.001</td>
<td>.050</td>
</tr>
<tr>
<td>Ethnic (2)</td>
<td>-1.17</td>
<td>.883</td>
<td>1.770</td>
<td>1</td>
<td>.183</td>
<td>.309</td>
</tr>
<tr>
<td>Group (1)</td>
<td>-1.97</td>
<td>.695</td>
<td>8.112</td>
<td>1</td>
<td>.004</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>.109</td>
<td>.563</td>
<td>.038</td>
<td>1</td>
<td>.846</td>
<td>1.115</td>
</tr>
</tbody>
</table>

1. Variable(s) entered on step 1: Gender, Ethnic, Group.

Overall, ethnicity ($p = .003$) and instructional type (group, $I = .004$) were the only variables found to be statistically significant in the regression model. Table 4.8 provides the Odds Ratio (OR) for cohort versus traditional instructional type influencing completion for students enrolled in either version of the Precision Machining program at the research site.

Table 4.8

Risk Estimate - Cohort vs. Traditional, Non-cohort Instructional Model

<table>
<thead>
<tr>
<th>Odds Ratio for Group</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>(traditional / cohort)</td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>3.628</td>
</tr>
<tr>
<td>For cohort Grad = No</td>
<td>2.254</td>
</tr>
<tr>
<td>For cohort Grad = Yes</td>
<td>.621</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>113</td>
</tr>
</tbody>
</table>
The Odds Ratio in Table 4.8 indicates in comparing both the traditional versus cohort based Precision Machining certificates, students enrolled in the cohort-based certificate are more than 3.6 times more likely to graduate from that program than students enrolled in the traditionally taught non-cohort version of the same curriculum (OR=3.628). In examining how specific ethnicity may predict student completion, Table 4.9 indicates that the odds of an African-American graduating the Precision Machining program is 27.9 percent the odds of a White student graduating from the same program.

Table 4.9

_Odds Ratios – African American_

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>95% Confidence Interval</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds Ratio for Ethnic (White / Black/African American)</td>
<td>.279</td>
<td>.097 - .804</td>
<td></td>
</tr>
<tr>
<td>For cohort Grad = No</td>
<td>.499</td>
<td>.305 - .816</td>
<td></td>
</tr>
<tr>
<td>For cohort Grad = Yes</td>
<td>1.787</td>
<td>.984 - 3.246</td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.10 presents the Odds Ratio for students represented within the combined category, Other Ethnicity, indicating that these students are 46.2% more likely to graduate than their White counterparts.
In comparing the Odds Ratio of the two largest ethnic categories of students in this study, Whites and African-Americans, Whites are 1.787 times more likely to graduate than African-Americans. The variable Gender was also tested with no significant difference found in the odds for females versus the odds of males in completing a certificate program.

**Student, Administrative and Faculty Perspectives**

The fourth research question seeks to understand the influence of the six specific design structures identified by the researcher as common to the cohort-based certificate programs at the research site and that have been identified within the literature as positively influencing increased measures of student completion and job placement. The six design elements of focus for this study include:

1. block scheduling of courses,
2. students experience the entire program as a defined group (peer cohort),
3. entire program of courses is taught with a limited number of dedicated faculty (faculty cohort model),
4. embedded in-class peer supports,
5. faculty support for students,
6. active job placement assistance, post-completion.

To collect this data, a one-hour focus group was conducted consisting of five faculty and one administrator that have been directly involved with the two cohort-based programs at the research site. Table 4.11 provides a summary of their roles and involvement within each of the three programs of focus.

Table 4.11

Administrator and Faculty Focus Group Participation

<table>
<thead>
<tr>
<th>Focus Group Participant</th>
<th>Cohort Precision Machining</th>
<th>Cohort Welding</th>
<th>Traditionally Taught Precision Machining</th>
<th>Years at the Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty 1</td>
<td>X</td>
<td></td>
<td>X</td>
<td>19</td>
</tr>
<tr>
<td>Faculty 2</td>
<td>X</td>
<td></td>
<td>X</td>
<td>21</td>
</tr>
<tr>
<td>Faculty 3</td>
<td>X</td>
<td></td>
<td>X</td>
<td>16</td>
</tr>
<tr>
<td>Faculty 4</td>
<td>X</td>
<td></td>
<td>X</td>
<td>17</td>
</tr>
<tr>
<td>Faculty 5</td>
<td>X</td>
<td>X</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Administrator</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>9</td>
</tr>
</tbody>
</table>

Student completion. The researcher coded the focus group transcript using the analysis program MAXQDA. In analyzing the administrator and faculty commentary, three predominant responses emerged within the discussion and in response to the focus group questions. The three predominant themes identified as having the greatest impact on student completion in the cohort program were: 1) block scheduling, 2) students taking all classes in the certificate sequence as a well-defined group, and 3) a dedicated group of faculty teaching the entire course sequence in a certificate, i.e., faculty cohort model. These three attributes worked together to benefit the students, inclusive of facilitating an instructional environment which encouraged higher rates of observed peer-to-peer and faculty support. A presentation of these findings follows.
**Block scheduling support for student completion.** For purposes of this study, block scheduling is defined as a model of instruction where all of the courses in a given certificate program are structured into a set schedule that do not require the student to select and register for each course individually. The positive contribution of block scheduling was directly identified by two thirds of the focus group participants as being the most impactful design element on both student completion and time to completion from among the six elements that make up the cohort-based design model. One faculty participant stated in regard to the impact of block scheduling: “Having the block scheduling, when we're [faculty] having input on when the students take certain classes - we're able to prep them for the next level. I think we're ... it's far more conducive to the students’ being more successful.” Another faculty remarked, “I believe it [block scheduling] is very supportive. I think it's been a big help. The students don't have a choice. They get put into very specific classes right out of the gate. It has influenced their time to completion.”

In the focus group, participant responses mentioning block scheduling tended to be linked to sub-themes of faculty being able to have better control over the student experience and by doing so creating a more predictive and familiar environment. By allowing the administration to select the order of courses taken and at what time was seen as advantageous to the learning experience and ultimately increasing success of students completing a program. One faculty member stated: “Having the block scheduling, when we're [faculty/administrators] having input on when the students take certain classes, we're able to prep them for the next level. It's far more conducive to the students being more successful.” Consistency and efficiency were also mentioned as related sub-themes that participants linked to why the block scheduling model was impactful from both a faculty/administrator perspective but also highly aligned to a strong
benefit to the student as it represented a form of intrusive advising model. This perspective may be seen in two faculty’s comments:

In advising students to follow a block format we avoid the students’ inadvertently submarining themselves? Torpedoing themselves by making a bad choice or wrong selection with all good intentions, but straying off the path. So, if that were 10% of our student body, we just corralled them back in so they're successful.

If we allow them [the students] to just choose what they wanted to take, I think it would become a complete debacle.

Block scheduling was also identified as providing the administration and faculty assurance that the entire sequence of courses will be taught since the students are locked into all of the classes at the same time. This effect benefited faculty and administrators in assigning load and planning teaching assignments across the academic year. One faculty stated:

The other thing, is enrollment. I don't have to worry about somebody taking a 101 and not taking 105. Finding out I got to cancel a class, because they didn't have enough people signed up for that one. When we do it as a cohort [with block scheduling], we know we're filling all five classes. So, it makes it much easier to handle the enrollment.

Making sure all the students are there.

**Students taking all classes together as a group.** The opportunity for students to take the entire sequence of courses as a defined group was a second prominent theme that emerged in the focus group session. Faculty reported several positive benefits that this design element provided for both the student and the faculty. A key benefit reported was the ability for students to build stronger relationships with their peers which manifested itself within and without the classroom. One participant stated of having the students together across all of the classes: “the fact that the
students are starting to build relationships. They're seeing each other in the same classes. They can begin to support one another. I find that to be very, very valuable in the classroom or in the labs.” Additionally, half of focus group participants reported a stronger learning environment that was created from students remaining in a group for the entire instructional time in comparison to students that experience a largely different student group in each class across the advising sequence in the traditional model. One faculty member captured this input well in the comments:

[I] see there's group dynamics when they're part of a program. They're all there. Most of the students… they go from class to class together. It's very similar. They support each other. Most of them are happy coming to class. They want to be there. They got a purpose. Then you have the other, say just the standard traditional people. Sometimes it's hard to see that synergism. They're just not there. They're all independent, working on their own, and so forth. So, I think if you're part of the program, they kind of go from class to class and they're taking things together. I think that's an advantage to the student, for their learning.

The sub-themes that emerged within this string of discussion regarding students experiencing the entire certificate program as a set group included:

- increased opportunity for faculty to facilitate a team environment for instruction, including project based learning that connected subjects across formerly disparate classes,
- facilitated the building of stronger peer to peer relationships in class
- observed higher rates of peer to peer mentorship and peer to peer supports within and without set class time in comparison with classes taught in the traditional non-cohort
format (Precision Machining curriculum).

Additionally, the use of the phrase “become like a family” was attributed by nearly half (40%) of the focus group participants as being responsible for facilitating an increased observance in the presence of an active relational dynamic created from adapting a group model of instruction for the entire course sequence in a certificate program. One faculty commented:

I wouldn't say a byproduct, but in the cohort model, grouping students and the synergy between classes actually seems to increase the student's desire for learning. That, yes, they're getting what they're ... they can see how it all fits together. Get the individual pieces. They can act as mentor to some and be mentored by others within the group. So, it's a more active, instead of passive learning environment. Well, they know to ask the question, or aren't afraid to ask the question.

Another faculty related the following story from a recently completed precision machining cohort as an example of the type of supportive relationships created from having students take all of their classes together across the entire sequence:

A number of our students in the accelerated [Precision Machining cohort] take the bus to class every day. It's at four o'clock in the afternoon and leaving at 10:30 ... 10 o'clock at night. What they did last year, is that they actually formed a carpool. Where somebody was actually going to their house, picking them up and then taking them home at nighttime. I don't think you'd have that in the traditional support. Because the times wouldn’t balance, but here, because they're all together, and they're supporting each other. I think it's a real example – [peer support] forming the carpool.

Limited number of faculty teaching in the cohort program. The third theme that emerged within the focus group discussion was the benefits of having a limited number of
faculty teaching all of the classes in the certificate program on student completion and learning. A benefit communicated clearly in the focus group discussion was the continuity across classes regarding expectations regarding in class structure that a limited number of faculty provides across the entire course sequence. The knowledge that a faculty member has of each student, their strengths and weaknesses across subjects was a strong sub-theme that was also reoccurring. A clear example of this input can be seen in the following quote from a faculty in the cohort-based Precision Machining program:

Knowing students from class to class, from section to section, I can see their weaknesses and I can see their strengths and identify where I can help students pair up or help one another. You know, you can start to build teams. Teach the students really what it's like to be in industry. We create this sense of let's work together, because we're all here to build and come to the same conclusion. So, through all that I'm able to identify each one, like I said, each one's weakness and help get a student that has the strength and I can put them together so they can build up one another. You know? That's it.

Another sub-theme of limited faculty teaching the course sequences centered on facilitating a consistency within the students’ experience that 30% of focus group participants identified as reducing stress on the student. Having the same instructor throughout much of the program was reported as giving faculty a stronger ability to establish familiarity and a consistent set of expectations regarding instructor styles. The idea that this dynamic reduced student stress by greatly reducing the need for students to adapt to multiple instructor styles and expectations was also expressed in the discussion. An example of this input can be seen in the following:

Keeping things consistent with the students helps to keep them at an even keel, if you will. They don't have to deal with different faculty. With different personalities and
different structures. It makes it easier for them to just focus on, be consistent and focus on what they're there to do.

A third sub-theme that emerged around the design element of the limited number of faculty teaching the courses in the certificate was the flexibility it gave the instructor the ability to adapt the day to day program to the needs of the students as they progressed in real time across multiple related courses. A good example of this narrative can be seen in the following segment of discussion from the focus group.

Because I'm the only one that's teaching them [students] from course to course, I don't have to be concerned at the beginning of the course, where the other person left off. If someone was before me, like blueprint reading one, I go and teach blueprint reading two. I don't have to try and figure out, okay, where do I start. Where [did] they end and how do I connect it up for the student? Because I'm doing both, one, two, then metrology. There's a lot of different synergies that are there, if you will. Things that I already know that they've been through. To kind of piggyback on what Faculty 3 said, I know what their strengths and weaknesses are. So, I don't have to rediscover that from course to course. With me teaching another ... with me being the only one there. If I was teaching behind somebody else, then I would have to reestablish a relationship, or reestablish relationship with the student at the beginning. Every time I get a new cohort, if you will, for that one class. Because I'm teaching all six, or eight, I have that relationship established with all of them. Throughout all of their courses I've been teaching. I think it's pretty beneficial.

**Interconnected dynamics.** A fourth theme that is strongly suggested by the focus group discussion is that the three dominant themes of block scheduling, students taking the entire
certificate courses as a defined group and the limited number of teaching faculty work together to achieve design elements four and five, viz., embedded in-class peer supports and faculty support for students. An example of this synergy between block scheduling, defined group instructional model and the faculty cohort can be seen in the following faculty and administrator comments:

As the faculty, we know how we need to push them [students]. Because we see the same student over and over. Their expectations. They'll learn the expectation of the instructor, being that they see the instructor over and over again. So, they'll learn from classroom to classroom what they have to do to prepare.

A question of concentration. It happens in ... there's a synergy that happens in ... within our program. Because, the courses are integrated. They're not siloed separately from each other. What you learn in blueprint you apply in the lab. What you learn in math you apply in blueprint. What you learn in programming is based on knowing manufacturing processes from the lab and print reading and all those things.

An aspect of adaptability and flexibility is also suggested by a majority of the focus group participants, speaking to the synergistic dynamics that are facilitated through the first three design elements of the cohort model acting together. One faculty responded:

You can judge where they are and you can move them [students] at a certain pace. Not so fast that you're going to lose some people and leave some people behind, as you would in a traditional class. So, I think that it's really that the faculty support that's there, that can support the group as it goes through. It's really, it doesn't make a difference, because if you're bringing people in that have a lower math skill, you know you've got to spend a
little more time with them... As a faculty member, you see that. You can see where their strengths and weaknesses are. Then you can work towards that. Towards filling the gaps.

**Student Survey Data**

To facilitate capturing the student perspective and their individual experiences with the cohort-based instructional model, a post-completion survey was distributed to 310 students that had completed a cohort-based program at the research site in either Precision Machining or Welding Fabrication during the academic years spanning 2012-2016. The survey consisted of seven, five-item Likert based questions focused on the design elements of the cohort model, three open ended questions for students to provide unstructured input on their perspective of the most impactful factors influencing their completion and one final question for any additional comments the student may have wanted to make regarding their overall experience within the program. The survey received a total of 39 complete responses. A summary of student responses to six of the seven Likert questions is provided in Table 4.12.
### Table 4.12

*Post-completion Survey Likert Questions 1-6 Response Summary*

<table>
<thead>
<tr>
<th>Likert Questions 1-5</th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Neither Agree or Disagree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having all my classes in the certificate program structured into a set schedule that did not require me to have to register for each course individually was a beneficial feature of the program.</td>
<td>79%</td>
<td>5%</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Having the same students in all of my classes was a valuable and positive part of my student experience in the certificate program.</td>
<td>69%</td>
<td>18%</td>
<td>8%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Having a limited number of instructors dedicated to teaching all of the courses in my certificate program was more beneficial than having a different instructor teaching each class.</td>
<td>79%</td>
<td>13%</td>
<td>5%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>The support provided to me both within and without class time by the instructors teaching in my certificate program was helpful to learning course material.</td>
<td>85%</td>
<td>13%</td>
<td>5%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>The presence of peer support from fellow students within my certificate program’s courses was a valuable part of the learning experience.</td>
<td>69%</td>
<td>15%</td>
<td>8%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>The certificate program’s accelerated pace to complete the entire program was a feature that I found beneficial to my ability to both participate in and complete the program successfully.</td>
<td>56%</td>
<td>28%</td>
<td>3%</td>
<td>8%</td>
<td>5%</td>
</tr>
</tbody>
</table>

*Note.* n=39

As Table 4.12 summarizes, a majority of the 39 respondents rated five of the six design elements as beneficial to their student experience and success in their certificate program which they completed. Of the five design elements identified within Table 4.12, block scheduling, a limited number of teaching faculty and the presence of faculty support both within and outside of set class time obtained the strongest positive responses in the Strongly Agree category at 79%, 79%.
and 85% respectively. Students experiencing the entire certificate program as a defined group was tied at 69% for Strongly Agree along with the presence of peer to peer support within the cohort. Each of the five Likert question responses corresponding to five design elements had at least 85% of total possible responses falling within among the Somewhat Agree and Strongly Agree categories. The Likert statement referring to the impact of the accelerated pace of both the Precision Machining or Welding Fabrication certificates achieved the least strongest response, though still with a majority attribution of their benefit to the student’s experience.

**Question 8: Describe your overall experience in the certificate program? What worked well for you? And what was challenging?**

Table 4.13 summarizes the 11 themes identified from student responses to open ended question 8, seeking unstructured thoughts on students’ experience in their certificate program.

Table 4.13

*Post-completion Survey Question 8 Open Ended Summary of Themes*

<table>
<thead>
<tr>
<th>Dominant Themes</th>
<th>%</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited Number of Faculty Teaching All Courses</td>
<td>29%</td>
<td>12</td>
</tr>
<tr>
<td>Fast Pace of the Program Worked Well</td>
<td>19%</td>
<td>8</td>
</tr>
<tr>
<td>Faculty Support Worked Well</td>
<td>17%</td>
<td>7</td>
</tr>
<tr>
<td>Practical Assignments/Hands-on Experience Worked Well</td>
<td>12%</td>
<td>5</td>
</tr>
<tr>
<td>Challenges: Fast Pace of the Program</td>
<td>7%</td>
<td>3</td>
</tr>
<tr>
<td>Block Scheduling was an Important Factor</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td>Believed They Needed More Time in Program</td>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>Job Placement Worked Well</td>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>Peer Support Worked Well</td>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>Students Having the Same Classmates Across Entire Program</td>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>Challenges: Learning Many New Things at Once</td>
<td>2%</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. n=32 students responded to question 8 with 42 themed responses.*

As Table 4.13 indicates, students responded with 9 themes that were positive in tone and 2 that are themed as challenges. 85% of the 42 responses to question 8 were categorized as positive in
tone, with the majority of responses being categorized around the themes: limited number of faculty teaching all of the courses in the certificate program (29%), the fast pace of the program (19%) and faculty support (17%). The presence of practical assignments and hands on experience was the fourth most identified theme (12%). The two identified themes that were in the challenges category consisted of those students that perceived the fast pace of their cohort program, not as a positive like the 29% did, but as a challenge (7%). One student responded that the multifaceted topics contained in the curriculum was a challenge. Table 4.14 provides a sampling of student responses for question 8.
Table 4.14

Post-Completion Survey Question 8 Select Student Comments

<table>
<thead>
<tr>
<th>Question 8 - Select Student Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>My overall experience was excellent. The most challenging part was the practical assignments, and the accelerated pace towards the end of the program was difficult but extremely productive.</td>
</tr>
<tr>
<td>I had a great experience in the certificate program. Having one instructor helped keep us on track. The challenging part was when the instructor was helping someone else he had to break away to help me.</td>
</tr>
<tr>
<td>The fast pace and boot camp like hours of the class was the most beneficial in learning and practicing skills. The all cold hard seats were a challenge in January and February.</td>
</tr>
<tr>
<td>Being inexperienced in the subject itself was the biggest challenge. The instructors were fantastic and found capability in everyone to pass the needed requirements. The industry based schedule helped me to transition easily into A shift hours. I also liked being able to tailor the program to the processes that most suited my goals moving forward. The math class was a total waste of time and needed to be focused more heavily on fabrication not machining.</td>
</tr>
<tr>
<td>Enjoyed the hands-on work and the instructor patience working with the students. No question was a bad one. I felt very comfortable with the instructors. I found the course challenging the pressure at the end to try and get as many certifications as possible. what work well for me was the time the instructor had to help me with tutoring and project. competition of project learning to read blue prints.</td>
</tr>
<tr>
<td>Overall, I have benefitted from the program's format. I enjoyed attending classes with the same students and professors. Because I work full-time, having classes pre-registered and scheduled at a set time enabled me to complete the program. Otherwise, it may have taken years. Two challenges: 1) The amount of homework assigned was extremely heavy at times. 2) The accelerated pace sometimes focused on the book work, rather than the hands-on work of the trade.</td>
</tr>
</tbody>
</table>

Question 9: What aspects of the program contributed the most to your successful completion of the program?

Table 4.15 summarizes the 10 themes identified from student responses to open ended question 9, seeking unstructured thoughts on what specific aspect within their certificate program contributed the most to their completion of their program. Of the 39 respondents to the student
post-completion survey, 32 responded to question 9.

Table 4.15

*Post-completion Survey Open Ended Question 9 Open Ended Summary of Themes*

<table>
<thead>
<tr>
<th>Dominant Themes</th>
<th>%</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Faculty Support</td>
<td>33%</td>
<td>16</td>
</tr>
<tr>
<td>Building of Camaraderie with Peers/Peer Support</td>
<td>15%</td>
<td>7</td>
</tr>
<tr>
<td>Practical Hands-on Experience</td>
<td>15%</td>
<td>7</td>
</tr>
<tr>
<td>Value of Peer Support</td>
<td>10%</td>
<td>5</td>
</tr>
<tr>
<td>Clear Structure of Program</td>
<td>8%</td>
<td>4</td>
</tr>
<tr>
<td>Value of Block Scheduling</td>
<td>6%</td>
<td>3</td>
</tr>
<tr>
<td>Access to Open Labs Outside of Set Class Time</td>
<td>4%</td>
<td>2</td>
</tr>
<tr>
<td>Students Having the Same Classmates Across Entire Program</td>
<td>4%</td>
<td>2</td>
</tr>
<tr>
<td>Earning Industry Certification</td>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>Fast Pace of the Program</td>
<td>2%</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* n=32 students responded to question 9 with 48 identified themed responses.

As Table 4.15 indicates, student open ended responses were categorized by the researcher into 10 themes. Of the 10 themes, responses aligning to the Value of Faculty Support as contributing most to the students’ completion was the most frequently identified response (33%). Both the themes Building of Camaraderie with Peers/Peer Support and Practical Hands-on Experience were tied at 15% for the second most frequently identified aspects that contributed most to completion. Responses falling themed as Earning an Industry Certification in the certificate program and Fast Pace of The Program both were tied with one response each and representing 2% of the total themed responses. Table 4.16 provides a sampling of student responses for question 9.
Table 4.16

*Post-Completion Survey Question 9 Select Student Comments*

<table>
<thead>
<tr>
<th>Question 9 - Select Student Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>The fact that every day was hands on. It got me used to welding all day and that was important for getting a job.</td>
</tr>
<tr>
<td>The ability to practice beyond the schedule of the course and the support of the instructors.</td>
</tr>
<tr>
<td>The structure of the course.</td>
</tr>
<tr>
<td>My instructors were very supportive and encouraging. They are the reason I joined the program.</td>
</tr>
<tr>
<td>Having certification to weld got me a higher paying job.</td>
</tr>
<tr>
<td>Class sizes, and time with the instructor.</td>
</tr>
<tr>
<td>support of the instructor and classmate were very helpful</td>
</tr>
<tr>
<td>Classes that were pre-assigned and having a set schedule.</td>
</tr>
<tr>
<td>Having the same professor for most classes, not having to worry about registration and most other college admin issues. Being able to talk about problems and projects during other class periods if necessary. The consistency of the same group, schedule, and professors made it easier to focus on the course work and studying.</td>
</tr>
<tr>
<td>Having peer support contributed greatly in my successful completion of the program. Also, having a dedicated, supportive, and extremely knowledgeable instructor helped me to successfully complete the program.</td>
</tr>
<tr>
<td>The instructor was very knowledgeable and helped the students grasp the concepts.</td>
</tr>
<tr>
<td>The variety of what we learn was always engaging, and the instructor was very knowledgeable and willing to work with you on anything you had questions about.</td>
</tr>
<tr>
<td>The instructors knowing all the information they were teaching helped tremendously. Also, having all the supplies to learn with.</td>
</tr>
<tr>
<td>The individual instructors making sure you were up to speed in each aspect and every aspect of the course program as it proceeded. Some people got somethings right away others took longer the class continued on but time was given to make sure everyone completed and was competent in each area.</td>
</tr>
</tbody>
</table>

**Job Placement.**

The impact that job placement had on student completion was reported by student respondents as the lowest rating of the six design elements identified as making up the cohort model within either the Cohort-based Precision Machining certificate or Welding Fabrication Certificate. Responses to Likert question 7 from the post-completion student survey identified
the benefit that job placement assistance had on students obtaining a job post completion as only 46% of the students selecting the Agreeing Strongly category in their response. On Likert question 7, students also responded with the highest neutral response rate (21%) and Strongly Disagree category out of any of the seven Likert questions in the post-completion survey. A summary breakdown of student responses for Likert question 7 follows in Table 4.17.

Table 4.17
Post-completion Survey Likert Question 7 Response Summary

<table>
<thead>
<tr>
<th>Likert Question 7</th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Neither Agree or Disagree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The job placement assistance that was offered to me as part of participating in my certificate program was helpful to securing a job after I graduated</td>
<td>46%</td>
<td>18%</td>
<td>21%</td>
<td>5%</td>
<td>10%</td>
</tr>
</tbody>
</table>

In alignment with the student survey responses to Likert question 7, half of the administrator and faculty focus group participants also identified job placement as the least impactful out of the six identified design elements in the cohort model for positively impacting student completion and success. One faculty commented:

I would say, for me… job placement's the least important. I think, independent of what's going on here, job placement's a different animal. Whether it's a cohort-based model or the regular model. I see that the least impactful of the six [design elements] that's up there, personally [referring to PPT slide listing the six design elements of the cohort instructional model].

An administrator also noted that “job placement is a by-product of the other five [design elements]. It will fall out at the end by itself.” Another faculty remarked to identifying the least impactful design element of the six: “to me it's job placement. Again, I mean, they're [students]
not really thinking about it [job placement] yet, in my mind.”

Question ten from the student post-completion survey also made inquiry from the student’s perspective as to the role that job placement assistance played within the experience of the student completing their certificate program.

**Question 10: If upon completion of the program you were able to secure new employment, in what ways do you think the program contributed to your successful hiring?**

Table 4.18 summarizes the 8 themes identified from student responses to open ended question 10, seeking student perspectives on the influence completing either the Cohort-based Precision Machining Certificate or cohort-based Welding Fabrication Certificate had on obtaining employment post-graduation. Of the 39 respondents to the student post-completion survey, 34 responded to question 10.

Table 4.18

*Post-completion Survey Open Ended Question 10 Open Ended Summary of Themes*

<table>
<thead>
<tr>
<th>Dominant Themes</th>
<th>%</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taught Skills Needed to Secure Employment</td>
<td>46%</td>
<td>18</td>
</tr>
<tr>
<td>Directly Connected Student to Opportunities for Employment</td>
<td>18%</td>
<td>7</td>
</tr>
<tr>
<td>Reputation of Program and Institution</td>
<td>10%</td>
<td>4</td>
</tr>
<tr>
<td>Demonstrated I was Motivated to Work in the Industry</td>
<td>10%</td>
<td>4</td>
</tr>
<tr>
<td>Program Diversified Student Skill Set/Knowledge/Awareness of Field</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td>Program Increased Student Confidence</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td>Faculty Support Within Program</td>
<td>3%</td>
<td>1</td>
</tr>
<tr>
<td>Program Did Not Contribute to Employment</td>
<td>3%</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. n=34 responses to question 10 with 39 themed responses.*

Table 4.18 tabulates student open ended responses categorized by the researcher into 8 themes.

Of the 8 identified themes, responses aligned most strongly to the Taught Skills Needed to Secure Employment theme (46%) as the aspect of a student’s certificate program that assisted most with employment post-completion. The second most identified category of benefit provided
by the certificate program in regards to assisting students in obtaining employment upon completion was Directly Connected the Student to Opportunities for Employment (18%). Both the categories Reputation of the Program and Institution and Demonstrated I was Motivated to Work in Industry tied at 10% in terms of student responses aligning to these themes. The themes receiving the fewest responses in terms of an aspect of the program that was seen as beneficial to employment were Faculty Support Within the Program (3%) and Program Did Not Contribute to Employment (3%). Table 4.19 provides a sampling of student responses for question 10.
### Question 10 - Select Student Comments

It taught me the skills I needed to work in the welding field. It gave me a well-known reference that was trusted in the area.

<table>
<thead>
<tr>
<th>Applicable skills to a job that paid higher. Support and good reputation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was confident in my ability to complete my job tasks.</td>
</tr>
<tr>
<td>I was able to work as a team with my fellow classmates and instructor. It was similar to working with coworkers and a supervisor.</td>
</tr>
</tbody>
</table>

By stating I was going to attend an accelerated program during an interview I think showed initiative and my willingness to learn a different field from my original career.

| I think what the program contributed the most was that it was very well rounded and helped me to become knowledgeable in many aspects of the industry. I learned not only about practical skills but also math, programming, theory. I think after the completion of this program, the abilities I gained would put me at an advantage over other candidates. |
| It showed I was motivated and had the skills to get a job. |
| the reputation of the College and seeing that I had a certificate in Machining. I have a good resume, that's why I get job offers. The College's certificate program adds and improves my resume. |
| Being knowledgeable and having a positive attitude in a new environment. The instructors taught us to be comfortable in the workforce trade. |
| I already had employment during the class but I helped turn my job into a much better paying position. |
| The program gave me the knowledge and confidence I needed to comfortably apply for the positions I pursued. The support I received in proof reading and revising my resume was another enormous help to my hiring |
| It allowed me to pass the written and practical testing required during job interviewing. |
| I was hired right out of the class into a decent job by an employer who recruited right from the class. I was totally prepared and it was great. |
| I was called directly from the welding director and was informed of a job and he gave my name and I filled out the required documents and ended up being hired. I wouldn't have known if not for him even 5 months after completion. |
| The head hunter that was incorporated into the program was instrumental in job placement. |
| Finished class in June of 2015 was hired as a welder less than two weeks after, and have been working as a welder ever since. |
| I didn't have any skills beforehand but did afterwards. |
| The instructors knew people in the local field of work. They made connections that helped me find employment. |
Question 11: Any Other Comments?

Table 4.20 summarizes the 5 themes identified from student responses to open ended question 11, seeking any additional comments student responders may have wished to make relating to their experience in either the Cohort-based Precision Machining Certificate or Cohort-based Welding Certification program. Of the 39 respondents to the student post-completion survey, 34 responded to question 11 with additional comments.

Table 4.20

Post-completion Survey Open Ended Question 11 Open Ended Summary of Themes

<table>
<thead>
<tr>
<th>Dominant Themes</th>
<th>%</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would Have Liked to Have More Time in the Program</td>
<td>38%</td>
<td>5</td>
</tr>
<tr>
<td>General Positive Comments on Program Value</td>
<td>31%</td>
<td>4</td>
</tr>
<tr>
<td>High Faculty Quality and Support Was Important</td>
<td>15%</td>
<td>2</td>
</tr>
<tr>
<td>Received Promotion at Work</td>
<td>8%</td>
<td>1</td>
</tr>
<tr>
<td>Administration Should Organize More Job Assistance Post Completion</td>
<td>8%</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. n=34 student responses to question 11 providing 13 themed responses.*

Table 4.20 tabulates the responses aligned most strongly to the 5 themes with 38% of comments aligning with a Would Have Liked to Have More Time in the Program. Of the five themes identified by the researcher, 46% of responses were aligned to themes that reflected a somewhat negative tone and 54% of responses were categorized into the three remaining themes that aligned to responses reflecting a generally positive tone. Table 4.21 provides a sampling of student responses for question 11.
Table 4.21

*Post-Completion Survey Question 11 - Select Student Comments*

<table>
<thead>
<tr>
<th>Question 11 - Select Student Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>I'm sorry to be so negative but I had 10yrs experience before enrolling in the machining program. My instructor is a terrible teacher.</td>
</tr>
<tr>
<td>Even with my negative comments above, it should be known that I am still at my place of employment and have received a promotion since starting there. My pay has gone up 20% since I started. Pay is still overall low, but it was nice to get the promotion.</td>
</tr>
<tr>
<td>I think the reason why this program works so well has to do with the instructors. Their real-life experiences in the field help the people in the classroom really get a sense of what they need to do to succeed.</td>
</tr>
<tr>
<td>Had a great instructor, great classmates, great time learning.</td>
</tr>
<tr>
<td>Having more CNC / machining classes would have been more beneficial. Classes like metrology and Blueprint 2, took away from the program because it focused on engineering and inspection, rather than learning the trade. Also, many concepts in both classes were covered in Machine Theory and Blueprint 1.</td>
</tr>
<tr>
<td>My instructor could have used an assistant to help with instruction.</td>
</tr>
<tr>
<td>I only would push for an extra week in the program.</td>
</tr>
<tr>
<td>Certain topics were redundant while others I couldn't grasp enough of because of the time frame in the set courses.</td>
</tr>
<tr>
<td>The Welding Certification Course is an excellent program that upgraded the employment opportunities of many people that completed the program.</td>
</tr>
<tr>
<td>At the completion of the program, I would recommend organizing a job fair for prospective employers to network with the students.</td>
</tr>
<tr>
<td>Wonderful program and people.</td>
</tr>
<tr>
<td>Overall it was good, but more time and rigorous testing with welds and prints would be better.</td>
</tr>
<tr>
<td>I wish we had more machine time even if it was before class hours.</td>
</tr>
</tbody>
</table>

**Summary of Findings**

The findings from this mixed methods research study come from three methods of data collection: statistical tests of student completion data, a post-completion student survey and an administrator and faculty focus group. The statistical tests reveal that students enrolled in the cohort-based Precision Machining program at the research site had higher completion rates than students enrolled in the same curriculum taught in a non-cohort, traditional format. Time to
completing a program was also reduced for students enrolled in the cohort-based Precision Machining certificate program when compared to the same program taught in a traditional, non-cohort format. Examining how program instructional type influences student completion when combined with the influence of specific student demographics reveals that the white students that enrolled in a cohort-based instructional model at the research site were more likely to complete their vocational technical certificate program than students of color enrolled in either a cohort-based or traditionally taught program.

A majority of the faculty and administrators involved with the cohort-based Precision Machining and Welding Fabrication certificates reported that of the six design elements reviewed in this study, block scheduling, students taking all of their courses as a defined group and having a limited number of faculty teaching in the certificate were the most impactful to supporting their completion. Additionally, these three design elements are reported by faculty and administrators as working together to facilitate both a greater degree of observed peer to peer support within and without designated class times and creating an environment where faculty are able to support cohort-based students through activities and teaching strategies including project based learning across multiple courses, a greater ability to adapt day to day activities to adjust to the cohort’s learning over multiple courses and the facilitation of consistent learning expectations that again span the courses within the certificate.

The majority of students completing the post-completion survey reported that of the six design elements, those directly relating to faculty support, peer support and experience with practical hands-on labs contributed most to the successful completion of their certificate program. More than half of students completing the survey positively identified with the themes of limited number of faculty, the presence of embedded faculty support and the fast pace of their
program as working well in supporting completion of their certificate program.

Job placement was reported by faculty and administrators as the least impactful design element for students and more of an effect of the overall cohort design model. Student responses regarding the presence of job placement assistance within their certificate program centered strongly on both the themes of their program connecting them to a job opening through the program’s affiliation with industry and being able to obtain employment upon completing a program due to having been taught skills most needed by relevant employers through an industry recognized education provider.
Chapter V: Discussion of the Research Findings

This study set out to investigate the influence of a cohort-based learning model on student completion within two vocational technical certificate programs that have been offered over a four-year period at a comprehensive community college located in Upstate NY. The Chi Square test for independence as well as logistic regression techniques were used to examine if a statistical difference exists for student completion rates between two vocational certificate programs taught in a cohort-based learning model and a traditional non-cohort format. As a mixed methods study, the researcher included qualitative methods consisting of a post-completion student survey distributed to all students that had completed one of the cohort-based programs at the research site over four academic years and a focus group conducted to capture administrative and faculty perspectives on each of the six-identified cohort-based design elements and the perceived influence of these elements on student success.

This mixed methods design provided a triangulation of findings from the research site incorporating, 1) statistical analysis of student completion data and demographic variables, 2) perspectives of students that have completed a certificate taught in a cohort-model, and 3) the faculty and administrator perspectives of those involved in one of the two cohort-based instructional models. This chapter will briefly analyze the key findings of this mixed methods case study, as well as discuss the implications of those findings, and provide suggestions for further research.

Summary of Key Findings

This study revealed four key findings regarding the influence of a cohort-based design model on student completion within vocational technical certificate programs:

- Student completion and time to completion is significantly higher for students in the cohort model.
• Faculty and administrators both identified several of the cohort design elements as significantly contributing to student completion rates.

• Students identified several of the cohort design features as having made a significant impact on their successful completion and time-to-completion.

• Faculty, administrators, and students identified block scheduling, faculty cohort, and cohort-based student engagement as the three most significant features of the cohort model directly impacting student completion.

**Student completion is significantly higher for students in the cohort model.** The first key finding supports the discussion within the literature and the theoretical framework of Structure Hypothesis that cohort-based structures are influential in achieving higher rates of student completion. Aligned to both RQ1 and RQ2, the results of this study support the research proposition that students enrolled in one of the two cohort-based models were more likely to complete their certificate program than students enrolled in the traditionally taught version of the Precision Machining program. When comparing the Precision Machining (PM) curriculum taught in a cohort versus a traditional non-cohort format, students enrolled in the PM cohort-based model were 3.6 times more likely to complete their program than the traditionally taught PM program format. Comparing completion data from academic years 2012/13 through 2015/16 for all three comparison groups revealed that both of the cohort-based certificate programs examined in this study had significantly higher student completion rates when compared to the completion rates for students enrolled in the non-cohort, Precision Machining program. As Table 4.2 indicates, by way of comparison, over a five-academic year period the Welding Fabrication certificate program completion rate was more than double (102%), with the cohort-based Precision Machining certificate 61% greater when compared to the traditionally taught, non-cohort Precision Machining certificate program’s rate of 47.7%.
Faculty and administrators both identified several of the cohort design elements as significantly contributing to student completion rates. Another key research finding was that faculty and administrators who had been involved in either teaching or administering one of the two cohort-based models reported that of the six design elements identified as defining the cohort-based model for this study, block scheduling, students taking all of the classes in the certificate as a defined group and the limited number of faculty teaching (faculty cohort) were the most impactful design elements contributing to student success when compared with students enrolled in a traditional, non-cohort program. The focus group research also revealed that, of the six design elements defining a cohort-model at the research site, faculty and administrators rated job placement as the least impactful design feature of the cohort structure on student success.

Students identified several of the cohort design features as having made a significant impact on their successful completion and time-to-completion. In comparison to faculty and administrator perspectives, student responses from the post-completion survey revealed a strong alignment to the findings from the focus group research on administrator and faculty perspectives. Students, like faculty and administrators, strongly identified both block scheduling (79%), and a limited number of faculty teaching their class (79%) as influential cohort-based design structures beneficial to the completion of their certificate program. Out of the six design elements, students most strongly identified (85%) with the presence of support from faculty both within and outside of set class time as influential to their success.

Faculty, administrators, and students identified block scheduling, cohort faculty, and cohort-based student engagement as the three most significant features of the cohort model directly impacting student completion. Examining both student, faculty and administrator perspectives regarding each of the six cohort-based design elements suggests that
the six design elements might be better conceptualized as three primary design structures that complement each other and facilitate the remaining three elements. As noted by faculty and administrator responses in the focus group, the structures of block scheduling, the limited number of faculty teaching in the certificate and students taking all of their classes together as a group, when combined together in a program model, appear to complement each other and facilitate greater faculty and peer support. The interconnected dynamics revealed from the survey and focus group research suggest that the six elements might be better conceptualized as acting on one another in the flow depicted in Figure 3.

Figure 3. Cohort-based design elements flow of interaction suggested from research finding

As was evidenced from both faculty, administrator and student responses, job placement, though reported as impactful, was the least highly rated of the six design elements with faculty and administrators perceiving it as a byproduct of the other five cohort-based structures working together.

**Summary.** In this mixed methods case study, the researcher examined the effect of a cohort-based learning model on student completion and time to completion within vocational technical certificates at a public comprehensive community college in Upstate NY. Using
quantitative and qualitative methods, the study revealed four key findings which support previous studies within the literature finding that cohort-based learning structures positively influence student success. Not only were students’ time to completion shorter when enrolled in a cohort-based certificate at the research site but completion rates were also significantly higher for students enrolled in cohort-based programs when compared to the success of students enrolled in the comparison group - traditionally taught, non-cohort-based certificate. Additionally, students, faculty and administrators report positive influence on student completion for all of the six cohort-based design structures active within the cohort-based certificate programs examined in this study. Of the six design structures identified and examined, the focus group and survey research suggest that block scheduling, the faculty cohort and students taking all of their courses as a defined group have the strongest influence on student completion and time to completion.

**Research Findings Relevance to the Theoretical Framework**

This study’s theoretical framework has been based on Tinto’s (1975; 1993) Student Integration Model (SIM) and an emerging conceptual framework proposed by Scott-Clayton (2012) called Structure Hypothesis. Both Tinto’s SIM and Structure Hypothesis suggest there are measurable benefits to students from college experiences that are both integrated and highly structured. A strong theme within Structure Hypothesis is that students’ ability to make good decisions is likely to be adversely affected when they are presented with several unaligned, confusing and bureaucratic factors as part of their college experience. Bailey, Badway & Gumport (2001), O’Banion (2006), Rosenbaum, Deil-Amen & Person (2006) and Scott-Clayton (2012; 2016) have discussed in their work, the challenges presented to students from the current community college operating model, where courses require students to select courses from a
“cafeteria style” offering model, as indicative of an environment where the dynamics of Overchoice are prevalent and correspondingly, completion rates have been historically low. Unlike in the traditional cafeteria style of student self-registration, the cohort-based learning model examined in this study is focused on six distinct structures several of which eliminate choices for the student. As faculty, administrators and students that participated in this research revealed, these structures were each identified by participants as having positive impact to influencing student completion. As already noted in Table 4.12, all six design structures included in the student post-completion survey were reported by students as being in the “strongly agree” category of the five-item Likert question set as to their benefit in supporting the completion of their cohort-based certificate.

Faculty and administrator responses in the focus group session also strongly supported the perception of positive impact of the cohort-based program structures with the most emphasis placed on the benefits of block scheduling, the limited number of faculty teaching in the cohort and students taking all of their courses for the certificate program together in a pre-registered sequence. The existence of these cohort-based structures aligns strongly to the literature evolving out of Student Integration Model and Structure Hypothesis. Deil-Amen & Rosenbaum (2003)’s research that found that the elimination of choices and bureaucratic hurdles were impactful to addressing low college completion rates. Block scheduling removes the need for students to choose their courses from an advising sequence and also removes the chance for students taking the incorrect classes or classes in an ill-advised sequence. It also eliminates schedule conflicts that may arise with other required classes within the class schedule. Aligned to the implications of Overchoice and Structure Hypothesis, block scheduling functions as a forced preregistration
where the administrators and faculty involved in the design of the cohort-based certificate have
removed the choice of course selection and order of sequence from the student experience.

The limited number of faculty teaching in the cohort-based program also serves as a
structure that increases consistency of faculty teaching style and learning expectations for
students as they do not move between many different instructors but remain with one to three
faculty experiences. As faculty and administrators reported, the faculty cohort structure strongly
aligns and complements the structure of block scheduling. The third structure of the student
cohort or all students taking their courses together as a defined group, also strongly aligns to the
theoretical framework of SIM and Structure Hypothesis as it further facilitates student
integration in complementation to the limited number of faculty teaching the defined group of
students across all of the courses in the certificate program. These three primary design
structures also were reported as providing a higher level of consistency for student experience
that facilitated a more intimate class environment from the small number of faculty teaching
across all of the students’ courses within a certificate program. As reported in both the focus
group and survey responses, students, faculty and administrators reported the benefits from this
more integrated environment in identifying higher rates of observed instances of teamwork, peer
support and faculty support from the cohort-based learning model in place at the research site
when compared to their experience teaching or administering traditionally taught curricula. The
identification of these integrated structures facilitating a supportive environment for students is
highly relevant to the theoretical framework of SIM and Structure Hypothesis.

Lastly, in alignment with the theoretical framework informing this study, SIM and
Structure Hypothesis, this mixed methods case study has found statistically higher completion
rates for cohort-based students as well as a much shorter time to completion for students. Quite
simply put, the cohort-based structures of block scheduling, faculty cohort and students taking all of their classes as a group do not allow a student the option to fall behind as in the traditional cafeteria style model of instruction. Students must move along the entire sequence from term to term as a group without the option of slowing down, taking less courses or taking a term off.

Table 4.3 and 4.6 illustrate the differences in the numbers of completions between the two cohort-based program and the traditionally taught certificate. The research in context of both the literature and the theoretical framework discussed in this study supports the benefits that the structures of block scheduling, a faculty cohort and group instructional model have on student completion when compared with a similar traditionally taught, non-cohort certificate program at the research site.

**Research Findings Relevance to the Literature**

The findings of the research also strongly align and are relevant to the literature reviewed on student success, learning community movement and the value of highly integrated student experiences and structures as referenced in the previous section. As noted in Chapter I, Shapiro & Levine (1999) and Tinto, Love, and Russo (1993), have found in their research that students who participated in learning communities where purposeful academic and social integration were designed into the student experience, persisted at a higher rate than those students who did not enroll in programs associated with a learning community. Based on their studies, Pascarella and Terenzini (1978, 1979, 1980) presented data that academic and social integration appeared to be influential for exploring the complex interactions of factors that affect student persistence or dropout decisions and also for predicting those students who may be at risk (Manan, 2007). As discussed and in alignment with Pascarella and Terenzini, the research findings of this study support that the cohort-based instructional model as a program instructional type at the research
site is a statistically significant predictor of the likelihood of a student completing his or her program when compared to students enrolled in the traditionally taught, non-cohort comparison group.

In alignment with the literature on the learning community movement and its derivative, the cohort-based learning community, the cohort-based programs at the research site share many of the same typologies such as paired or clustered courses, coordinated and team taught courses and smaller cohorts among larger enrollments (Inkelas and Soldner, 2012). As a review of the literature on learning communities and cohort-based education models have shown, the cohort-based learning model at the research site has been shown to be associated with a positive influence on key measures of student success. These include a positive impact on both student completion and the time it takes a student to complete a program of study. Participant responses from both the student post-completion survey and the faculty and administrator focus group also align with the literature and reveal evidence that the cohort-based model employed in both the Precision Machining and Welding Fabrication certificate programs facilitate a variety of positive psychosocial dynamics which influence student perceptions of connection to each other, and also the faculty. In this way, the cohort-based comparison groups examined in this study support the understanding of the cohort-based learning model as an effective and efficient instructional approach for positively impacting student completion and time to completion for students enrolling within technical vocational certificates.

**Significance of the Study**

The research findings of this study support that the positive impacts associated in the literature on student completion from employing cohort-based learning communities are also present for students enrolled in the two cohort-based certificate programs at the research site.
These findings are significant especially when understood in context of the primary role that community colleges have in producing a majority of the applied-STEM and middle-skills technical workforce for the US economy. Concern by policy makers, industry and educators has become more focused in recent years around the threat that deficits in the supply of qualified and educated middle-skilled workers pose to business and industry. If, as both the literature on student success and cohort instruction has shown and this study’s findings support, that cohort-based instructional models positively influence student completion and time to completion, then cohort-based learning should be seriously considered as an important component of a community college’s workforce model for addressing worker shortages in a local economy. With many local economies forecasting long term deficits in the availability of workers for their middle-skilled and Applied-Science Technology, Engineering and Math (STEM) workforce clusters, understanding alternative instructional models like cohort-based learning and their student support systems may be critical to creating a more efficient community college workforce mission that can more effectively graduate workers in support a region’s economic development strategy.

The results of this study also suggest direction for how cohort-based learning models may serve as a guide for reform of how traditionally taught vocational technical certificate programs are offered at a community college. In reviewing the literature and former studies of the positive impact that cohort-based design elements and structures have had on student success, it is unlikely that full cohort-based design may be able or appropriate to be applied to all technically-oriented programs offered in a community or technical college. Even without a full implementation of a cohort-based learning model like was implemented at this study’s research site, this study suggests benefits to students in traditionally taught programs could be derived
from adapting one or more of the three primary design elements that were attributed by faculty, administrators and students as being most impactful to their completion. These would include block scheduling of classes, having a limited number of faculty teaching all of the courses in the program and students taking all of their instruction together as a peer group. Any of these primary design elements could be implemented on an individual basis without invoking a full cohort-based model. Based on the findings of this research study and a review of the literature on student success, it is plausible to expect students to experience greater levels of faculty and peer support in adapting some of these structures. The researcher suggests that incorporating those structures reported as most impactful out of the six design elements into the traditional cafeteria style academic operating model represents a practical application of this study’s findings in broadening the benefits of the cohort-based learning model into the traditional academic operating model.

**Limitations**

When considering the applicability of the study to other community college career and technical student populations, limitations exist. This case study was limited to a specific design of cohort-based vocational technical certificate program at one research site, a comprehensive, public community college in Upstate NY. Only one traditionally taught, non-cohort program was used as a comparator against the two cohort-based certificate programs’ performance. With more available resources, additional vocational technical certificate programs at other research sites could be included in the comparison of completion rates against cohort-based programs’ performance in order to better understand the potential benefits for these instructional models.

Additionally, though both the cohort-based design models included in this study were found to have significantly higher completion rates when compared to the traditional taught non-
cohort program, the Welding Fabrication certificate students experienced consistently higher completion rates than the Precision Machining cohort-based students. This exceptional and consistently high completion rate requires more research to determine why this specific application of the cohort-model to the subject of welding achieves such strong rates of student success. Though beyond the scope of this study, gaining a better understanding of the possible reasons for this high rate of success beyond the six cohort-based design elements will be beneficial to identifying other structural or operating components that may be considered as impactful for improving and achieving high rates of student success for post-secondary certificate programs.

Furthermore, since this study’s focus was limited to understanding how a cohort-based instructional model may affect student completion and time to completion, the researcher was unable to examine further reasons, beyond the lack of cohort-based structures, for the measurably lower completion rates and slower time to completion achieved for students enrolled in the traditionally taught Precision Machining certificate program. As the researcher considers opportunities for further research suggested by this study’s findings, conducting a survivability analysis on non-completers from traditional and cohort-based programs would be valuable in order to better understand student attrition in context of the vocational technical certificate programs offered at a community college for the purpose of graduating more qualified workers needed to fill in-demand occupations in a regional economy. The key findings of this research study related to the higher measures of student completion, time to completion and the positive impact that block scheduling, a limited faculty cohort and students taking classes as a defined group found within the cohort-based instructional model used at the research site build upon and support prior literature within the fields of student success and workforce development.
Validity

The validity of this research has been based on controlling for unintended and extraneous variables outside the scope of the intended study (Fraenkel, Wallen and Hyun, 2014). The researcher identified three primary threats to validity. The first threat involved not controlling adequately for similar student populations across each of the comparison groups. This threat was actively managed through the use of descriptive statistics to ensure each of the three comparison groups’ student demographics were consistent and representative across each of the comparison groups. These demographic data can be viewed in Table 4.0 and 4.1.

A second threat to validity was ensuring that the cohort learning model examined in this study was authentically and similarly functioning across the two cohort-based certificates. This threat to validity was addressed by the researcher by carefully documenting with member checking that all of six cohort-based learning design elements identified within the literature have been active and functioning within each of the two-relevant cohort-based certificates programs being measured. Lastly, a third identified threat to validity was to ensure faculty from both the cohort-based and traditional formats of Precision Machining and Welding Fabrication are similar in terms of qualifications, industry and teaching experience. Given that each Precision Machining faculty is part of the same department and have taught the program in both formats, this threat specific to Precision Machining is mitigated. Additionally, given that the cohort-based Welding Fabrication program is taught in a non-credit format without a credit based analog, the researcher documented that instructors active in this program have similar qualifications, and industry experience to those faculty approved to teach in credit bearing vocational technical programs at the research site. As with faculty qualifications and teaching experience, careful documentation of active design elements for the cohort-based comparison groups significantly
reduce the threat of the research not capturing authentic influence of the cohort based learning model on student’s completion when compared with the traditional, non-cohort comparison group.

**Future Research**

The limitations discussed in the earlier sections of this chapter provide direction for areas where this research study may be extended and augmented. This mixed methods study has sought to extend the literature on student success and previous studies involving Student Integration Model and Structure Hypothesis specifically to vocational technical certificates at a public community college. As already noted in the limitations section, examination of the effectiveness of cohort-based programs in place at other community colleges would be significant to better understand if the measurably higher completion rates experienced within the research site’s cohort-based certificates also extends to other similar institutions and their technical cohort-based programs. The limitation of having only one credit bearing traditionally taught comparison group also presents opportunity for further research by expanding the study to include multiple traditional, non-cohort vocational technical certificates at both the research site and in any further expanded study involving multiple institutions. As already noted, incorporating survivability analysis of non-completers from both traditional, non-cohort and cohort-based certificate programs into a future study would greatly build upon and expand practitioner’s understanding of how the cohort-based learning model and its structures may be augmented to address the needs of students who do not complete. Conducting a survey of students that have completed a traditionally taught vocational technical certificate would also provide a better comparison in understanding the factors non-cohort students attribute to most impacting their success in their certificate program. This type of comparison would provide
greater context to assess the influence of cohort-based design structures beyond which this study has been able to provide.

**Conclusion**

This study set out to explore the effectiveness of cohort-based learning structures on student success for technical vocational certificates offered at a community college. In alignment with previous research and the literature reviewed as part of this study, these cohort-based structures, as implemented at one research site, have been shown to be associated with higher completion rates and to facilitate a shorter time to completion than similar curricula taught in a traditional, non-cohort format. In context of workforce and economic development considerations, cohort-based learning models warrant consideration as a viable and impactful approach for community colleges to implement as part of an overall strategy to produce more technician level workers that have been measured as being in-demand within a regional economy. From this application, cohort-based learning models and their structures can be viewed as a reasonable and active response by the community college in addressing large Middle-Skills gaps within business and industry. Though further research is needed, there is sufficient evidence to consider cohort-based instructional models based on the six design elements reviewed in this study as providing a more efficient workforce development model reducing the rate of attrition and time to completion for producing a 21st century technician level workers. While certainly not a panacea for all student populations in terms of addressing the need for achieving higher rates of student success, cohort-based structures may be considered a viable instructional strategy for vocational technical oriented students that are seeking to obtain in-demand skillsets. As community colleges continue to operate with the burden of historically low completion rates, cohort-based learning models should be seriously considered and further explored as a structural
intervention for impacting student success that is linked to in-demand occupations within business and industry within the regional economy.

**Personal Comments and Reflection**

In conducting this research study, I set out to better understand how an alternative instructional model may significantly increase a community college’s completion rate. As a workforce practitioner, I have become increasingly concerned and bothered by the low rates of student completion experienced across the community college system. Understanding the full implications that these low rates of completion have in terms of the economic loss to both the community and the student make the case for greater openness among post-secondary educators to newer and emerging models of instruction that have been shown to be more effective in terms of both overall completion rate but also time to obtaining completion. The challenge of course, is how to implement newer instructional and operating models within environments that are intrinsically rigid, bureaucratic and highly resistant to change. Reflecting on how inefficient the publically funded “worker production” model has become also demands that administrators and faculty better understand the deficiency that the traditional academic operating model has demonstrated in supporting many types of non-traditional students in obtaining completion from a labor linked program of study. The vocational perspective taken in this study’s approach sees as a primary workforce mission of the community and technical college system as gaining the student access to an educational pathway that offers a high probability of successful completion followed by the likely prospect of entering the workplace as a qualified worker at graduation.

As I have now completed this study and reflected on its findings, I believe there are clear applications and benefits suggested for incorporating design elements from cohort-based models into the dominant academic operating model. As already noted in this chapter, rather than
implementing a full cohort-based model there are potential benefits suggested from the individual design elements, particularly those structures that eliminate confusing choices for students that have been linked to influencing students dropping out. Block scheduling, keeping students together as a group and using a limited number of faculty to teach most of a certificates program of study provide these dynamics. As highlighted in Table 1.1, these more structured operating elements may be blended and utilized creatively into a variety of secondary and post-secondary applications that offer new options for students in obtaining their education. The challenge to the community and technical college system across the country is the motivation and willingness to allow alternative instructional models to become an option for students. If in time these alternative models are able to achieve substantially higher levels of student success at scale, then further reform of the traditional operating model may be seriously considered.

The experience of conducting this study has greatly influenced and shaped my perspective on the value of quantitative and qualitative research methods and how each approach complements and informs the researcher in their interpretation of research findings. This I believe is especially true of informing quantitative methods with participant perspectives garnered through qualitative research. Overall, probably the greatest learning outcome for me in conducting and completing this thesis is the appreciation I have gained as a newly trained scholar-practitioner on how a mixed methods research approach provides the practitioner a more holistic perspective for understanding a given set of human phenomena relevant to their practice. It is for this reason that I am thankful to my advisor and my readers for their encouragement and guidance in directing me to a mixed methods approach. It is on this reflection that I hope to build upon as I continue the journey of developing myself into a more reflexive and impactful scholar-practitioner.
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Appendix A

Post-Completion Student Survey

Thank you for taking the time to participate in this online survey. You have been invited to participate in this study because you are a recent graduate of a cohort-based certificate program at Monroe Community College. The purpose of this study is to better understand how you experienced specific design features of the program. As a certificate program participant, I am very interested in your experience.

Your participation in this study consists of 10 brief survey questions, and should take no more than 10 minutes. Your response is completely confidential.

Please read the following section regarding the purpose of the study and your participation and if you should agree to participate, simply click on the “next” button to begin the survey.

Request to Participate in Research (Unsigned Informed Consent)
We would like to invite you to participate in a web-based online survey consisting of 11 questions. The survey is part of a research study whose purpose is to better understand how you experienced the certificate program you recently completed at Monroe Community College. This survey should take no more than 10 minutes to complete.

We are asking you to participate in this study because you have been a student in a technical certificate program at the Community College. You must be at least 18 years old to take this survey.

The decision to participate in this research project is voluntary. You do not have to participate and you can refuse to answer any question. Even if you begin the web-based online survey, you can stop at any time.

Will there be any risk or discomfort to me?
There are no foreseeable risks or discomforts to you for taking part in this study.

Will I benefit by being in this research?
There are no direct benefits to you from participating in this study. However, your responses may help us learn more about how higher-education institutions can best support adjunct professors who come from industry.

Will I be paid for my participation?
You will not be paid for your participation in this study.

Will it cost me anything to participate?
There is no cost to participate in this study.
Who will be able to see the responses I give?
Your part in this study will be handled in a confidential manner. Any reports or publications based on this research will use only group data and will not identify you or any individual as being affiliated with this project.

If you have any questions regarding electronic privacy, please feel free to contact Mark Nardone, NU’s Director of Information Security, via phone at 617-373-7901, or via email at privacy@neu.edu.

If you have any questions about this study, please feel free to contact Todd Oldham, the person mainly responsible for the research, via email at oldham.t@husky.neu.edu or 585-775-9276. You can also contact Chris Unger, the principal investigator, at c.unger@northeastern.edu or 857-272-8941.

If you have any questions regarding your rights as a research participant, please contact Nan C. Regina, Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: n.regina@northeastern.edu. You may call anonymously if you wish.

Please click Next to begin this survey. Again, the entire survey should only take 15 minutes to complete.

“Next”

Online Survey Part I

The following pages contain seven statements. Please rate how much you personally agree or disagree with each statement. Note, there is not right or wrong answer. All that is important is that you indicate your personal response.

1) Block Scheduling of Courses

Having all my classes in the certificate program structured into a set schedule that did not require me to have to register for each course individually was a beneficial feature of the program.

a.) Agree Strongly
b.) Agree
c.) Neither Agree or Disagree
e.) Disagree
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?

2) Students Experiencing the Program as a Defined Group
Having the same students in all of my classes was a valuable and positive part of my student experience in the certificate program.

a.) Agree Strongly  
b.) Agree  
c.) Neither Agree or Disagree  
e.) Disagree  
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?

3) **Limited Number of Dedicated Faculty (faculty cohort model)**

Having a limited number of instructors dedicated to teaching all of the courses in my certificate program was more beneficial than having a different instructor teaching each class.

a.) Agree Strongly  
b.) Agree  
c.) Neither Agree or Disagree  
e.) Disagree  
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?

4) **Faculty Supports**

The support provided to me both within and without class time by the instructors teaching in my certificate program was helpful to learning course material.

a.) Agree Strongly  
b.) Agree  
c.) Neither Agree or Disagree  
e.) Disagree  
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?

5) **Embedded Peer Support for Students**

Peer support is defined as the assistance or help provided by other students (peers) during class
or after class that you may have utilized during your time of study in your certificate program. The presence of peer support from fellow students within my certificate program’s courses was a valuable part of the learning experience.

a.) Agree Strongly
b.) Agree
c.) Neither Agree or Disagree
e.) Disagree
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?

6) Time to Complete Program

The certificate program’s accelerated pace to complete the entire program was a feature that I found beneficial to my ability to both participate in and complete the program successfully.

a.) Agree Strongly
b.) Agree
c.) Neither Agree or Disagree
e.) Disagree
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?

7) Job Placement Assistance

The job placement assistance that was offered to me as part of participating in my certificate program was helpful to securing a job after I graduated.

a.) Agree Strongly
b.) Agree
c.) Neither Agree or Disagree
e.) Disagree
f.) Strongly Disagree

Please feel free to add any comments on how this feature of the program was or was not helpful to you?
Online Survey Part II (open ended questions)

Students’ Overall Perceived Benefit of the Cohort-based Design Model

For the last four questions, please provide a written response describing your experience as a student in the certificate program you completed.

8) Please describe your overall experience in the certificate program? What worked well for you? And what was challenging?

9) What aspects of the program contributed the most to your successful completion of the program?

10) If upon completion of the program you were able to secure new employment, in what ways do you think the program contributed to your successful hiring?

11) Any additional comments you would like to add?

Thank you very much for participating in this study and completing this survey. Your responses to these questions and your input is very important to this research.

If you are interested in participating further in this study, I am seeking to follow up with participants to conduct a brief follow up phone interview to learn more about your experience as a student partaking and completing your cohort-based program at the College.

If you would be willing to participate further in a brief 10-15 minute phone interview at a time that is convenient to you, please email me at oldham.t@husky.neu.edu.

Thank you again for your time and for your consideration.
Appendix B

Focus Group Protocol - Administration & Faculty

The Impact of a Cohort-based Learning Model on Student Success Within Vocational Technical Certificates at a Community College

Part I: Introduce Participants to Study
- Purpose of study: To understand how the specific cohort-based design elements within the Welding Fabrication program and the Accelerated Precision Machining program support student learning and may lead to higher rates of completion. The researcher will introduce a brief overview of the study by providing a PowerPoint slide with the six design elements of focus for the cohort-based instructional models at the research site.
- Quantitative study: This is mixed methods case study examining five-years of student completion data for students that have formally enrolled in either an academic or non-credit vocational technical certificate program at the research site.
- This part of the research is qualitative and is being conducted to augment the statistical data analysis with perceptions of administrators, faculty and students involved in cohort-based certificate programs at the research site.
- I am a workforce administrator at the research site and am undertaking this study to better understand how cohort-based instructional models may impact student completion and success. This study is also a partial fulfillment of the requirements for a doctor of education degree at Northeastern University.
- I have no preconceived notions on what your answers will be, nor am I looking for you to prove or disprove any theory – no right or wrong answers exist.
- I encourage you to be as candid and open as you feel comfortable.

Role of the Moderator:
- My role is to do the following:
  o Ask initial questions that get the discussion going.
  o Ask follow-up questions that probe further on key points you raise.
  o Provide clarification if any topic or question is confusing.
  o Encourage all of you to participate.
  o Redirect the discussion if the conversation goes off topic.

Ground Rules:
- The conversation today is being recorded via the application Rev.com for purposes of providing an accurate transcript of today’s discussion. The transcript will be used to identify themes across the conversation for purposes of augmenting the quantitative analysis being conducted on the five years of student data. Your comments and discussion today will be anonymized with no personal attribution made to your comments within the study.
- In order to allow this process to be accurate and thorough for analysis:
  o Please start each comment by saying your name; this will ensure comments are assigned the correct speaker.
  o Please speak one at a time and as clearly as possible.
- Do you have any questions before we start this session?

Getting Acquainted and Introductory Questions

Please introduce yourself and address the following in your introduction:
- Who you are?
- What programs have you been involved at the Institution and for how long?
- What is your role in the program (faculty, administrator)?

More Substantive Questions Specific to Design Elements at the Research Site

- How important do you believe the structured supportive elements within the cohort based programs have been for students?
  - In relation to impacting student completion?
  - In relation to influencing students time to completion?

- From your experience working with Cohort-based programs, how do you see the six design elements functioning overall in the program?
  - Block Scheduling
  - Limited number of faculty teaching the program (faculty cohort model)
  - Students experiencing instruction as a set and defined group
  - Embedded Peer Supports
  - Embedded Faculty Supports
  - Job Placement

- Which of the six design elements do you feel have been most impactful for you in your role as an administrator or faculty member?
  - Which have been least impactful

- Which of the six design elements do you feel have been most impactful to student success based on your work in the program?
  - Which have been least impactful from your experience?

- How important is the presence of an active job placement component to student success?

General Questions Regarding Comparison of Cohort-based to Traditional programs

- In what ways, have you seen peer and faculty support active in the cohort-based programs?
- What advantages do you see that the structures in cohort-based programs provide students compared to the Institution’s traditional non-cohort programs?

- Do you see student learning as increased from the presence of any of the six design elements compared to a traditionally taught program?

**What Haven’t We Asked You?**

- Is there anything that we did not discuss that you believe is important for the researcher to know in better understanding how the cohort-based instructional models at the research site and the structural supports within them have affected student success?

- Any last comments you wish to make?

**Thank you for taking the time out of your busy schedule and sharing with us your experience.**