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The Efficacy of Postsecondary Vocational Curriculum in Preparing Students to Transition from School to Work

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Concordia University–Portland
College of Education
Doctorate of Education Program

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The Efficacy of Postsecondary Vocational Curriculum in Preparing
Students to Transition From School to Work

Peter James Brown Sr.

Concordia University–Portland

College of Education

Dissertation submitted to the Faculty of the College of Education
in partial fulfillment of the requirements for the degree of
Doctor of Education in Teacher Leadership

Brianna Parsons, Ed.D., Faculty Chair Dissertation Committee

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Concordia University–Portland

2019

Abstract

Postsecondary vocational education in the United States has become an important part of training in the current knowledge-based economy. One such program of study is Natural Gas Compression. This industry requires highly trained individuals who maintain and repair the natural gas engines and compressors that gather, process, and distribute natural gas throughout the United States. This qualitative case study addressed two questions. First, how do graduates of a career and technical education (CTE) program perceive and describe how a technical curriculum prepared them for the transition from school to work? Secondly, how do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on-the-job demands? This study intended to provide valuable insight on the efficacy of the curriculum of a Natural Gas Compression program (NGC) on providing the skills and training needed for a smooth school-to-work transition. Through semistructured interviews, graduate participants of this study believed that the NGC program curriculum gave them the skills and training necessary to smoothly transition from school to the workplace. In addition, industry partner participants felt that NGC graduates make excellent employees and admire their maturity and skill sets. All participants believed that there was a need for more “hands on” training and that the lack of this training may have caused them to have some problems initially. The implications and recommendations for further research based on the findings from this study are discussed.

Keywords: School to work, postsecondary, career and technical education (CTE), natural gas compression (NGC).

Dedication

This dissertation is dedicated to all those who have supported me during this journey.

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Thank you to my wife Denise M. Brown for being my sounding board and biggest fan. Thank you to all my friends and coworkers. Thank you, Dr. Parsons. You are an amazing person and have helped me through some times when I really wanted to quit. I could not have completed this monumental task without all of you.

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Chapter 1: Introduction

High school often marks a transition point in the life of students that moves them from dependence to independence. During these transitional years, there are few mechanisms in place that are designed to provide support for success (Roderick, 2006). Many choose to continue their education by attending college. They are often met with challenges after completing their program of study and make their first attempts to enter the workforce. In our current knowledge-based economy, the highest paying and most readily available jobs seem to be in the technical and medical arenas (Mupinga & Livesay, 2004). This being said, for some students it may make more sense to pursue a technical degree. Students who choose to attend an institution of technology to learn a skill or trade may still meet with challenges when transitioning from school to work.

Instructors who teach technology-based courses are often tasked with teaching students new skills and concepts that are needed to obtain employment. Being able to recognize and associate prior learning and apply it to new technological concepts is a very important aspect of teaching technology at a university. Instructors should pay careful attention to the needs of the students and design curricula that meet those needs. Many students have difficulty applying previously learned fundamental concepts to more complex systems, which has a detrimental effect on their training and ultimately on their transition from school to work. There is a fundamental difference between the educational needs of students today and those of earlier generations. Today's rapidly changing technologies have profound effects on communication and the ways in which people understand and make meaning (Klenowski & Wyatt-Smith, 2014).

One Natural Gas Compression (NGC) program at a university in the midwestern United States is preparing students to work in the natural gas production and processing industry. Many

natural gas compression students have little or no technical training before they enroll in the NGC program. These students often have difficulty grasping some of the concepts that are introduced during the first few courses, which include theory, mechanical, and electrical courses. One NGC advisory committee member suggested that a standardized aptitude test be given to categorize all prospective students. This has presented a problem, given that the NGC program is an open enrollment program and enrollment is available to the first applicants, regardless of their mechanical aptitude or experience. An aptitude test might have an adverse effect on enrollment. Those who were enrolled in vocational training during high school or have some experience working on engines or industrial equipment ultimately have a head start, a better grasp, and are often more successful. Being aware of the nature of a specific type of job enables students to plan for those jobs and arrange their experiences and activities around their specific goal of achieving that particular career. Students who prepare themselves with skills, knowledge, and proper behavior for jobs have better opportunities to successfully obtain those jobs and transition from school to work (Kim, 2009).

The years after a student leaves the secure environment of the college campus are years of choice and change. The choices may be deliberate or they may be implicit, made by action or inaction, but either way students make important career choices during the transitional period moving from school to work. Shavit and Muller (1998), in their research of the school-to-work phenomena, have found there is a weak link between schools and employers, especially in the United States, that causes many students to become disillusioned with the lack of support they receive from prospective employers. Often, the outcome of this lack of support results in the students returning to school to develop skills that are more attractive to employers.

Postsecondary career and technical education (CTE) institutions offer programs that incorporate

general education with vocational education that is tailored to specific industries. One such program is the NGC program on which this study focuses. This program offers students specific training needed for employment in the natural gas compression industry. This industry provides a network of plants and stations throughout the United States that processes natural gas from the wellsite to the end user. This industry employs individuals who are trained to work on engines, motors, and compressors that are used to compress natural gas to move it from one location to another. The NGC program offers fundamental, mechanical, and electrical training to students who are interested in working in the natural gas compression industry. Keeping up to date with current technology and providing world-class training are the goals of the NGC program and, in essence, are the foundation for this study.

This study examined the efficacy of the curriculum of the NGC program on providing a smooth transition from school to work through the eyes of the students who were in the program and the industry partners who employed them. This qualitative case study examined the perspectives of both the students and the industry partners on how effective they felt the curriculum of the program was in providing skills that enabled them to have a successful transition into the industry.

Statement of the Problem

While natural gas compression programs exist throughout the United States, the NGC program, which is the focus of this study, has the largest program in the nation. The NGC program has capacity for 160 students. Enrollment peaked at 140 students a few years ago (Crow, 2017). A study of the efficacy of the curriculum is needed to ensure that the training matches the required skills that a natural gas technician must possess to be successful. The program has been in existence for more than 10 years, with little change in the curriculum. A

study to compare what is taught to the students and what is essential knowledge was needed to provide validation. In order to understand the experiences of graduates from this program, who transitioned directly from school to work, a case study design was used as the methodology for this research. This design was chosen because the research was centered within a bounded system of a specific group of individuals during a given time frame (Yin, 2014). The experience and knowledge of graduates from the NGC program, after working in the field for at least one year, was a valuable resource in the investigation of the efficacy of the curriculum.

Background of the Study

Almost all occupations require training before the tasks involved can be effectively carried out with some degree of competence. Throughout history vocational education has been a significant element in the progressive development of this competence. Apprenticeships once held a position of honor during the time of Hammurabi, only to be later shunned by the Spartans. Skills passed from father to son throughout the Middle Ages. Further, organizations appeared whose purpose was to educate others in their trades—for example, the Candlemakers Guild in Paris originated in the year 1061, among many others was specific purpose. The need for vocational education has remained a constant through the ages (Nye, 1965).

The origin of career and technical education (CTE) dates back to the late 1800s. The Morrill Act of 1862 established institutes in several states and territories that would educate students in the practical occupations of the time, such as agriculture, home economics, and mechanics (Lightcap, 2008). As the industrial revolution took root and America was established as an economic power, it became evident that industrial education had a place in education. The Smith-Hughes Act of 1917 provided vocational education in the public schools. The act further

emphasized a funding formula that allowed schools not only to train students for industrial occupations but also to incorporate academic study (Foster & Wright, 1996).

After World War II, national security became a significant concern and high school curriculum centered on academics with vocational training incorporated into the curriculum. The National Defense Education Act of 1958 provided funding for a refocused curriculum that was deemed vital for national security. The Carl D. Perkins Vocational Education Act of 1963 aided in the development and improvement of vocational training. A major focus of the Perkins Act was to integrate academics into technical programs of study. The Perkins Act has been reauthorized several times with the latest version occurring in 2006, bringing about the name change to the Carl D. Perkins Career and Technical Education Improvement Act of 2006. The name change was not just renaming of an old law, but a new focus on student learning that is directly applicable to the workforce of the 21st century. According to public law, the Perkins Act defines vocational education as organized educational programs offering a sequence of courses directly related to preparing individuals for paid or unpaid employment in current or emerging occupations requiring other than a baccalaureate or advanced degree. Programs include competency-based applied learning, higher order reasoning, problem solving skills, and the occupational skills necessary for economic independence as a productive and contributing member of society (1998, 101–392). Bottoms (2008) stated:

For the first time, federal law requires that CTE [Career and Technical Education] courses include essential academic skills . . . quality CTE studies must be linked with high school reform to dramatically increase the percentage of students who graduate from high school prepared for further study and careers. (p.17)

The new focus of CTE is to promote the relevance and meaning of what is learned in the classroom and apply it to the workplace. Regardless of the vocation that is chosen by a student, all students should be able to experience learning that is relevant and meaningful. Miller (1996) stated that in theory, preferred practices serve as benchmarks for program development and curriculum change; determining which curriculum revisions to make is a very important part of the educational process and should be approached as such.

An ongoing issue within the realm of postsecondary education is the transition from school to work. There are those who think—and research supports, to some degree—that vocational education is of little benefit to employers and employees. Marcotte (2010) concludes that secondary and postsecondary education indeed do benefit both the student and the employer. It is the purpose of this study to investigate the actual benefits of the curriculum being taught to graduates of a postsecondary technical school, and to determine if the students gain needed skills and information that will assist them in going straight from school to the workforce. The current research does not yield a conclusive answer to that question.

Purpose Statement

The purpose of this study was to examine the effectiveness of the curriculum of an NGC program and how it provided the skills that are needed to smoothly transition from school to work. Further, the study investigated the opinions of the industry partners who are involved with the NGC program regarding the quality of employee the graduates make. Fifteen recent graduates of the program were recruited to give their thoughts, feelings, and attitudes about the effectiveness of the curriculum of the program from which they graduated. Their experience in the field provided insight on the quality and effectiveness of the program in providing a smooth transition from school to work. Furthermore, the opinions, thoughts, and feelings of five

industry partners who provide internships and employment to the graduates of the program were investigated. It was expected that two different perspectives would come from the two different groups and new ideas for improvement would be uncovered.

The significance of this study lies in the need for valid information that either supports the effectiveness of the NGC curriculum in making a smooth transition from school to work or contributes to the improvement of the curriculum. Natural gas compression technology changes from year to year and a validation process is essential to serve as a benchmark for future improvements. There are few studies that deal with this topic and the findings provided data that will add to the current research and be used to suggest improvement to the NGC program.

Research Questions

This study was guided by two overarching research questions which aimed to examine how a NGC curriculum aided in a smooth transition from school to work by program graduates, and how industry partners experienced new employees. The first research question was:

1. How do graduates of a CTE program perceive and describe how a technical curriculum prepared them for the transition from school to work?

It was expected that most of the participants would affirm that the curriculum in the NGC program developed skill sets that were advantageous to their new job. However, some may have ideas about how the curriculum could be enhanced to provide a smoother transition from school to work. After working in the field for a substantial amount of time, the participants may have discovered areas of concern that are not addressed by the curriculum of the program, and this should be expected.

The second research question of this study was:

2. How do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on the job demands?

The industry partners' responses to the questions that were asked during the interview process should reflect the industry partner involvement in curriculum development. It was expected that most of the graduate participants and industry partners would feel that the program is valuable; however, it was expected there would be a few suggestions for improvement of the curriculum and some areas of concentration that should be added to the program of study. It was further expected that the industry partners would have some suggestions for improvement.

Rationale, Relevance, and Significance of the Study

Much research has been conducted in an effort to validate the role that postsecondary education plays in preparing individuals for the workplace, however little research exists that attempts to validate the role curriculum plays in preparing individuals for smooth transition from school to work. It is the scope of this research to investigate the effectiveness of the curriculum of the NGC program on providing a smooth path for the students from school to work. It was furthermore the scope of this research to validate the curriculum by investigating the industry partner perspectives about the quality of the education received by their interns and employees who completed the program. The goal was to formulate ideas that will be used to improve the program.

Definition of Terms

School to work: The transition that students make either from high school to the work place or from postsecondary education to the work place (Shavit & Muller, 1998).

Postsecondary: This term refers to any education received after high school.

Career and Technical Education: This term refers to vocational training received either during high school or postsecondary.

Natural Gas Compression: An industry involved in the production, processing, and supply of natural gas and natural gas byproducts.

Natural Gas Compression Program: A program of study that trains individuals to become natural gas compression technicians who work on natural gas engines and compressors.

Assumptions, Delimitations, and Limitations

Research has inherent limitations on its use and generalizability. Qualitative research is often extremely difficult to duplicate (Wiersma, 2000). There are known and unknown assumptions, delimitations, and limitations associated with every research study. In this study, each individual's perspective on the transition from school to work was evident, but each case did not necessarily reflect the participant's perspective on the curriculum, due to individual experiences and success and failure within the industry. It was assumed that the participants would be honest and not inflate their responses to the open-ended questions they were asked. Furthermore, it was assumed that the participants thought highly of the NGC program, but would have recommendations for improvements. The delimitations of this study, or the choices that were made that constrained the study, were the question count and the interview time limit. Ten open-ended questions were asked the participants and interview time limit was 90 minutes. This study was limited due to the small sample size. The small sample size makes it difficult to formulate generalizations across the entire population of graduates of the NGC program. It does, however, provide valuable insights on the actual school-to-work transition that these particular individuals experienced that will allow further study to be conducted on the NGC curriculum and the school-to-work transition phenomenon.

Summary

Skills and tasks are handed down from generation to generation, from skilled tradesmen to unskilled, untrained individuals; however, the idea of “passing it on” has largely become a thing of the past. The technical skills of modern industrial engine and equipment repair and maintenance now must be learned either on the job, through institutions of technology, or a combination of both. There are many theories about the value of secondary and postsecondary vocational training.

It is the consensus of much research that vocational education is valuable and a valid pathway to skilled trades and technical jobs. Very little research has been done to validate the actual curriculum that is being offered by postsecondary vocational institutions. It is the purpose of this study to investigate the efficacy of the curriculum of the NGC program from the perspective of its graduates.

What is the nature of a curriculum that is job specific, and how does the CTE curriculum influence the transition from school to work? What are the effects of a job specific curriculum on making a natural, smooth transition from the academic world to the workforce? It is the scope of this research paper to determine if the curriculum that is being taught at a particular institution is valid in the eyes of those who have been through the program of study and their employers.

The efficacy of curriculum and the transition from school to work is the subject matter this research study addresses. Fifteen recent graduates of the program were selected to give their thoughts, feelings, and attitudes about the effectiveness of the curriculum of the program from which they graduated. Their experience in the field provided illumination on the quality and effectiveness of the program in providing a smooth transition from school to work. Furthermore, the opinions, thoughts, and feelings of five industry partners who provide

internships and employment to the graduates of the program were investigated. It was expected that new ideas for improvement and methods for delivery would be uncovered.

Chapter 2: Literature Review

In the face of a rapidly changing world, career and technical educators are faced with new challenges to meet the needs of an economy that has evolved from being a primarily industrial-based system to a knowledge-based system. This growing role reinforces the assumption that innovation is contingent on the production and organization of knowledge. There is much evidence that the knowledge intensity of all sectors of the economy is increasing (Boden & Miles, 2000).

As the economy grows and changes, so too must educational curricula and training. Employers are diligently seeking employees who possess skills and knowledge that enable them to transition directly from school to work. This economy demands knowledge and skills, not a certificate that has come to reflect attendance and perhaps perseverance for many students but not any identifiable level of performance in areas key to full participation in the economic system of today (Conley, 2010).

Shavit and Muller (1998) stated that particularly in the United States, there is a weak link between schools and employers, as many students leaving directly from high school seeking employment are quickly disillusioned with the lack of support they receive from prospective employers. Often the outcome is disappointing, resulting in returning to school to develop skill sets that are more attractive to employers. Key learning skills need to be embedded into curriculum early, at least by high school. In order to do this, high schools must adopt ways of thinking that include the assumption that students are likely to engage in at least some postsecondary education. Students from cultures that embrace readiness for college and careers develop behaviors and practices that will help them succeed. One key behavior that must be

learned and practiced by students is self-management. This process must be learned before and during high school (Conley, 2010).

Postsecondary degrees often produce credentials that are recognized by potential employers as evidence of learned skill sets, but there is still much uncertainty in the pursuit of meaningful, well-paying careers (Shavit & Muller, 1998). With soaring college tuition costs, many high school graduates are considering whether to attend college at all. Of those who do attend only 42% graduate with 2- or 4-year degrees by their mid-20s. With knowledge and skills being the new currency of the 21st century, the drive is on to produce a high number of highly skilled workers (Jackson & Hasak, 2014). There is a direct connection between vocational training and wages. Statistically, wages are higher for young people who invest in a vocational education (Buddelmeyer, Herault, & Zakirova, 2011). The curriculum that is used to produce a highly skilled workforce must be continually assessed and improved. Research is needed to investigate the efficacy of curricula being taught in vocational programs to ensure those who are making the transition from school to work are well prepared for their careers and can consistently receive a return on the investment they have made in their future. Hartley and Wentling (1996) stated that, “Data and empirical evidence suggest that our nation’s colleges and universities are not responding in meaningful ways to the nation’s call for reform in teacher education related to reform in vocational and technical education” (p.12). More than 20 years later this statement remains true.

What is it that will drive educators to investigate the effectiveness of the curriculum and motivate them to revise the vocational educational system? To answer this question, it is essential to narrow the focus of the foundational purpose and reasoning behind career and technical education. Should vocational education be defined as solely a means for preparing

individuals for a specific job? This was commonly thought for nearly a century, as the early works of Prosser (1913) suggested. Prosser claimed that 60% of high school students need “life adjustment education,” or, in other words, the adjustment of individuals to the social and occupational circumstances in which they live. Should we as educators define career and technical education as a means of academic education for a living democratic society (Dewey, 1916)? Do the changes and revisions in the educational system and the curriculum that is taught remain constant at the secondary and postsecondary level? Does the curriculum of postsecondary career and technical institutions meet the specific demands of current industry needs? In order to gain full understanding of the philosophies, assumptions, and leadership of technical education in institutions worldwide, these questions need to be answered. The answers to these questions, and many more, depend on a number of variables, not the least of which are underlying philosophies, implicit assumptions, and “common vision” held by those who are responsible for career and technical education (Rojewski, 2002).

Attaining an occupation that will provide the means to live and be successful is largely dependent on the amount of education or training one receives. Career and technical education (CTE) has evolved from being mostly concerned with agriculture and industrial arts to advanced technologies. CTE programs are driven by the needs of the current labor market and thus must adjust their curricula accordingly. High quality programs provide students with employable and transferable skills that enable them to be successful in the workforce (Goins, 2015). The success for any education and training system should be measured by what people actually learn from it (Jessup, 1994). Students who participate in CTE programs have the advantage of acquiring knowledge and skills that will help them to be successful in today’s demanding workforce. This

advantage also benefits the employers who hire them, saving them time and resources that they would normally have to use for training individuals (Goins, 2015).

Making the transition from school to work is often a difficult endeavor and leaves many unprepared, frustrated, and aimless. The transition from school to work is often a crucial time in the lives of today's young people. How and when this transition is made can have a major impact on the sense of identity that is developed by the one making the transition (Hodkinson, Sparkes, & Hodkinson, 2012). Arum and Shavit (1995) make a point to emphasize that this transition is a subject that needs to be understood in terms of the rapidly changing needs of our present economy. Despite the fact that young people today are better educated than their older counterparts, high youth unemployment remains a serious problem in many countries. The cause of this is complicated and reflects various factors, such as the high proportion of young people completing their basic education without the skills needed to adapt well to the labor market (Quintini, Martin, & Martin, 2007). It is important to note that today the transition process is different than it was in the past. Arum and Shavit (1995) also point out the concept of a specific transition period has been diluted as many students start working while still in secondary school and on into postsecondary. The jobs that many students have while attending school give them some experience in transitioning from school to work. However, while these jobs often lead to further employment within the same company, there is often not a break from school life to work life that is necessary to establish a foundation of the daily routine of going to work and earning their own living (Arum & Shavit, 1995).

It also important to understand that while students are preparing themselves for the workplace, they are undergoing physical and emotional changes in transitioning from childhood to adolescence, and from adolescence to adulthood (Jung et al., 2003). Achieving independence

from parents, which often is only possible after obtaining fulltime employment, is normally the milestone that shows one has achieved adulthood. True independence incorporates having the means, capacity, confidence, and orientation to interact with others on an equal footing. As the economy becomes more and more knowledge-based and suitable employment that will meet the needs of unskilled workers is becoming harder to find, this transition to work is often being deferred until formal training or education can be completed. (Jung et al., 2003).

Shavit and Muller (1998) noted that American educational institutions have made a distinction between academic and vocational training since the 1950s. Furthermore, secondary and postsecondary education schools are increasingly marketing themselves as vocational or academic. By tailoring the education of each student according to the needs of both the student and the labor market, a better quality of education can be obtained. Furthermore, vocational offerings have brought about a consistent pattern of positive outcomes, in that graduates have higher initial wages than those who chose to leave high school and go straight to work (Shavit & Muller, 1998). Almost every occupation requires training and preparation to learn the tasks involved with some degree of competence. However, the skills and tasks learned in vocational schools should match the skills needed to perform well in prospective occupations.

Career and technical education (CTE) programs are designed to help prepare students to become effective in the workplace by equipping them with skills that are needed in the 21st century workplace (Goins, 2015). The efficacy of postsecondary vocational curriculum in preparing students to transition from school to work is the subject of this case study. Much research exists on school-to-work transition and the effectiveness of technology in teaching, but there is little research on the effectiveness of methods and curriculum taught in postsecondary CTE programs. The purpose of this study is to qualitatively examine and understand the

effectiveness of the objectives taught in a CTE program and how well the curriculum promotes ability to complete given job requirements. To gain understanding of the scope of this study, a close look at some of the conceptual framework is necessary.

Conceptual Framework

Miller (1996) stated that a conceptual framework contains principles that suggest preferred practices serve as benchmarks for program and curriculum development, choice of instructional practices, and the development of policy and philosophy that make assumptions about human nature and activity. Philosophy itself actually becomes a conceptual framework for cohesion and assessment because it aids the educator in determining what should be changed, and what should be left as it is (Miller, 1996). Three issues that impact a definitive CTE conceptual framework are the dynamic and increasingly global nature of work and the workforce, the evolving patterns of family and community living, and the need for CTE educators to continually revise and update curricular content to provide industry with employees who possess cutting edge technology, skills, and personal characteristics (Rojewski, 2002). Conceptual frameworks should accomplish several things. It should establish parameters of a given profession, account for historical events, and establish the philosophical underpinnings of the field (Rojewski, 2009). Any conceptual framework for vocational education must be flexible, allowing for differences in secondary or postsecondary programs and accommodate different economies throughout the world. At the same time, this framework must identify underlying beliefs and values that are consistent for all types of programs (Rojewski, 2009).

Because appraisals of educating individuals for careers vary and often appear in literature, there is a need to develop conceptual distinctions that will put them in perspective and clarify some of the main issues that exist. According to Silberman and Ginsburg (1976) there are

four dimensions that can be used to classify the issues with postsecondary vocational education: a technical-social continuum, individualism-altruism, conservatism-liberalism, and centralism-decentralism. Unprecedented changes in work, family, community, and politics in the 21st century, fueled by globalization, have brought about an emphasis on capitalization (Rojewski, 2009). Hodkinson et al. (2012) stated that there are differences between the career paths of young people from different societies and backgrounds. For the purposes of this study, the technical-social continuum and an emphasis on the value of skilled trades and job preparation will help frame the experience of those moving from school to work.

Technical-Social Continuum

Silberman and Ginsburg (1976) stated that vocational educators traditionally have emphasized technical job skills as the solution to school-to-work transition. The lack of these occupational skills, which prepare students to perform essential job tasks, has made it hard for students to make a smooth transition from the academic life to work. Rojewski (2009) stated that the worldwide influence of capitalism has brought about a need for knowledgeable workers skilled in technology.

This poses certain significant challenges for CTE educators to create curricula that address the needs of workers, society, and industry. One solution to this problem is to place more value on skilled trades and make students aware of these occupations as early as elementary school. Not only are technical skills important in transitioning to work but social skills, which are necessary to perform in almost any occupation, are equally important. Decision-making, problem-solving, and communication skills are among those social skills. Educators who believe the transition problem is a lack of social and problem-solving skills conceptualize that there is an absence of opportunity for making decisions and solving problems

(Silberman & Ginsburg, 1976). Both technical and social skills are needed for work-ready competence, but the emphasis that is placed on them varies among educators. Policy decisions will certainly be affected, based on the stand that educators take on this issue. The focus on either technical or social skills will have a profound effect on the ability of schools to ease the transition problem (Silberman & Ginsburg, 1976). Smooth transition from school to work requires focus on both of these factors.

Curricula that will improve and enhance the transition from school to work must contain elements of the technical-social continuum to be effective. Time and experience is needed to complete a smooth transition from any established lifestyle, especially the transition from school to work. This transition is one of the first and most demanding facing young people graduating from high school or college.

Centralism-Decentralism Continuum

Centralism-decentralism is rooted in the belief that standardizing leads to a more efficient system that will meet the needs of the many. The needs of the few do not outweigh the needs of the many. Traditionally, those who hold to the centralist way of thinking believe that strong connections exist between the failure of individuals to transition smoothly from school to work and the problems of a larger society; therefore, institutions of higher learning cannot solve the issue by themselves. To the centralist, education should be centralized and collaborated in a way that creates strong connections between colleges and institutions of higher learning. The decentralist holds to the point of view that every school is its own entity and should take care of its own affairs. Although efforts have been attempted to centralize the education system of the United States they have, on the most part, failed due to a lack of incentive (Silberman & Ginsburg, 1976). There is a possible connection between the social aspects of students and their

transitioning from school to work. Many students have not been in an environment that instills a solid work ethic. Role models are essential in establishing this ethic and many are simply lacking those models. The NGC program on which this study is focused has for years established relationships with the natural gas compression industry that provide leadership and guidance to students that incorporate not only technical training, but support and encouragement in the social aspects of life. Although this issue is relevant to a smooth transition into the workforce and is critical as an overall part of a good education, the scope of this study will investigate only the effectiveness of the curriculum of the NGC program.

Human-Capital Theory

The human-capital theory in education holds to the belief that if young people invest in themselves and their futures by enrolling in school, they will reap the returns on that investment. Fitzsimons (2015) stated that throughout Western countries, education has recently been theorized as primarily being an economic device and is seen increasingly as a key determinant of economic performance. Shavit and Muller (1998) suggest that many young people have a narrower perspective on the yield. Many want to know about immediate returns and if they can expect immediate results from the investment in education. The human-capital theory considers education from the point of view of investments and returns. Students invest in their own futures by enrolling in school with the hope that the return on that investment will be substantial. The return is not expected to be an immediate windfall but something that will pay off over an entire lifetime. The human-capital theory cannot be denied as a viable theory on educational stratification, nor should it be exaggerated (Shavit & Muller, 1998). Just as early financial investments contribute to a healthy retirement income, early investments in the education of students contribute to their readiness to make the transition from school to work.

Traditionally, vocational education begins in high school. Throughout most of U.S. history, American high school students were routinely taught vocational and job-ready skills along with reading, writing, and math. Not everyone goes to college. The latest report from the Bureau of Labor Statistics (BLS) show that 68% of high school students attend college. That leaves more than 30% who do not (Wyman, 2015). Many of these students who do not attend college received vocational training in high school and have joined the workforce in their prospective industries.

Theoretical Framework

Student development theory can give educators a better understanding of students and how to respond to them empathetically. It can provide a lens through which to view students and can assist educators in putting student behavior into context rather than simply being confused by it. It can explain student behavior and give suggestions for working with students (Evans, Forney, Guido, Patton, & Renn, 2010). Chickering and Reisser (1993) developed seven vectors of student development that shed some light on the process of transitioning from school to work. These vectors, or tasks, are accomplished slowly through being exposed to appropriate developmental environments over a period of years. Chickering and Reisser (1993), in their book *Education and Identity*, include these seven vectors: developing competence, managing emotions, moving through autonomy toward independence, developing mature interpersonal relationships, establishing identity, developing purpose, and developing integrity.

The first vector of Chickering's theory is the development of intellectual, physical, and interpersonal competence. Intellectual competence involves using one's mind to build skills, analyze and understand thought, and form various points of view (Chickering & Reisser, 1993). The second vector of Chickering's theory is the ability to manage emotions. Learning to handle

emotions such as anxiety, anger, depression, desire, guilt, shame, and embarrassment is crucial to becoming an adult (Chickering & Reisser, 1993). The third vector of the developmental theory is “moving through autonomy toward independence.” Emotional independence occurs when separation from support groups such as parents, peers, and teachers occurs. Thus, developing ideas and then putting those ideas into action is instrumental independence (Chickering & Reisser, 1993). It is the scope of this study to investigate how effective the curriculum of the NGC program is in developing individuals who think independently and are able to make decisions that aid in the transition from school life to the workplace.

Developing mature interpersonal relationships is the fourth vector. Two aspects of this are “(1) tolerance and appreciation of differences [and] (2) capacity for intimacy” (Chickering & Reisser, 1993, p. 48). The capacity for intimacy relies heavily on tolerance and acceptance; thus intimacy is directly linked to tolerance and appreciation of diversity (Chickering & Reisser, 1993). The fifth vector is “establishing identity.” This vector is important because it encompasses development that occurs in the first four vectors (Chickering & Reisser, 1993). The development of identity includes the following: (a) comfort with body and appearance, (b) comfort with gender and sexual orientation, (c) sense of self in a social, historical, and cultural context, (d) clarification of self-concept through roles and lifestyle, (e) sense of self in response to feedback from valued others, (f) self-acceptance and self-esteem, and (g) personal stability and integration. Developing purpose for attending college or pursuing various paths in life is different for everyone and depends on goals, aspirations, and commitment to family and other aspects of life. Thus, the development of purpose is the sixth vector (Chickering & Reisser, 1993).

The seventh vector of Chickering's theory is "developing integrity." Integrity for one's beliefs, values, and purposes must be established before an individual can move from being dependent to independent (Chickering & Reisser, 1993). Chickering's theory has been tested and refined over time. Chickering and Reisser pointed out that student development can be expressed as a series of steps that students move along as they progress in their development. They noted that students' cognitive development parallels their ability to move along the different vectors. Although Chickering and Reisser did not give a particular sequential order for the vectors, they did note that the steps or vectors can be used to explain where the students are developmentally and where they are headed. One of the main characteristics of moving from school to work is that it is marked with many transitions, both physical and social. This period marks a time when emerging adults experience self-focus, multiple possibilities, feeling trapped in-between, and instability. For the collective of soon-to-be adults who are enrolled in postsecondary education, this period of transition requires that the university and the curriculum respond with a new standard of practice (Rosemond & Owens, 2018).

Effective curriculum should be developed that takes into consideration the concepts and theories that have been researched and tested and use them as a benchmark to build a foundation of effectiveness. Time and experience are needed to complete a smooth transition from any established lifestyle, especially the transition from school to work. The transition from school to achieving a productive livelihood, or school-to-work transition, constitutes an important juncture for all learners, moving from an environment that is more or less predictable to one that is not. (Pavlova, Lee, & Maclean, 2017).

Review of Research Literature and Methodological Literature

Shavit and Muller (2000) stated that some scholars theorize that the skills taught in most secondary vocational schools are of little value to the industries they represent and employees who aspire to join that particular industry, and that vocational education is a way for working-class students to avoid the track that leads to higher education and the professions. These scholars consider vocational secondary education as an aspect of education that serves to reinforce the social inequality between generations. Although this theory does have some aspects that are true, most research points toward secondary vocational education as being beneficial to both the student and the employer (Shavit & Muller, 2000).

Human-capital theorists, on the other hand, consider vocational education as a method for teaching students skills that are valuable to employers and can increase the prospects for employability and the attainment of desirable occupations, and, of course, the wages that come with those positions (Shavit & Muller, 2000). CTE advocates argue that allowing students to start preparing for their careers in upper-secondary school will increase the number of students who stay in school even after the age when they are no longer required by law to attend (Bishop & Mane, 2004). Fitzsimons (2015) emphasized that throughout Western countries, education is being categorized as a key determinant of economic performance. In the United States, vocational education emerged in the early 1900s in the midst of debate about the nature of public vocational education. In general, the importance of establishing vocational training in public schools in addition to classical, academic training emerged. However, there was disagreement about the design and implementation (Rojewski, 2009). In recent years, more systematic ways of developing vocational education curriculum has emerged by linking vocational and academic desired outcomes. Both vocational and academic education are both significant and urgent. A

lifelong learning strategy is necessary when considering the framework of the school-to-work transition issue (Pavlova, Lee, & Maclean, 2017).

Technical preparation or tech-prep programs provide training in technological fields that increase the number of qualified workers with knowledge in technology through a combination of secondary education and technical training (Krumboltz & Worthington, 1999). Tech-prep focuses on the blending of essential academic competencies with technical skills through curriculum that has been revised to emphasize applied academics. Industry-specific training takes place during the final stages of tech-prep programs and requires development in specific competencies used in the field. As a result, not only do participants enter the workforce with specific skills, they also have experienced learning well beyond what is needed for the industry they choose to enter. This is due in part because of the employability skills they learned through the program (Krumboltz & Worthington, 1999).

The role of the vocational, technical, and/or community college or institute in the education system is a topic of much debate. Since the early 1980s, the earnings of workers with a postsecondary education have grown relative to those of their high school-educated peers (Marcotte, 2010). Understanding the economic returns of a community college education is important for several reasons. First, community colleges and institutions of technology provide educational opportunities to students who typically would not pursue a college education. These students are often at risk for being left behind by changes in the ever-evolving labor market. Second, these institutions are a principle mechanism in our education system for upgrading skills of those who are already in the labor force but may be falling behind with technology because of their open admission policies and flexible programs of study. Finally, community colleges enroll

a greater number of students who are affected by state and federal aid that makes community college enrollment easier and more amenable (Marcotte, 2010).

The economy is changing at a rapid pace into an economy based on innovation in which technology changes the dynamics of almost every occupation. As such, new skills are needed for workers to succeed, such as computer literacy, soft skills, and job-specific technology. Postsecondary education is becoming an essential requirement in many industries. Two-thirds of America's growth in the 1990s can be attributed to the introduction of new technologies. Sixty percent of the new jobs created by technology require some sort of postsecondary training that is held by only one-third of the workers who are presently employed (Educating America, 2004). This has created a skills gap that is in need of closing. Workers are not trained quickly enough to produce skilled workers who can meet the challenge of today's economy (Educating America, 2004).

An ongoing issue within the realm of postsecondary education is the transition from school to work. There are many who think, and research supports to some degree, that vocational education is of little benefit to employers and employees. Marcotte (2010) concludes that secondary and postsecondary education benefits both the student and the employer. It is the purpose of this study to investigate the actual benefits of the curriculum being taught to graduates of a postsecondary technical school, and to learn if the students gain needed skills and information that will assist them in going straight from school to the workforce. The current research does not yield a conclusive answer to that question.

Review of Methodological Issues

Historically, many forms of research were used to study the transition from school to work. These studies include quantitative, qualitative, mixed method, and longitudinal in nature.

Quantitative research generally refers to research that is used for testing relationships among variables. Variables are then measured so that numbered data collected can be analyzed using statistical methods (Creswell, 2014). Qualitative research, on the other hand, is a means of both investigating and understanding meanings that groups or individuals place on a given social or human experience or problem. Mixed method research is a blending of both quantitative and qualitative research methods, and takes into consideration philosophical assumptions, the use of qualitative and quantitative approaches, and the analyzing of both types of data (Creswell, 2014)

Quantitative Research. Quantitative research involves the gathering of data primarily for measurement. Measurement can be defined as assigning numerical values to data to give indications of different values. Measurement is used to determine if traits or trends have a significant difference that can be used to make inferences. Nominal, ordinal, interval, and ratio scales can be used to evaluate the differences between data collected on samples of populations (McMillan, 2012).

Arum and Shavit (1995) compared two variables using quantitative methods. Findings indicate that vocational education is neither detrimental nor advantageous to a student's pursuit of advanced degrees. The findings did indicate that students who were well prepared for postsecondary education tend to succeed in their individual pursuit of a bachelor's degree. "It is interesting that the most beneficial curriculum seems to be the one that combines vocational and academic education, since the effects of the mixed category are all positive and significant" (Arum & Shavit, 1995).

When analyzing the assumption that vocational education provides a safety net that reduces the risk of unemployment, Shavit and Muller (2000) used labor market data to investigate outcomes of those who completed vocational training using a meta-analysis of a

comparative study on educational qualifications and occupational destinations. Dependent and independent variables were analyzed and contrasted to support their claim that secondary vocational education reduced the odds of unemployment. To do so, the authors used a comparative analysis of social mobility in industrialized nations (CASMIN), which is a core model to measure educational qualifications. The CASMIN core model was used to distinguish between primary, secondary, and postsecondary education. Labor market outcomes were measured using odds of being employed rather than unemployed, entering the work force as a skilled worker rather than unskilled, and the occupational prestige of the first job held after completion of schooling. The results from this study did support the hypothesis that vocational education serves as more than just a safety net but perhaps long-term outcomes would be established due to the training received (Shavit & Muller 2000).

In a longitudinal study, Buddelmeyer, Herault, and Zakirova (2011) examined the effects of vocational education and training and higher education qualifications on the wages of young people in the three years following their last educational course. This study clearly distinguishes the effects of participation in and completion of CTE courses. The study examines the student after the first few years of CTE completion and the effects on wages that participating in CTE have. Descriptive statistics were used to analyze the data. One of the difficulties of this type of study is the relatively small sample size and how that impacts the statistical significance.

Anderson, Nabavi, and Wilhelmsson (2014) also used longitudinal research methods in their study of personality and motivation on the job. This study presents data that supports the assumption that CTE has a long-term effect on the salaries of those who complete the program. Shavit and Muller's (1998) human-capital theory frames this study and helps show that an initial

investment in one's future through education will pay dividends over time as manifested in increased income.

Mixed Methods. Mixed method research designs are grounded in the assumption that despite the differences in quantitative and qualitative research designs, researchers can capitalize on the strengths of each method (McMillan, 2012). Although both quantitative and qualitative research designs have inherent limitations, mixed method research can provide answers to questions that involve both product and process, or outcomes and explanations of outcomes.

Hagen (2010) used a constant comparative method known as flexible means in his qualitative study of mandated CTE classes and their impact on college and career readiness. The main objective of this study was to examine the course work of CTE classes and their potential impact on student development. The premise of this study was that schools are currently educating narrowly focused students who are not prepared for the challenges of postsecondary life. Chickering's theory of student development was used as conceptual background. This method of research requires explicit coding and theory development (Hagen, 2010). Tuckwiller (2012) also used a mixed method design for his research on the level of knowledge possessed by CTE teachers regarding performance-based assessment. The study findings provide a foundation for CTE teacher administrators to use to assess teacher performance and it was found that support from administration had a profound effect on teacher implementation of performance-based student assessment practices.

Qualitative Research. Although most empirical studies use quantitative research methods, qualitative research has been used for many of the studies on the transition from school to work. Qualitative research is based on a different set of assumptions and methods. It is important to remember that qualitative methods are no less "scientific" than quantitative

methods. Qualitative researchers often defend their methods by maintaining that the systematic and rigorous design of their research is indeed as scientific as quantitative methods. Qualitative research makes the assumption that the bias of the researcher and the environment of the research must be included when interpreting the findings (McMillan, 2012).

Montague (2001) analyzed the mitigating conditions and factors that prevent young people from becoming apprentices. Qualitative interviews were conducted that yielded self-report-based information on the outcomes of obtaining vocations with industry partners. The claim that nontraditional curriculum taught during the grade years 10 and 11 aided students in developing more mature perspectives on work and career was substantiated in this study. These questions were asked: Why are young people not encouraged by schools to take an active part in available internships and apprenticeships, and Is traditional education for everyone or just a minority? The strength of this type of research is the broad range of responses that can be acquired through open-ended questioning. The weakness of this type of research is the self-reporting mechanism. Goins (2015) reported in a study of the phenomenology of the experiences of high school graduates who participated in a career and technical plan of study that four themes emerged during the research process. According to Goins (2015),

1. The learning process was enhanced during CTE classes.
2. CTE had a positive influence on decision making skills.
3. Understanding follows knowledge use.
4. Guidance and advisement needs to be purposeful.

This qualitative study used interview methods and concluded that CTE courses enhance the learning experience and were beneficial to the students.

Paolotto (2011) established the vocational success of adults who were formerly labeled as having behavioral or emotional problems. The consensual qualitative research (CQR) method was used in this study to find agreed-upon themes. The themes that were agreed upon were used as a benchmark for the interview questions. The purpose of the qualitative interviewing used in this study was to uncover truth, reveal realities, and provide information that would otherwise be difficult to obtain. The first interview responses were aligned, cross-analyzed, and reviewed using the NVivo software program for possible themes by the researchers. The interview protocols in this study followed the protocols established by Reiff, Gerber, and Ginsberg (1997). The protocols allowed for a reconstruction of the secondary school experience of the individuals involved. The results of this study yield data that align with the conceptual framework that having a caring adult to mentor and support enhances the chances for a successful life.

Starr (2013) related the role service learning plays in transitioning from school to work. This study used a cross-sectional descriptive mixed methods strategy to reveal understanding of how service learning enhances the overall educational experience and has positive effects on skills needed to transition smoothly into the workforce. An online survey was administered, followed with scripted interviews. The Lowery conceptual learning model was used to assess how service expectations have an influence on the development of character traits related to civic responsibility and cultural awareness, especially the needs of others.

Meanings are constructed by human beings as they engage and interpret the world around them (Creswell, 2014). For the purpose of this study, a qualitative research design lended itself to a thorough examination of the questions asked. This study involved participants who had completed a 2-year, postsecondary degree in CTE and the industry partners who hired them. The efficacy of the curriculum that was taught in their program was examined through survey and

semistructured interviews. Their experience in the field will give them the ability to answer questions about the relevancy and effectiveness of the training they received, enabling them to answer several open-ended questions such as:

1. Was the curriculum taught at the university you attended relevant to what you needed to know to perform the essential job tasks of your job?
2. Do you feel like you were well prepared to engage in the tasks that you were required to perform on a daily basis?
3. What would you change, concerning the curriculum, about the program of study that you graduated from (Creswell, 2014)?

Questions such as these lend themselves to interviews and surveys and can unveil hidden meanings and attitudes that can shed light on the relevance of a program of study, which is the purpose of qualitative research. Qualitative research seeks to understand the context or setting of the participants by visiting the environment and gathering information personally (Creswell, 2014).

Quantitative procedures such as one-on-one interviews take into consideration environment and meanings that individuals place on experiences. Many experimental studies use quantitative research methods, and the data is analyzed using statistical methods that yield significant or nonsignificant differences in the experimental and control groups. These types of studies are valuable but limited. Educational researchers mostly agree that questions and problems are best investigated by using whatever methods are appropriate to acquire the most credible answers (McMillan, 2012).

Synthesis of Research Findings

A substantial number of studies have investigated the transition from school to work. Many of these studies address the issue of secondary and postsecondary education. During relatively recent history, a division arose: those who were privileged received formal education and developed academic skills that were not readily available to those who were less fortunate; and those who did not receive formal education, who were often educated in skilled trades through the apprenticeship method (Chickering & Reisser, 1993; Goins, 2015; Haury & Rillero, 1994; Marcotte, 2010; Shavit & Mueller, 1998). The past 200 years have proved to be a blending of the two. Career and technical education has been, and will continue to be, a blending of general studies and technical skills. There are many technical areas that are a part of the CTE education matrix. The scope of this study is concerned primarily with the training of industrial technicians. In recent years the sum of knowledge that is needed by a technician has dramatically increased. With the introduction of complex electrical and electronic control systems on natural gas engines and compressors, a new philosophy is beginning to emerge. The need for intensive classroom instruction and hands on training is taking the place of the “handed down” method.

Stepping-stone to Employment

Shavit and Muller (2000) researched the value of secondary education as it relates to unemployment and found that secondary vocational education is a stepping-stone rather than a stumbling block to those on their path to higher education. It is credible to consider secondary vocational education as both a safety net while planning for higher education but also as a pathway to gainful employment as skilled workers. A few years prior, Arum and Shavit (1995) researched the difference in outcomes of students who take rigorous courses during college prep.

They found that these students were more prepared for higher education and thus more likely to achieve a higher degree than those who did not take college preparation classes. The findings of these two studies support the human-capital theory that vocational education serves as a means for individuals to achieve gainful employment. However, while these two studies address the value of vocational training, they do not research the value of curriculum taught in specific programs. The question still remains if what is being taught in a given plan of study is really relevant and preparatory to student success when defined as the successful transition from school into the workforce with the skills and knowledge to be successful.

Montague (2001) researched the possible benefits of society recognizing the value of apprenticeships and traineeships. The analysis of mitigating conditions and factors that prevent students from obtaining internships or traineeships was studied using qualitative methods. The findings support the notion that departing from a traditional curriculum to a more progressive plan of study that includes vocational training may help students to be more prepared to transition from school to work and develop more mature attitudes about work in general. Curriculum alone does not adequately prepare students. An atmosphere of support and encouragement must be present to guide young people who choose to pursue a career in the skilled trades. Although this study did investigate many of the issues that are involved in transitioning into the workforce, it did not investigate the actual curriculum and its value. Sweet (1998) stated:

In total, almost 15% of all 15–19 year olds are neither full-time education nor in full time work, and this proportion has grown during the 1990s. The problem that young people face in making the transition from initial education to their working life is not only to find work but to be able to escape from a cycle of insecure, casual, temporary, and part-time

work after they leave school. Many completely drop out of both education and the labor market. (p. 2)

This problem is further exacerbated by the decreasing number of students who are enrolling and completing classes in high school that prepare them for college.

Hagen (2010) did investigate the possibility of integrating core academic studies with career and technical education (CTE) to determine if a balanced approach was used in secondary education that blended CTE courses with core academic studies would the outcome be a more balanced student who would attend classes regularly and perform better in the postsecondary education arena. It was determined that if a student develops competence, emotional management, and independence that their employment and educational outcomes would be better. Although this study investigated the integration of academic courses, it did not research the actual effectiveness of the CTE curriculum and the opinions of past students on their level of preparedness for the job. “Developing competence includes making certain that the skills and knowledge necessary to be confident and competitive are instilled” (Hagen, 2010, p.15). In order for a student to make a smooth transition from school to work, a certain level of competence must be obtained prior to going to work and maintained during the transition.

Goin (2015) did investigate the enhancement of student job readiness through the program of study of a secondary vocational school in North Carolina. This study investigated the perceptions of students who completed CTE training at the secondary level. Although this study does dig into the actual purposefulness of the curriculum, it fails to identify the actual job readiness that is obtained from the curriculum. Most of the determinations were general and not focused on the actual effectiveness of core courses of the program. Four themes emerged during the research process of this study, in which the learning process was enhanced, decision making

was influenced and enhanced, new situations were supported by knowledge gained from understanding what was learned, and the guidance received during the education process needs to be purposeful to be effective. Many college graduates are not prepared for the emphasis that is placed on them to be knowledgeable in their field of study and have skills that help them collaborate well in a team environment. The importance of being able to deal with different types of people and balancing work demands with personal life cannot be overemphasized. Some college graduates mistakenly believe that having a superior academic standing will mean automatic success in the professional world. The fact is that having a college degree or graduating from a post-secondary vocational institution does not guarantee favor with employers. In reality, most of the jobs that are available to college graduates are entry level positions. Post-secondary vocational education is a stepping stone to employment, but employers want and need individuals who can quickly learn and perform required tasks.

Critique of Previous Research

Many of the studies conducted on school-to-work transition seem to focus mostly on subjective issues such as support, motivation, attitude, and whether or not vocational education is beneficial if one intends on pursuing a postsecondary degree (Silberman & Ginsberg, 1976). Little research attempts to understand effectiveness of the objectives taught in a particular plan of study or the outcomes produced. The question needs to be asked: Are we as faculty teaching technology students what they need to know to be effective in their chosen vocation? In turn, is a smooth transition from school to work a purely subjective matter or does knowing what you need to know to do your job well more important? The literature that is available fails to answer these questions.

If indeed we are striving to train students to be effective workers, doesn't the curriculum need to be job specific? Many choose to believe that if you teach the fundamentals of any given vocation, then the learner, through on-the-job-training, will be able to learn the specifics of the job with time. If a smooth transition to work is the goal, then would it not be better to train individuals on the specifics of a particular job to enable them to go straight to work with the correct expectations? The NGC program strives to teach job skills that are needed to complete daily tasks that are required by the industry. This type of training has proved effective. Shavit and Muller (2000) used data that was already available to complete their study. Although this might have met the needs of the research they conducted, this information would be of little use in determining the actual relevancy of the curriculum being taught in a program of study. On the other hand, Goin (2015) did use actual students who completed a program to conduct his study, but the questions being asked and the answers that were obtained were subjective and open to interpretation. New research is needed to answer questions that many CTE programs are asking, such as:

1. Does our plan of study incorporate all that is needed for the students to make a smooth transition from school to work?
2. Is the difference between the objectives or tasks being taught in our program different from actual tasks that are involved after the completion of the plan of study?

If the goal is to train future workers and help them make a natural, smooth transition into their chosen field, research is needed to help CTE programs incorporate practices into their curricula that meet that goal.

Conclusion

Skills and tasks are handed down from generation to generation, from skilled tradesmen to unskilled, untrained individuals; however, the idea of “passing it on” has largely become a thing of the past. The technical skills of modern industrial engine and equipment repair and maintenance now must be learned either on the job, through institutions of technology, or a combination of both. There are many theories about the value of secondary and postsecondary vocational training. Those who hold to the technical-social theory consider vocational education a solution to the school-to-work transition. Silberman and Ginsberg (1976) state one solution to the problem is to place more emphasis on skilled trades at an early developmental age.

If one is to assume that human nature is basically unselfish, as those who theorize altruistically, then too much concern for one’s own self could be a problem that contributes to a poor transition from school to work. Silberman and Ginsberg (1976) stated that those who hold to the altruistic side believe that a job or career does not have to be fulfilling and simply needs to be done even if it is mundane. Opponents to this theory believe that autonomy is important to job satisfaction, and it therefore smooths the transition from school to work.

The conservative-liberal continuum is similar to the altruistic continuum. Traditionally the conservative end of the spectrum expresses that work is purely a “means to a way” endeavor and the bottom line is earning money. The liberal end of the spectrum assigns much more meaning to work and believes that work should have some free choice and meaning involved.

What part does education play in the transition process? The centralist believes that failures to make a smooth transition into the workforce is rooted in society; therefore, institutions of higher learning cannot solve these issues. The centralist holds to the idea that secondary and

postsecondary institutions should collaborate more and create a clear pathway to industry (Silberman & Ginsberg, 1976).

Throughout Western countries, education is often theorized as primarily an economic device. Human-capital theory is the most influential theory of Western education, setting the framework of government policies since the early 1960s. It is often seen as an indicator of economic performance (Fitzsimons, 2018). The human-capital theory places the value of education in a role of investment. The more that is invested in one's future dictates the outcome. Students invest in their own future and expect a return on their investment. This return takes the form of well-paying careers that will support them and their families. Secondary vocational education is viewed by many as a less rigorous path for young people to take, and is viewed as an aspect of education that reinforces social inequality.

Human-capital theorists consider vocational education a valid pathway to the skilled trades (Shavit & Muller, 2000). Postsecondary education, on the other hand, is considered by most to be a valid choice. Industry partners view postsecondary institutions as a good source for prospective employees and offer internships that often lead to full-time positions (Marcotte, 2010). It is the consensus of much research that vocational education is valuable and a valid pathway to skilled trades and technical jobs.

What is the nature of curriculum that is job specific, how does CTE curriculum influence the transition from school to work, and what are the effects of job-specific curricula on making a natural, smooth transition from the academic world to the workforce? It is the scope of this research paper to determine if the curriculum that is being taught at a particular institution is valid in the eyes of those who have been through the program of study and their employers.

Based on this review of literatures, which develops a unique conceptual framework using the human-capital theory, the altruistic continuum, and Chickering's Theory of Student Development to understand what can assist students in making a smooth transition from school to work, there is sufficient reason for thinking that an investigation examining the impact of job specific curricula may yield significant findings that would enhance the CTE programs in schools. I can therefore claim that the literature review has provided strong support for pursuing a research project to answer the following questions:

1. How do graduates of a CTE program perceive and describe how a technical curriculum prepared them for the transition from school to work?
2. How do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on-the-job demands?

Chapter 3: Methodology

Education is the single most important determinant of occupational success in industrialized societies (Shavit & Muller, 1998). Employers rely on education credentials when making selections for specific job tasks. Furthermore, individuals invest in their education to improve their chances in the labor market. Transitioning from school to work is often a difficult task for students and it is this transition and how the curriculum of a specific program can aid students in making the transition smoothly and with minimal difficulty that this study seeks to examine.

Faced with a highly technological and changing world, career and technical educators are challenged to meet the needs of a modern economy. As industry grows and evolves, so too must the educational curriculum. Shavit and Muller (1998) emphasized that employers seek employees who are able to go straight to work, with minimal additional training. This is becoming the mandate for postsecondary career and technical institutions. This type of training is most often obtained through postsecondary technical programs, including the NGC program.

The future competitiveness of America's workforce is dependent on increased student engagement, an innovative curriculum, and by meeting the needs of both the student and the employer (Drage, 2009). The primary focus of career and technical education is to prepare students to enter the workforce as prepared as possible, while ensuring that traditional academic courses are included to give both a breadth and depth of knowledge. However, career and technical education courses (CTE) provide specialized training in specific areas that are relevant to the field that students are planning to enter and provide skills that make transitioning into that field less difficult. The future of career and technical education lies in promoting high standards, both in academic and occupational areas (Drage, 2009).

This qualitative research study considered the efficacy of the curriculum taught in the NGC program through exploration of participant experience. This study sought to understand how the NGC program can engage in best practices to provide a smooth transition from school to work. As a result, graduates from the program were asked to reflect on their lived experience of the NGC program, their perception of curricular alignment with the workforce and the skills they learned while in school. Furthermore, industry partners were asked to describe their satisfaction with the job-readiness of the NGC graduates they hired. Graduates of the program who have worked within the industry for at least one year after graduation and the industry partners with whom they are employed were selected to participate in this case study.

Research Design

While Natural Gas Compression programs exist throughout the United States, the NGC program on which this study focuses is the largest in the nation and a study of the efficacy of the curriculum of this program will be beneficial not only to the NGC program, but other similar programs. The NGC program has capacity for 160 students. Enrollment peaked a few years ago at 140 students (Crow, 2017). To understand the experiences of graduates from this program, who transitioned directly from school to work, a case study research design was used as the methodology for research. This design was chosen because the research was centered within a bounded system of a specific group of individuals during a given time frame (Yin, 2014). The main interest in conducting this research was to compare the curriculum of the program with the actual need-to-know information required for a graduate to be successful and transition smoothly from academic life to working life. The experience and knowledge of graduates from the NGC program, after working in the field for at least one year, provided a valuable resource in the investigation of the efficacy of the curriculum.

The case study research design complemented the research questions for this study. Graduates from the program have made the transition from school to work and are performing required tasks on a daily basis. The knowledge utilized in the field was compared to what they actually learned while in school. The most accurate information about the program can be obtained from the perspectives of those who have experienced it, such as the graduates and their employers. Because lived experience varies from individual to individual, activities that are unique for each participant were examined and analyzed. Many of the graduates have experienced common activities within the framework of their employment, but not all industry partners conduct business in the same manner and many activities were different. This provided multiple responses to questions asked. Furthermore, the relationship between the activities in which the participants are engaged on a daily basis was compared to the curriculum to which they were exposed while in school. Semistructured interviews allowed the participants to consider their experiences and reflect on the curriculum that was taught and how it influenced their performance on the job.

McMillan (2012) stated that a qualitative research study involves the researcher entering the study “as if they know very little about the people and places they will visit. They attempt to loosen themselves from their preconceptions” (p. 277). Because of this perspective and the researcher’s limited knowledge of the particular environment, individuals, and information sources, it was difficult to begin the study with a precise research design. As the study proceeded, the researcher uncovered what needed to be done to fully describe and understand the phenomena being studied. The design was emergent in that it remained flexible and evolved during the study (McMillan, 2012). Data was collected, recorded, analyzed, and interpreted using procedures that are consistent with current qualitative research. The tool used to collect data was

direct interviews with the participants, which were recorded and transcribed by the researcher. Detailed information will be given in the next section.

Case Study

A case study is defined as an intensive study about a person, a group, or a unit, aimed at generalizing over several groups (Gerring, 2004). Yin (1984) defined the case study research method “as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (p. 23). Gerring (2004) stated that the case study method is correctly understood as a particular way of defining cases, not a way of analyzing cases or a way of modeling causal relations. Gerring (2004) further emphasized that understanding the subject illuminates some of the persistent ambiguities of case study work. In other words, knowing the participants you are studying and the specific language used in the particular research setting helped the researcher to clarify some of the descriptions that could have more than one meaning. It was the understanding of the participants’ feelings about their education and their employer’s opinion about the efficacy of the program this study sought to find.

The primary source of information in this case study was web-based, semistructured interviews with participants. Case study methods, such as open ended questioning and descriptive details, assisted in explaining both the process and outcome of a particular phenomenon through analysis of the case under investigation (Tellis, 1997). As a result, this study examined the perspectives and experiences of both the graduates and industry partners who hired them.

Research Questions

This case study was guided by two research questions which arose during the review of literature and probe into the issue of transitioning from school to work:

1. How do graduates of a CTE program perceive and describe how a technical curriculum prepared them for the transition from school to work?
2. How do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on the job demands and do the two perspectives match?

Target Population, Sampling Method, and Related Procedures

Purposeful sampling was employed for this case study, which allowed participants to be selected in a manner that empowered the researcher to extract the most from the data (Merriam, 2009). Within the category of purposeful sampling, there is critical case sampling. Patton (2002) explained that critical case sampling is a form of purposeful sampling that is useful in exploratory qualitative research in which case study is employed. Patton (2002) further discussed that critical case sampling can be decisive in explaining the phenomenon that is of interest to the researcher. Patton (2002) stated that critical cases, as defined above, should not be used to make statistical inferences; however, they can be helpful in making logical generalizations. It was with this methodology in mind that this case study was designed and implemented.

The target population for this study consisted of 15 graduates of the NGC program who graduated in the past five years and who are still working in the natural gas compression industry. This allowed for participants to recall the curriculum and ensured that enough field experience had been obtained to allow the candidates to answer the questions with a high level of

confidence. These graduates, having spent at least one year employed in the industry, have acquired valuable experience and knowledge which was valuable for this study.

The second group of participants in this study was composed of five industry partners who have hired interns as well as program graduates for full-time employment. There were 10 companies who support the NGC program who were contacted about participating in this study. As stated above, five representatives of these companies were interviewed. Some of the industry partners may have more than one graduate participant involved in the study. By choosing companies who have employees who are involved in the study, two perspectives were obtained concerning the effectiveness of the curriculum.

Coyne (1997) stated that sampling is a very complex issue in qualitative research, as there are many variations of qualitative sampling described in the literature, and much confusion about the overlapping of types of sampling, especially in the case of purposeful and theoretical sampling. According to Patton (2002), the logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. With 15 graduate and five industry partner participants it was reasonable for the researcher to interview, collect, analyze, and code the data. Even though this was a small-scale study, and the results are not generalizable, it provided valuable information that may be used for further research and to form ideas for improvement for the plan of study of the NGC program. The data collected was rich and the interviews provided insight into the questions concerning the efficacy of the curriculum. Both student and industry partner participants invited to the study were asked to contact the researcher to schedule an interview. Before their respective interviews, all participants were asked to sign an informed consent form (see Appendices B and C).

Interviews were conducted on-line using a web-based video software that allows participants to visually connect with the interviewer. The program records the audio and video, and provides a transcription of the interview. The assumption is made that nothing that occurs during the interview process is trivial, so whatever is seen, heard, or experienced is recorded and considered. The respondents were protected by the use of pseudonyms. As mentioned, the video software provided a transcription but the researcher had to read the transcriptions and correct for errors after the interviews were concluded. The transcripts were sent to the participants via email for member checking. Appendices D and E, which identify the interview questions, can be found at the end of this research document. These interviews were open-ended and lasted no longer than 90 minutes, and the video and audio recordings were deleted immediately after the transcriptions were downloaded and corrected for mistakes.

Instrumentation

The participants of this study were interviewed by the researcher. McMillan (2012) stated that interviews provide a direct interaction between the interviewer and the respondent, which has both advantages and disadvantages compared to self-report tests, inventories, and questionnaires. By establishing a proper rapport with the subject, a skilled interviewer can enhance motivation and obtain information that might not otherwise be offered. Interviews allow for greater depth and richness of information (McMillan, 2012). Because these interviews were video recorded, facial expressions and body language will also play a part in the interpretation of the answers given. The questions that were asked were written by the researcher, who is one of the instructors in the NGC program. The interview questions were designed to obtain the participants' thoughts, feelings, and attitudes toward the program (see

Appendix C). The industry partners who hired these participants were also interviewed. Similar interview questions were asked of them (see Appendix E).

Data Collection

A consent form from each of the participants was obtained before the beginning of the initial interview. Participants were briefed on the content of the consent form before they digitally signed it to reassure them that they had the opportunity to discontinue participation if desired. The online interviews were conducted individually. Interviews were conducted via computer and webcam. Each participant was informed that the interview would be video and audio recorded. All of the participants had access to a laptop or other appropriate digital devices. Member checking was used to ensure the quality of the transcriptions and later any conclusions and interpretations of the researcher via email. The participants were asked to review the transcriptions, interpretations, and conclusions made by the researcher and confirm the findings, per recommended methods from McMillan (2012). This allowed a systematic presentation of the data in Chapter 4.

Participants responded during the interview to 10 open-ended questions. Because the interviews were semistructured, additional questions and conversations arose that clarified the answers given by the participants. The questions were written to determine the feelings that the participants and their employers have toward the curriculum that was taught during the program and if they felt that it successfully prepared them to transition from school to work. The industry partners were asked a different set of questions that investigated the effectiveness of the curriculum from their point of view. The interviews were constructed in a manner that allowed the researcher to “respond to the situation at hand” and to ask follow up questions during the interview for clarification (Merriam, 2009, p. 90).

Artifact Collection

Artifacts are archival sources that are different from documents and may include comments in student files, test results, letters of recommendation, and any other object that summarizes the strengths and weaknesses of observations and interviews (McMillan, 2012).

Artifacts were collected as a natural outgrowth of the interview and not in response to the request for artifacts. Interview and artifact analysis resulted in a great amount of data that was summarized and interpreted.

Each participant was asked during the interview if there was something special that they used on a daily basis that they could not do without. A tool, device, document, or anything else that they consider a “must have.” The artifacts were used to enhance the interview and provide a deeper understanding of what made their experience while in the NGC program and the work they are currently involved in meaningful. The collection of artifacts, as a secondary source of data, allowed for personalized discussion of areas that are most meaningful to the individual participants. Artifacts included tools, manuals, devices, and other related items that have become meaningful while they have been working in the natural gas compression industry. The most commonly mentioned artifact was a 10-inch crescent wrench.

Pilot Study

Chenail (2011) stated that a common practice for testing the quality of an interview protocol and for identifying potential researcher biases is the pilot study in which investigators try out their proposed methods to see if the planned procedures perform as expected. This procedure increases the validity and reliability of the study. A well-constructed pilot study can

help the researcher begin to address instrumentation and bias issues because it allows the researcher the opportunity to:

1. Administer the questions in the same way as the main study
2. Ask the subjects for feedback to identify ambiguities and difficult questions
3. Record the time it takes to complete the interview and decide if it is reasonable
4. Discard all unnecessary, difficult, or ambiguous questions
5. Assess whether each question gives an adequate range of responses
6. Establish that replies can be interpreted in terms of the information that is required
7. Check that all questions are answered
8. Re-word any questions that are not answered as expected
9. Shorten and revise if indicated. (Chenail, 2011, pp. 257–258)

A pilot study was implemented using faculty of the NCC program. These faculty were interviewed using the study interview questions, and their feedback on the quality and alignment of the questions was used to revise and improve the quality and validity of the questions. There were very few changes in the questions. All of the faculty members agreed that the questions for both the student participants and the industry partners were appropriate for the study.

Data Analysis Procedures

Following the individual student and employer interviews, the video recordings and the transcription of the interviews were downloaded from the video website and saved on a password-protected laptop computer. Each interview transcript was labeled with the pseudonym of the interviewee to protect the privacy of the participant. The responses were then organized, matching response with corresponding questions.

Qualitative data analysis using in vivo coding was then implemented. In vivo coding is the practice of assigning a label to a section of data, such as an interview transcript, using a word or short phrase taken from that section of data (McMillan, 2012). Furthermore, McMillan (2012) suggested that the key for successful coding is to let the data suggest the codes, not vice versa. In other words, instead of creating codes beforehand, the data itself suggested the codes. Data was then read through and labeled accordingly (Strauss & Corbin, 1990). The transcriptions of the interviews were reviewed to identify words, phrases, or events that seemed to stand out. Codes were created for these topics, and these codes were then used to create categories to organize the data. (McMillan, 2012). Broad terms were created relating to what emerged and to establish properties of each code. A search for connections among codes was then conducted. Strauss and Corbin (1990) believed that the purpose of coding is to make “connections between a category and its subcategories” (p. 97). The next step was to selectively code, identifying the core variable/s that included all of the data. It is the “process of integrating” all of the information (p. 143). The process of selective coding required rereading the interview transcripts to identify any relationships that exist related to the core variables. This analysis of the conversations during the interviews, as described above, was manually coded by the researcher. Words and phrases became the primary method of coding the data. This process allowed for development of a better understanding of the perspectives of the participants.

Limitations of Research Design

Research, no matter how well done and scientific, has inherent limitations on its use and generalizability. “Because qualitative research occurs in the natural setting it is extremely difficult to replicate studies” (Wiersma, 2000, p. 211). The goal of this case study was to understand the effectiveness of curriculum from the perspective of both the participants and their

employers. There are inherent limitations, known and unknown, associated with every research study. Each case may not reflect the participants' perspective on the curriculum, but their perspective on the transition from school to work should be evident.

Due to the small sample size in comparison to the larger population of all the graduates of the NGC program, there are inherent limitations. It will be difficult to make causal conclusions given the parameters of this qualitative study. Results and conclusions are limited to other individuals who have the same or at least very similar characteristics (McMillan, 2012). This study involved the behaviors and experiences of a small group of individuals in a particular industry. This study did not allow for a reliable generalization. It does, however, provide insight into the perspectives of this particular group of individuals. These perspectives, feelings, and attitudes can be used to form ideas on how effective the curriculum is and what changes, if any, are needed to make the program provide a smoother transition from school to work.

Expected Findings

The goal of both qualitative and quantitative research studies is to modify theory and to transfer knowledge gained. In qualitative research, each participant in a relatively small sample has been selected purposely for the contribution he or she can make toward any emerging theory (Morse, 1999). In this study, it was expected that the curriculum studied by the participants during their time in the program was valuable, providing the student with the necessary skill sets to make a smooth transition into the workplace. Although the curriculum may need updating and improvement, the overall benefit of graduating from the NGC program was beneficial and provides a good return on the investment of the participants. The research questions were:

1. How do graduates of a CTE program perceive and describe how a technical

curriculum prepared them for the transition from school to work?” It was expected that most of the participants would affirm that the curriculum in the Natural Gas Compression program developed skills sets that were advantageous to their new job. However, there were some who had ideas about how the curriculum could be enhanced to provide a smoother transition from school to work. After working in the field for a substantial amount of time, the participants discovered areas of concern that were not addressed by the curriculum of the program; this was expected.

2. How do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on-the-job demands?” The industry partners’ responses to the questions that were asked during the interview process reflected the industry partner involvement in curriculum development. It was expected that most of the graduate participants and industry partners would feel the program was valuable; however, it was expected there would be a few suggestions for improvement of the curriculum and some areas of concentration that should be added to the program of study. It was further expected that the industry partners would have some suggestions for improvement.

Ethical Issues

The consideration of ethical issues is always a concern in research. Participants were not put in situations where there was risk of harm or discomfort. In this study, there was a negligible chance of physical harm. Much effort was taken to produce an environment that included safeguards to reduce the risk of possible psychological distress, invasion of privacy, protection of confidentiality, or social disadvantages. The study was submitted to the Concordia University IRB on March 3, 2018 and was approved on March 13, 2018. The site approval was obtained in the form of an email from the Vice President of Academic affairs. Since this research involved

graduates of the program and was not conducted on site, there were zero issues with the approval process.

It was imperative to protect the rights of participants by maintaining privacy and confidentiality. All participants had the freedom to discontinue participation at any time during the study without fear of reprisal. Additionally, their involvement in the study had no effect on their job security or placement within the companies that employ them. The data was stored on the researcher's password-protected computer and the participants all were given pseudonyms.

Researchers must be diligent and prepared to address the unpredictable nature of qualitative research and its inherent issues (Batchelor & Briggs, 1994). McMillan (2012) stated that all researchers have a professional obligation to conduct studies with appropriate attention to ethical and legal guidelines. In this study, the mandate was to maintain the role of researcher and not become an active participant so that ethical issues related to psychological or social distress did not arise from a conflict in the types of interactions that potentially occurred between researcher and participants. It is also important to note that the researcher was one of the instructors of the NGC program. This enabled the participants to be more relaxed and free to discuss the issues of the research project with the researcher, based on the prior working and professional relationship.

Several safeguards were implemented to prevent the participants from feeling obligated to answer the interview questions in a certain way. Before each interview, the participants were briefed on the purpose of the research and encouraged to answer the question truthfully and completely. Opportunities were provided for each participant to review their responses, or member check, in order to establish validity.

This study relied on recorded, web-based interviews. Ramos (1989) described three main ethical issues in qualitative research: the researcher/participant relationship, the researcher's subjective interpretations of data, and the design itself. It was very important to not be deceptive or to withhold information during this study. Because it was impossible to predict the impact of the research on the participants, anticipation of the possible outcomes was critical. For example, it was important for the researcher to consider any relationships with the participants beforehand. Ramos (1989) stated that with any relationship, deliberately construed or not, there is a risk that the parties may not communicate effectively. There was also a possibility that the participants might feel obligated to answer the interview questions in a manner that they felt was advantageous to the researcher or the NGC program. These considerations were noted and many assurances were given to each participant of the important nature of the study, as improvements would come only from additional information concerning the curriculum. Finally, video recorded data was deleted after the study was done and all field notes were destroyed.

Summary

The efficacy of curriculum and the transition from school to work is the subject matter this research study addresses. Fifteen recent graduates of the NGC program and five industry partners were selected to give their thoughts, feelings, and attitudes about the effectiveness of the curriculum of the NGC program. Their experience in the field provided insight on the quality and effectiveness of the program in providing a smooth transition from school to work. Furthermore, the opinions, thoughts, and feelings of the industry partners who provide internships and employment to the graduates of the NGC program were investigated. It was expected that new ideas for improvement and methods for delivery would be uncovered.

This chapter explained the process and the research design for this study and how this case study was conducted. An explanation of the rationale for the methodological decisions for this study was discussed. The purpose, methodology, and methods shed light on the various complexities included in this study. The explanation of the types of coding of data was presented as well as expected findings. Finally, a consideration of limitations of this case study research and how potential ethical issues were addressed for this study were discussed and explained.

Chapter 4: Data Analysis and Results

The purpose of this qualitative case study was twofold. First, the study sought to record and analyze the thoughts, feelings, and experiences of recent graduates from a Natural Gas Compression (NGC) program on both their experience with the academic curriculum and how it prepared them for the transition from school to work. Furthermore, this study analyzed the experiences that industry partners had with graduates from the program. By utilizing a case study design, graduate and industry partner perceptions became evident and examination of the efficacy of the curriculum was made possible.

The case study research design addressed two primary research questions:

1. How do graduates of a CTE program perceive and describe how a technical curriculum prepared them for the transition from school to work?
2. How do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on-the-job demands?

Because each graduate experience is different and involves events not only of the graduate but also of the particular industry partner for whom they work, their feelings and perspectives were obtained to understand if their experiences with the curriculum of the NGC program prepared them to make a smooth, relatively seamless transition from school to work. Furthermore, each company represented by the industry partners has different policies and rules that govern interns and employees. The perspectives of the industry partners were extremely important to acquire a more complete picture of the effectiveness of the NGC curriculum.

As the lead instructor in the NGC program with eight years of teaching experience, I expected most of the graduate participants to affirm that the curriculum in the NGC program developed skills sets that were advantageous to their new job. I also conjectured that some

graduates would have suggestions for improvement to the curriculum. After working in the field for at least one year, the graduate participants may have discovered areas of their jobs that are not addressed by the curriculum within the program.

The companies that are represented by the industry partner participants in this study played a critical role in creating and developing the curriculum that is used in the NGC program. While I expected most of the industry partner participants to feel that the current NGC program curriculum is sufficient based on the number of program graduates they routinely hire, I did anticipate that some industry partners would offer a few suggestions for improvements and enhancements to the curriculum. Hands-on training that teaches troubleshooting electrical problems and more basic engine and compressor training are two of these areas.

Description of the Sample

The sample population consisted of graduates of a midwestern Natural Gas Compression program (NGC). The NGC program is a 2-year course of study designed to award students an Associate's Degree in Applied Science. Further, industry partners from Oklahoma and Texas, who hire the graduates of the NGC program for internships and full-time employment, participated in this study. The NGC program is a recognized leader in applied technology education and is known for world-class teaching facilities, partnerships with industry, and a nearly 90% career placement rate (Crow, 2017). The NGC program trains individuals to work in the natural gas compression industry, which is very prevalent in the midwestern United States.

The individuals within the sample in this study were chosen using purposeful sampling procedures and consisted of 15 graduates of the NGC program with work experience ranging from one to five years. Five industry partners were chosen based on their availability and willingness to participate in the study. All of the graduate participants are currently working in

the natural gas compression industry. An email was sent out to a large list of graduates from the NGC program inviting them to participate in the study. An additional email was sent out to a list of industry partners. The 15 graduate participants of this study were chosen based on criteria such as graduation date, years of employment, availability, and success in the industry.

Pseudonyms were assigned to protect the identity of each participant. Each of the graduate participants has been employed in the natural gas compression industry since graduation and has been working for at least one year in the field. All participants who were invited to participate in the study were provided with a consent form prior to their interviews. Table 1 gives the student participant pseudonyms and demographics:

Table 1.

Graduate Participant Demographics

Pseudonym	Work Title	Years of Experience
S1	Plant Operator	3
S2	Lead Operator	5
S3	Safety Management Engineer	2
S4	Mechanic	1.5
S5	Tech 4 Technician	1.5
S6	Compressor Mechanic	3
S7	Operator	2
S8	Compressor Mechanic	3
S9	Make Ready Mechanic	5
S10	Compressor Mechanic	5
S11	Owner of roustabout business	5
S12	Operator and Mechanic	4
S13	Mechanic	3
S14	Mechanic	3
S15	Operator and Mechanic	1

Table 2 gives the industry partner pseudonyms and demographics.

Table 2

Industry Partner Demographics

Pseudonym	Position	Years with Company	Location
IP1	Area Service Manager	5	Western Oklahoma
IP2	District Superintendent	31	Central Oklahoma
IP3	Corporate Training Manager	3	Oklahoma and Texas
IP4	Area Service Manager	11	Oklahoma
IP5	Make ready Fleet Yard Manager	10	Oklahoma

Research Methodology and Analysis

Forty-eight graduates of the NGC program and 10 industry partners were sent an email requesting their participation in the study. Of these, 15 graduates and five industry partners were chosen using purposeful sampling. Seventeen graduates initially responded to the email. Work schedules, time constraints, and the scheduling of the interviews narrowed it down to 15 graduate participants. There were five industry partners who were willing to participate. All participants, both graduates and industry partners, were sent an email notifying them of their participation and the interviews were scheduled. As the original email was sent out during a peak time within the industry, a month’s time was required to schedule all of the interviews.

All of the semistructured interviews were held online using the web-based program, which recorded and transcribed the interviews. Prior to the interview, all participants were provided with a digital copy of the consent form and were allowed to sign it digitally. If there were questions about the consent form the participants were encouraged to discuss their concerns before the interview. My laptop was the primary recording device and participants were aware that the interview video recordings and transcriptions were stored and password protected. After

each interview, the transcript was formatted and corrected for errors. Folders were created on my password protected laptop and the completed transcriptions were stored there.

Because the interviews were semistructured, each participant was encouraged to speak freely about the questions asked. Before asking the first interview question, I talked with the participants about their current situation and acquired some demographic information. The interviews varied in time and ranged between 30 and 90 minutes in length.

Each transcription document was rechecked for errors. By watching and listening to the videos several times and going over the transcriptions, I developed a better understanding of the material. Each transcript was then emailed to the participants for their review. All participants responding to the emails agreed on the accuracy of their transcript. The process of interviewing 15 graduate participants and five industry partners took approximately three months.

Each graduate participant received a pseudonym and the interview transcription was identified using that pseudonym. The transcripts were reviewed several times. Themes and subthemes emerged from the codes that were based on the interview questions. Open coding was used as a process of creating themes and subthemes based on the major ideas that were discovered within the data (Creswell, 2014). The codes or phrases were highlighted, counted, and organized into a table. The first round of coding yielded 275 codes, which led to 24 categories. The second round of coding yielded 12 themes and 45 subthemes. The third round of analysis yielded six themes and 12 subthemes. Six themes and three subthemes finally emerged and were used in the final analysis.

Table 3

Graduate Participant Themes and Subthemes

Themes	Subthemes
Curriculum alignment to job demands	No subtheme identified
Lack of training	Deficits in electrical training and knowledge
Transition problems	Overcoming the lack of experience
Recognition of curricular strengths and weaknesses	Suggested changes to the program
Overcoming technical challenges	No subtheme identified
Employer-provided education	No subtheme identified

The industry partner responses were analyzed next. The open coding process for the data retrieved from the industry partner interviews yielded 125 codes. From these 125 codes emerged 16 categories. The second round of coding yielded nine themes and 37 subthemes. The third round of analysis yielded seven themes and 11 subthemes. Finally, seven themes and five subthemes remained as shown in table four.

Table 4

Industry Partner Themes and Subthemes

Themes	Subthemes
Understanding logical pathways to employment	No subtheme identified
Quality of graduates	How graduates reflect on the school Understanding desirable graduate attributes
Recognition of changes from the perspective of the industry partners	Understanding time constraints and limitations
Qualities of a good mentor	No subtheme identified
Understanding graduate skill gaps	No subtheme identified
Graduate transition problems	Management of unrealistic expectations of graduates Social aspects of isolation
Educational gaps filled by the employer	No subtheme identified

To enhance the internal validity of the study, triangulation was used. Triangulation is a technique that seeks convergence of findings and cross-validation among different sources and methods of data collection (McMillan, 2012). This study used multiple sources of data including semistructured interviews, two distinct groups of participants, and artifacts. After reading through all of the interview transcripts from both sources and comparing phrases and themes that are similar or the same and including the artifacts, sufficient data was analyzed to assist with triangulation in the case study. Figure 1 shows how triangulation was used in this study.

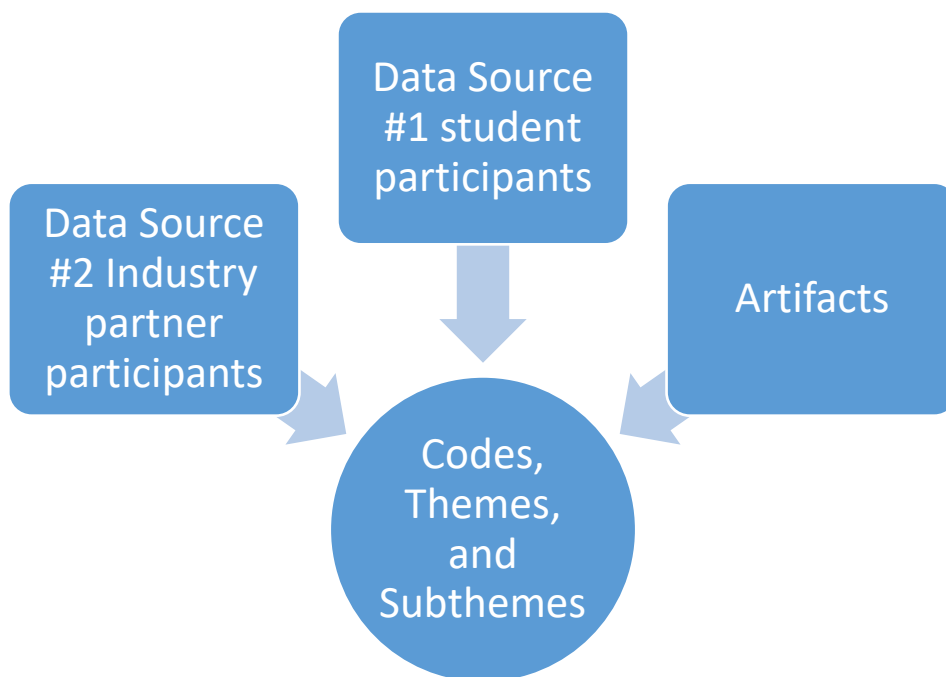


Figure 1. Triangulation used in this case study.

Summary of the Findings

The findings of this study revealed that, in general, all of the participants of the study, both graduates and industry partners, had a favorable opinion of the program and its effectiveness in providing a smooth transition from school to work. Although some of the participants mentioned some changes that they believe would enhance the program, all of the participants found the program to be valuable and a great steppingstone into the natural gas

compression industry. As voiced by industry partner participant IP3, “So, rather than allow them to complete a program and then dive headfirst into an industry without any real-world experience, the NGC program allows students to work with different companies to see what direction within the industry they really want to go.” The industry partners agreed that the program provides a valid pathway to employment with their companies. However, there were areas that many of the partners felt could be improved and updated. This study found that the student participants were generally satisfied with the education they received from the NGC program and acknowledged that going through the program changed their lives, affording them opportunities that they would not have had otherwise. Participant S14 stated “So, my overall feeling is that I am truly blessed to have had the opportunity to come through the program because it boosted my career.” S14 continued to express his gratitude during the interview for being able to be a part of a program that enabled him to go directly to work in the natural gas compression industry.

Participants in this study expressed that more “hands-on” training should be integrated into the curriculum. Student participants emphasized that you can learn only a certain amount in the classroom. Industry partner participants have recognized that “hands-on” training develops more confidence right from the start. Industry partner mentors were discussed frequently during the interviews. Student participants had nothing but good reports about the mentors they were assigned. Industry partner participants agreed that mentor qualities are extremely important and could “make or break” the intern.

Presentation of the Graduate Participant Data and Results

Interview questions were developed for each group of participants and interviews were held with the goal of answering the two research questions. In response to the student participant

interview questions data was compiled, coded, and analyzed. Six themes emerged from the data: (a) curriculum alignment to job demands, (b) lack of training, (c) transition problems, (d) recognition of curricular strengths and weaknesses, (e) overcoming technical challenges, and (f) employer-provided education. From these six themes, three subthemes emerged from the analysis.

Theme 1: Curriculum Alignment to Job Demands

Student participants perform various duties for their employers. Among these duties are preventive maintenance, major repairs, operating equipment, monitoring pressures and parameters, and troubleshooting. Student participant S10 stated, “What I do on a daily basis is mostly preventive maintenance.” By preventive maintenance S10 was referring to scheduled maintenance on the compressor packages that he worked on, consisting of changing the oil and filters, changing the spark plugs, setting the valve lash on the intake and exhaust valves, and visually checking all of the components on the compressor/engine package for proper function. The student participants were exposed to most of these duties while going through the NGC program. The participants who were operators explicitly stated that they wished they had received more training in the area of operating. An operator deals mainly with the operation of the unit and making sure that it is doing what it is designed to do. Operators do not perform actual repairs. Some operators do minor mechanic work, but not major repairs and scheduled maintenance. The NGC program focuses mostly on training individuals for compressor mechanic positions. For example, S9 stated that “on a daily basis we get units that have come off contract and we bring them back to the yard and we make them ready for new contracts.” Make ready entails any maintenance and repair that might need to be done to the unit before it goes out to another customer. S13 recalled that,

I'm just a mechanic, I don't do any operations work. So every day when the operators come check the units they call us if they have any problems. We have older equipment so we see problems more or less every day and it can be anything from a small leak to a major failure with the engine or the compressor.

One of the participants, S3, was involved in Process Safety Management. He stated, "On a daily basis I'm ensuring that we comply with OSHA standards."

Positions that are held by NGC graduates that participated in this study are plant operator, compressor mechanic, lead operator, and engineer. Operators were mostly trained on the job, as the NGC program does not emphasize this training. Most of the graduates who participated in this study are compressor mechanics, which is the focus of the training of the NGC program.

S14 believes that his skill level was definitely more than an entry level candidate and stated, "They hired me in as a level four technician, not a level one or two." The industry partner that S14 works for normally hires individuals with little experience as level one or two technicians. S14 was hired as a level four technician because of the training he received from the NGC program. All of the student participants had strong, positive feelings about their skill levels after graduation. Their levels of skill were described by the graduate participants as green, advanced, and entry level. Most felt they had very little work experience but an abundance of knowledge acquired while going through the NGC program.

Theme 2: Lack of Training

Most of the graduate participants had no issues with the mechanical engine and compressor training they received while in the NGC program. Many of them noted that they struggle with the electrical side of the industry, and suggested that more emphasis should be placed on hands-on electrical troubleshooting. Many of the participants admitted that they

learned more in one month working in the field than they did during the entire program, implying that they wished they had spent more time learning how to trace and repair electrical problems, although graduate participant S10 has taught others how to wire up Murphy panel boards. He noted, “I have to teach other technicians how to wire up and program the Murphy EICS control system (engine control system.)”

Subtheme 1: Deficits in electrical training and knowledge. The most mentioned area concerning lack of training was electrical and troubleshooting. Participant S1 stated, “While I was in North Dakota I pretty much had to figure stuff out on my own.” S1 also insisted that there is no way someone can be prepared for every situation that comes their way. S1 went to work in North Dakota on his internship. He then became a full-time employee for that company. He pointed out during the interview that he was immediately assigned duties. S1 felt a little overwhelmed and stated that he had to “sink or swim.” All of the graduate participants agree that the shop time and the “hands-on” training were the most beneficial training they received while in the program, especially in basic electrical troubleshooting and understanding electronic systems and end devices.

Theme 3: Transition Problems

Graduate participants, as a whole, had few problems making the transition from school to work. The problems that were incurred by some of the graduates mostly involved issues such as marriage, debt, lack of experience, and unrealistic expectations. Many of the graduates were married soon after beginning employment with their companies. S2 went directly to work after graduation and was soon married. He stated,

I went through a pretty big life change. When I graduated from college I had student loans, I had a lot more debt, and also I got married. So, I had a lot of life changes that happened. So that was my most difficult time.

Subtheme 1: Overcoming lack of experience. Graduates felt their lack of experience was one of the biggest transition problems. S4 explained, “School helped a lot. The biggest issue I had was the troubleshooting aspect of it.” Troubleshooting is finding problems with engines and compressors that are not easily found, such as a bad connection in a wiring harness. Generally, dealing with problems out in the field that they had never faced before caused anxiety for the graduates, and their lack of confidence from being inexperienced was troublesome. Graduate participant S6 summed this up with this statement:

I had trouble with major maintenance on engines. I’ve gotten better at it but the company that I started with expected me to know how to basically be a seasoned mechanic and, you know, we went into a head change job and it’s like okay, what does this torque to, thinking I should know that, you know.

S6 admitted that his lack of experience caused him some anxiety when he first started working in the industry. Graduate participants agreed that school prepared them for getting up early in the morning, as classes start at 7:30 AM. The graduate participants also agreed that the program taught them the importance of being on time and informing their employer in case of absence, which is one of the outcomes of the NGC program.

Theme 4: Recognition of Curricular Strengths and Weaknesses

All of the graduate participants had a positive view of the NGC program curriculum. Of the courses that were deemed most beneficial, basic engines and compressors were identified by eight of the 15 participants. Hands-on training was mentioned by the participants as crucial to

learning the skills needed in the natural gas compression industry. The curriculum of the NGC program was deemed beneficial by all 15 of the graduate participants. Current job assignment had a lot to do with which courses they felt were most beneficial.

The graduate participants of this study agreed that the curriculum of the program was good, but needed more hands-on activities. Graduate participant S2 stated:

I think it is a great program. I am not just saying that because I went through it. My wife and I did a lot of research before I actually decided to go to the NGC program. They have one of the best programs as far as what we were looking for. I wanted something that was going to place me into a job right away, not go to school and possibly get a job. That was a big factor for me.

Although all of the graduate participants agreed that more hands-on training should be incorporated into the curriculum, they realized that there are limitations to what can be done at school. Generally, the training received on compressors, basic engines, and basic electrical were mentioned as the most beneficial of the program. It was the consensus of the graduate participants that definite opportunities arose due to these trainings received in the NGC program. S4 felt his training was “awesome.” “The teachers were great, the learning environment was great, and everybody made you feel welcome.” S4 later said, “especially when it comes time to graduate, finding jobs and even internships.” He said that he recommended the program to everyone, “It was the best choice I’ve ever made.” Overall the graduate participants felt that 10 years of experience would be needed to get into the industry without the NGC program.

Subtheme 1: Suggested changes to the program. Although the graduate participants noted the NGC curriculum prepared them for becoming compressor mechanics, the participants who were in the operations side of the industry tended to feel that the program needed to include

operator training. One participant, S1, said “The program needs more information on the makeup of natural gas and operator training.” Further, S2 noted,

I remember coming back to the school a couple of years after I graduated. I came back and taught an operations class. Now, I don’t expect the school to teach that kind of class to students because maybe they are not interested in operations, but maybe an overview of how a lot more of the equipment has an effect on the process?

Operator training, newer equipment, more compressor training, and electrical troubleshooting were among the changes the participants believed the program needs. One other area of change that was suggested by participants was that some newer equipment with which to train should be acquired. The equipment used when these participants were going through the NGC program was old and outdated. Some of it had been used in the industry 30 years ago. Since that time much newer equipment has been donated by the industry partners which has allowed for updated training.

Theme 5: Overcoming Technical Challenges

Graduate participants feel that they are challenged by electrical and electronic technology. The challenges include troubleshooting, control panels, electrical wiring, programming panels, and computer literacy. Graduate participant S13 stated, “And it kind of goes back to the electrical thing. I’ve gotten into situations with electrical stuff that I didn’t know what to do. I just had to go back to the basics and trace the circuit. I definitely think that you could hit harder on the electrical.” S15 stated, “Biggest thing that got me in the beginning was a Murphy panel. That was the biggest thing that got me. You know, you got 16 channels, then you have 10 channels and so on just simple, but to a new guy it’s a lot.” S15 was expounding on a problem doing electrical troubleshooting when he first began in the industry.

He did not know exactly what to do or what to look for because he had never seen or faced a problem like that before.

Theme 6: Employer-Provided Education

Graduate participants stated that their employers all required and provided online and face-to-face safety training. Some of the employers provided additional mechanical training. Some of the training provided consisted of brand-specific training such as Caterpillar, Ajax, and Ariel. Graduate participant S2 reported:

So when I [was] hired on I was kind of a unique case. I interned as a mechanic and they didn't have any mechanic positions open. They offered me an operator position and I was kind of nervous because I was not trained for that, but the company told me not to worry, they would train me.

Graduate participant S14 said: "My company has done away with any training, it is all on the job now." Even though this particular company has done away with outside training, they are filling in educational gaps by providing trained individuals to help others learn the industry on the job.

Artifacts

The graduate participants were asked during the interview if there was any particular object, device, or document that they use on a daily basis that would be hard to live without. Artifacts summarize the strengths and weaknesses of observations and interviews (McMillan, 2012). The most frequently named artifact by the graduate participants was a "crescent wrench" also known as an adjustable open-end wrench. S4 stated, "Yeah, when you get out of the truck the crescent wrench goes in the back pocket." The use that was stated for this artifact was to open and close valves on the engine/compressor skid. Tools, written documents, electronic devices, and physical senses were also named as items important to them that were used on an

everyday basis. Graduate participant S14 said that “Oh yeah, that stays in my pocket as if it were the only tool I had. I bring it with me everywhere I go to open valves.” Furthermore, S6 noted, “Yeah, we were not allowed to use “crescent wrenches” for anything while going through the program. We were told that a crescent wrench is something that does not fit exactly and will damage bolts and nuts.” The graduates used the crescent wrenches for turning valves on and off, which is an appropriate use of the tool. The use of this tool represents an area of instruction that should be addressed, since most of the students use this tool on a daily basis.

Cell phones were another artifact mentioned. S9 noted, “I use my phone for emails, information, and I take pictures of stuff I’m working on. It helps me to remember how it goes back together.” Some technicians save PDF files on their phones that contain specifications on the equipment they are working on. The instructors of the NGC program encourage the use of cell phones for informational purposes. S9’s usage of this artifact to capture pictures of the equipment he is working on was encouraged while going through the NGC program.

Concerning the use of the senses as an important artifact, graduate participant S1 stated, “I’m gonna say my eyes just because you don’t have to be the smartest person if you are aware of your surroundings, you know, and what’s going on.” He insisted that the most important thing that he used on a daily basis was his eyes and ears, watching and listening to everything going on and noticing anything that looked or sounded different. Table five gives graduate participants and the artifacts they mentioned above.

Table 5

Artifacts

Participant	Artifact
S1	Eyes and ears, paying attention to what is going on around you.
S2	Procedure manuals and plant operating instructions
S3	Laptop computer
S4, S7, and S14	Crescent wrench
S5	No artifact
S6	Magnetic tray to hold tools and bolts
S8	Caterpillar dial indicator
S9	Cell phone
S10	Feeler gauges for setting valve lash
S11	Hand tools in general
S12	Hand tools in general
S13	Schematic
S15	Infrared temperature gun

Presentation of Industry Partner Data and Results

In response to the industry partner participant interview questions data was compiled, coded, and analyzed. Seven themes emerged from the data: (a) industry hiring of graduates, (b) quality and attributes of graduates, (c) recognition of changes from the perspective of the industry partners, (d) qualities of a good mentor, (e) understanding industry partner opinions of observed lack of training, (f) graduate transition problems, and (g) educational gaps filled by employer. From these seven themes, five subthemes emerged from the data that were analyzed.

Theme 1: Understanding Logical Pathways to Employment

All five of the industry partners felt that hiring NGC graduates was a profitable venture. The areas that were looked at by the industry partners were: performance, preparedness, attitude,

basic knowledge, and grade point average. IP3 stated that “hiring NGC graduates is a logical pathway.” The industry partner participants agreed that hiring NGC graduates for internship gives them a chance to “test drive” individuals and see if they are a good fit for the job. IP4 was impressed with the graduates that he hired from the program and stated, “They knew more than some of his guys that had been with him for three years.” The industry partners of the NGC program come to the school twice a year and hold a job fair. During this event the students have an opportunity to interview with several industry partner companies. The industry partners let the students know what their companies are looking for and what they expect out of a new hire.

Theme 2: Quality of Graduates

Participating industry partners agreed that the quality of the graduates from the NGC program is high. IP2 stated,

They seem to come out of the program mature. Which is nice. We have hired younger adults through the years that don’t go through a program like the NGC program and they don’t have that same maturity. They had the basics already down, they have the concepts already down. We’ve had a really good experience with the graduates from the program.

Subtheme 1: How graduates reflect on the school. When the industry partner participants were asked if they could think of a time when an NGC program graduate went above and beyond expectations at work two out of five of them had specific examples. IP2 praised one of the graduates of the program by saying, “We normally do not hire people with the background that he has. But we did and he hit the ground running. He is the biggest success for the NGC program and our company.” IP4 praised one of his graduates by saying that he knew as much as a someone with three years of training. IP4 noted that good troubleshooting,

collaboration, quality maintenance practices, and good electrical skills are among the attributes that the graduates who exceed expectations have.

Subtheme 2: Understanding desirable graduate attributes. When discussing the industry partner's opinion of their favorite attributes of a graduate of the NGC program all of the industry partner participants had certain attributes of the graduates that they liked. Among these are: camaraderie, maturity, diversity, and dependability. IP2 said this about one of the graduates of the NGC program:

I would say maturity. And that is what we really look for because as a rental company we may not see these guys for three or four days. They start from their homes, go to work, then go back to their homes. You have to be self-motivated, a self-starter, and have some maturity about yourself.

IP1 addressed the question about his favorite attribute and asked:

Can I be quite honest with you? It's pretty fun when you have two or three of them [the graduates] that graduated together and just the camaraderie. That stuff is kind of the fun stuff for me, when they all get to working together.

All of the industry partner participants in this study agreed that graduates were very well rounded, with diverse training and were very dependable.

Theme 3: Recognition of Changes from the Perspective of the Industry Partners

The industry partner participants of this study varied in their opinions about needed program changes. IP1 stated that he did not particularly like the panel board troubleshooting skills that some of the graduates display. "I think the program does a good job teaching them some pretty intense stuff that we do not work with, for example programmable logic controller programming." Furthermore, IP1 was more interested in seeing the graduate's knowledge on

Murphy panel boards increase. IP2 agreed, stating, “I feel like the students needed less classroom time and more hands-on shop training.” His company hires technicians to work on compressor/engine packages. IP2 further noted, “I understand that courses are needed to complete the degree program, but my company is interested in individuals who can work on compressors.” IP3 was convinced that there were no changes that needed to be made in the NGC program. “I work with other programs, so I see all of the alternatives that exist within the U.S. Looking at all the other programs, there is nothing that I would change at the NGC program.” IP4 simply stated, “There is nothing that I would change.”

Subtheme 1: Recognition of time constraints and limitations. IP5 stated that “I do not think the students have enough time in each class to really dig in.” The classes are each two hours a day for eight weeks. He realized the time constraints of each course but wished the students could spend more time actually mastering the skills they are being exposed to. Furthermore IP5 agreed that there are limitations to what a student can learn in a classroom/shop environment and that there is not a replacement for actual work experience.

Theme 4: Qualities of a Good Mentor

“It is always better to have experienced mechanics and veterans as mentors.” This statement by IP1 is very descriptive of the opinion of the other industry partner participants. Among the qualities that the industry partners agreed are important for a good mentor these are the three most prevalent: experience, the right attitude, and patience. IP3 noted,

But our corporate mentality when it comes to an internship is that we want to introduce individuals to the company the right way. We don’t want to throw them into the fire. We do not want to put them with a mentor that’s doing nothing but troubleshooting because it is pure chaos. Historically we place our interns in a make ready yard.

The industry partners agree that the mentor is a “make or break” situation that is critical to the development of a quality employee.

Theme 5: Understanding Industry Partner Opinions of Lack of Training

It was the consensus of the industry partner participants that the graduates of the NGC program tend to have a few deficits in their training in the mechanical areas of compressor repair and engine repair. IP1 stated that: “Sometimes it comes down to the guy. I have graduates of the program that come out and can do that kind of stuff [mechanical repairs] and some of them can’t.” IP1 was of the opinion that much of the deficits that he has seen in the mechanical training of graduates had to do with mechanical aptitude and experience. IP4 feels that some of the graduates are overconfident. “The only issue I have seen is overconfidence and not wanting to do it our way.”

Theme 6: Analysis of Graduate Transition Problems

A few problems were noted during the interviews with the industry partners concerning issues that graduates of the program are having making a smooth transition from school to work. Long hours worked, on-call duty, unrealistic expectations, and isolation were pointed out as being the most predominant problems being seen. IP3 stated, “I think the biggest transition problem we’ve ever had is that some of them [graduates] are not prepared for the amount of hours that our guys work.” Typically, natural gas compressor mechanics work much more than a normal 40-hour work week.

Subtheme 1: Management of unrealistic expectations. One industry partner pointed out that he thought the graduates had unrealistic expectations from his company. IP2 stated, I understand why the students have to take all of the classes they take, it is for the degree. That’s the one thing I see from many of the graduates, they think that they should be at a

higher level with my company because they have a degree. We are looking for mechanics. The graduate needs to realize that they are starting at an entry level position, not at the top.

The industry partners agree that many of the graduates feel they should start at a higher level than they do because of their education. Across the board the industry partners were adamant about graduates having to earn any position they obtain.

Subtheme 2: Social aspects of isolation. Graduates are often asked to move away from their families and friends to pursue a career in the natural gas compression industry. Many times this causes transition problems as noted by IP5 who stated,

The other transition problem that I have seen is some of the guys (graduates) have to move away from home; that was one of the biggest obstacles in their way. When we interview graduates for internships it seems they [graduates] want to be close to friends and family. Many times jobs close to home are not available. Many just could not live with that or grasp that. Many do not succeed because they wanted to get home. That is really a hard transition for an 18-year-old.

IP5 feels like moving away from home and dealing with the isolation and loneliness is a definite problem with some of the graduates. Furthermore, IP5 noted that many of the graduates are simply not ready to start “adulting” yet.

Theme 7: Educational Gaps Filled by Employer

Many of the companies that the graduates of the NGC program work for offer additional training after the graduate completes the program. Among these, Ariel compressor training, in house field training, and brand-specific training are offered. IP3 emphasize that his company was “filling in the gaps by matching training to what the technician is assigned to.” All of the

industry partner companies have extensive in-house traditional training, although one of the companies is using mostly on-the-job training in the field. S1 stated, “We have computer-based training that we have to do. We also have corporate training to keep up with certifications. It is a constant flow of information. You learn something new every day.” IP4 said, “We have a lot of in-house training that is done by our technical service department and that’s anything from Ariel compressors to the big Caterpillar engines.” The graduate and industry partner participants agree that training is a major concern of the natural gas compression industry.

Summary

The purpose of this qualitative case study was to understand how the training of graduates of the Natural Gas Compression Program (NGC) affected their introduction into the natural gas industry and how the curriculum assisted them in making a smooth transition from school to work. There were two groups of participants: graduates and industry partners. In general, all of the graduates who participated in this study found most of the curriculum beneficial and the NGC program was “life-changing” for them. Emphasis on engines, compressors, and basic electrical were the areas that the graduates thought needed more attention, and graduate participants felt “hands-on” training was the most important aspect of the training. Most of the graduates voiced an opinion that would support the addition of more “hands on” electrical troubleshooting curriculum.

The industry partner participants also agreed that most of the curriculum was beneficial. All five industry partners liked hiring graduates of the NGC program and have had mostly positive experiences with them. They recognized the quality of employee the graduate makes and could point out several times that a graduate of the program went “above and beyond” expectations. All of the companies represented in this study continue to support the program.

The industry partner mentors have been recognized with qualities that are necessary to make sure the mentees have a positive experience. The industry partners agreed that more “hands-on” training is needed, and would enhance the training the students of the NGC program receive.

Many of the industry partners noted that some of the graduates had problems transitioning from school to work due to unrealistic expectations of the graduates and from isolation encountered due to moving away from family and friends. In general, this study found that the curriculum of the NGC program does provide a strong knowledge base that allows for a smooth transition from school to work and that the natural gas industry admires the qualities that the graduates of the program have. Further, this study pointed out several areas that would improve the transition from school to work. These areas for improvement include more emphasis on the actual repair and maintenance of compressors, basic engine repair and maintenance, basic electrical, and more “hands-on” training in general. The following chapter contains explanations of the results as related to the literature, limitations of the study, and recommendations for further research.

Chapter 5: Discussion and Conclusion

This qualitative, single case study investigated the efficacy of the curriculum of a natural gas compression (NGC) program at a university in the midwestern United States. A qualitative research methodology was used, which allowed individuals to share their thoughts and feelings about the program and the effect it had on their transition from school to work. This was a case study with two distinct groups of participants. The first group consisted of graduates of the NGC program who have been working in the field for at least one year. The second group was composed of industry partners who work for companies that hire the graduates of the NGC program. Semistructured interviews were used which allowed the participants to explore their answers through open-ended questions, and provided freedom to openly share their experience. After recording the interviews with all of the participants and reading through the transcripts of the interviews several times, extensive analysis of the data revealed six themes and three subthemes for the graduate participants and seven themes and five subthemes were uncovered for the industry partners. Overall, graduate participants in this study had positive attitudes about the curriculum of the NGC program, even though there were some suggestions for additional training. Furthermore, the industry partner participants felt that hiring graduates from the NGC program was a valuable option for them and the graduates possessed attributes that were beneficial to their company's mission.

In this chapter, a summary and discussion of the results are presented in relation to the literature. Next, the limitations to the study and implications of the results for practice are discussed. Finally, recommendations for further research are discussed and a conclusion is presented.

Summary of the Results

This case study had two objectives. First, to analyze the thoughts, feelings, and experiences of graduates from the NGC program concerning their perceptions of the effect the curriculum of the program had on their transition from school to work. Second, this study analyzed industry partners' experiences with graduates from the program. After the data and artifacts were analyzed, this study found that in general, participants acknowledged that the NGC program is valuable and had a positive effect on graduates transitioning from school to work. Further, industry partners voiced their approval of graduates as employees and found many attributes that were deemed desirable. Graduate participant S6 recalled that his transition from school to work was not a challenge, and said, "For me, I don't think there were any, (transition problems). So it was an easy transition for me." He insisted that school helped him tremendously in making the transition from school life to work life.

However, graduates and industry partners both voiced concerns with insufficient training in some areas of the industry. Collectively, the graduate participants felt that more "hands-on" training should be included in the current curriculum. Additionally, industry partners felt the training offered by the NGC program was limited in resources. Further, the industry partners felt the NGC program needed to focus on giving students as many "hands-on" experiences as possible while they are in school, especially in compressors, engines, and electrical troubleshooting.

Following an analysis of data collected from the graduate interviews, six themes and three subthemes emerged. From the industry partner interviews seven emergent themes and five subthemes were discovered. Through the use of open coding, transcriptions of both the graduates and industry partner interviews were reviewed several times; statements and phrases

that appeared frequently and represented the participants' thoughts and feelings about the subject matter were highlighted. Subsequently, all codes were grouped according to frequency and similarity. For example, the code "hands-on" was found in several of the transcripts. This code eventually became the part of theme "Recognition of curricular strengths and weaknesses" and the subtheme was "Suggested changes to the program."

Initially, 275 codes were identified from the graduate participant data. During the second round of coding 12 themes and 45 subthemes were identified. Finally, six themes and three subthemes were identified after four rounds of coding and condensing. The industry partner data was coded in the same manner and finally yielded seven themes and five subthemes. The six graduate themes were: (a) curriculum alignment to job demands, (b) lack of training, (c) transition problems, (d) recognition of curricular strengths and weaknesses, (e) overcoming technical challenges, and (f) employer-provided education. The seven industry partner themes were: (a) understanding logical pathways to employment, (b) quality of graduates, (c) recognition of changes from the perspective of the industry partners, (d) qualities of a good mentor, (e) understanding graduate skill gaps, (f) graduate transition problems, and (g) educational gaps filled by the employer.

Discussion of the Results

Two main research questions guided this study:

1. How do graduates of a CTE program perceive and describe how a technical curriculum prepared them for the transition from school to work?
2. How do CTE industry partners relate their understanding of how a technical curriculum prepared their employees for on-the-job demands?

To answer each question, the interviews of both the graduate participants and the industry partners were coded and analyzed. Further, demographic information of each participant was collected during the interview. Further, the graduate participants were asked to discuss an artifact they brought to the interview that they used on an everyday basis that was representative of their career and learning. The interviews of both the graduates and the industry partners, along with the artifacts that were discussed, led to the following findings as related to the themes and subthemes that emerged during analyses.

Finding #1: The NGC Program Curriculum is Adequate in Engine and Compressor Rebuild and Repair

Results from this study found that the training the graduates of the NGC program received is in alignment with the daily engine and compressor repair and maintenance duties faced by graduates of the program. The graduate participants that work on natural gas compressors on a daily basis stated they felt the engine and compressor repair training they received from the NGC program prepared them for the repair tasks they faced in the field. Of the 15 graduate participants, 11 work as engine and compressor mechanics. These 11 graduates all agreed that the training they received enabled them to quickly adapt to the daily tasks involved in being a compressor mechanic in the industry.

Compressor training needs to be enhanced with more hands-on activities. One participant, S6, was concerned about the type of training he received in compressor repair, and felt strongly that he was unprepared to work on compressors directly out of the program. He stated, “I felt like we should have probably gone in and torn apart the frame of the compressor to familiarize ourselves with that, because we never did take the lid off the compressor.” While

others did not share the same feelings about the compressor training they received during the program, S6 felt like more training was needed in compressors.

Additional operator training should be added to the curriculum. Three of the 15 graduate participants in this study are operators of equipment, not mechanics. These three individuals felt that operator training should be incorporated into the curriculum of the NGC program. Graduate participant S2 did his internship as a mechanic. When it came time to be hired as a full-time employee, there were no mechanic positions available. The company he interned with offered him a position as an operator. Operators do very little mechanic work as they mostly monitor the equipment and make sure that it is operating within parameters. S2 felt that he did not have enough training for this position. The company encouraged him to give it a chance and S2 became an operator and, after five years, is a lead operator. He believed the program would benefit from incorporating some of the operator training he received from his company. S1 became an operator immediately out of school. He stated that it was basically an environment of “learn as you go.” He was adamant about the program needing operator training saying, “I think it is a good program, but should expand to include the process and operating side of the business.” All of the participants who were operators saw a need for the expansion of the NGC program to include more operator training.

Enhancement of electrical troubleshooting training will benefit students. This study revealed that the graduate and industry partner participants felt that more training was needed in electrical troubleshooting. IP1 stated, “Some of the stuff I don’t like in particular is some of their panel board troubleshooting skills.” Graduate participant S7 noted that “you’ve still got to learn your basic troubleshooting practices, I learned more in one month after getting out of school than I did the whole time [in the NGC curriculum].” Both industry partners and graduates

felt the NGC program needs to focus more on troubleshooting skills, especially in electrical. S13 stated, “You can teach anyone to rebuild an engine or compressor but most people struggle with the electrical portion of it.” All participants agreed that more emphasis on electrical and electronic troubleshooting would enhance the program and facilitate a smoother transition from school to work.

Finding #2: Lack of Experience is one of the Main Transition Problems

The NGC program has initiated several curriculum and program changes over the past few years. Originally, the program had two internships. The first internship was after the first year of school and the second internship was the last course that was taken before graduation. These two internships provided the students with more on-the-job training, which aided in the transition from school to work. Callanan & Benzing (2004) found that the completion of an internship was related to finding a career-oriented job. Further, the training and contacts that were obtained during an internship provide an intern with opportunities that otherwise would not have been accessible. Many interns find, while on their internship, that indeed their career choice is a good fit. The efficacy of internship placement is one of the major concerns facing those who develop educational curricula (Wan, Yang, Cheng, & Su, 2013).

During an internship period, interns shadow a seasoned mentor to learn daily tasks and skills needed to perform at a high level. While an age-old concept, the practice of mentoring in the workplace was only recently acclaimed as a powerful human resource intervention (Hegstad & Wentling, 2004). Through a contextualized learning approach provided by mentors, graduates were able to make connections between core content that was learned during the NGC program and work-based learning experiences (Brand, Browning, & Valent, 2013). Mentoring assists employees in career advancement, serves as an effective form of on-the-job-training, and helps

create learning organizations. Although varying types of mentorships have proved successful, those that have a formal structure help maximize opportunities for all employees involved (Hegstad & Wentling, 2004). The NGC program currently has only one internship. The current internship occurs during the final trimester of the program and many of the industry partners hire NGC students on as full-time employees during this internship. As a result, these students go directly from school to work, without needed transition or advisement. All of the graduates and industry partners felt the two internships provided a much better transition into the workforce. A lack of experience, combined with new surroundings and new situations, made the transition from school to work more of a challenge for many of the graduates. While CTE programs are designed to prepare students to become effective members of the workforce, the participants of this study agreed that two internships prepare students better, and better equipped them to go directly from school to work (Goins, 2015). An internship that is well designed will expand the knowledge and skills of the student while assessing their ability to apply what they have learned in the field. Often situations are encountered during internship that have real-world consequences, which enhance the student's problem solving ability. A well thought out internship becomes a foundation of need-to-know information. According to the industry partners, internships are the cornerstone of the NGC program and thus two internships need to be reconsidered (Fry, Bottoms, & O'Neill, 2005).

School does not prepare students for the social aspects of transition. Upon graduation, students face many social issues that are new to them. Marriage, debt, and change of surroundings are among the most frequently mentioned issues. Even if students did not have problems transitioning from school to work with their employers, they did have to make adjustments to their lifestyles after leaving school. Graduate participant S2 said, "But when I

graduated from college, for one I had student loans. I had a lot more debt and I got married, so there were a lot of life changes that happened.” Many of the transition problems faced by students are not in the scope of the curriculum of the NGC program; however, the problems are real and do have an effect on the transition from school to work. Graduate participant S2 further explained that it was not as hard for him to deal with the social aspect of transitioning from school to work because he was older, accustomed to going to work every day, and had already established himself financially to some degree. For those in the program who enrolled in the NGC program directly out of high school, the social aspects of transition can be overwhelming. When asked about the social aspects of transitioning from school to work, S5 said, “I guess just growing up. I’ve always tried to be on time and be honest and I carry that over to the workplace. But, I mean it’s a little different coming from school to work.”

Some of the NGC program courses are more beneficial than others. All of the students and industry partners involved in this study felt all of the courses were beneficial. All of the graduate participants felt there needed to be more “hands-on” training with less classroom time. One industry partner participant passionately stated that some of the more advanced training, such as PLC programming was more than the graduates needed to know for an entry level mechanic position. IP1 stated,

Some of the stuff I don’t like in particular, one thing is some of their panel troubleshooting skills. I think the program does a good job teaching them some pretty intense stuff that we don’t work with, like for example programming an Allen Bradley [programmable logic controller].

Most of the industry partners had no concerns with the actual courses. All of the industry partners were of the opinion that more “hands-on” training should be included, a perspective that was equally shared by graduates.

Finding # 3: NGC Program Graduates Make Good Employees

According to the industry partner participants of this study, NGC graduates make good employees even though some of them have unrealistic expectations concerning salary and job descriptions. These unrealistic expectations about salaries, daily tasks, and benefits often arise from misinformation that the intern received from other interns working for different companies. Interns frequently fall victim to financial fatigue. Because internship pay tends to be minimal, and tuition is required to gain academic credit, interns often have financial problems (Day, 2012). The industry partners agree that the graduates come out of the program with real maturity, which reflects well on the school. IP1 stated, “All in all, graduates make good employees, but I also believe that the quality of the employee reflects the human being and not always the school.” IP1 went on to explain that people often make good employees simply because they are good people. He also stated that the NGC program internship is a good idea. Individual characteristics, training received from the NGC program, and integrity are cited for making good employees.

Graduates from the NGC program display a mature attitude. The NGC curriculum provides diverse training and produces individuals who have attributes that are beneficial to the industry partners. Camaraderie, maturity, diversity, and dependability are among the industry partners’ favorite attributes of NGC program graduates. IP2 stated that “maturity is what we really look for as a rental company.” He explained that employees of his company are expected to be self-starters and have the ability to work independently with little supervision. IP2 went on

to explain that after an intern finishes his or her internship they are assigned a certain number of engines to maintain. The employee must then schedule their work day and perform scheduled maintenance on all of their engine/compressor packages with minimal supervision.

The NGC program has created definite opportunities for its graduates. The graduate participants of this study all agree that being a part of the NGC program has afforded them opportunities that they would not have had otherwise. S2 stated that, “going through the program was the best decision that I ever made.” Many of the graduates felt the NGC program is the best way to get into the natural gas compression industry. S1 stated, “The contacts, internships, and training created a pathway for success.”

Although the transition from school to work is often difficult for some students, others seem to have little difficulty with the change. The graduate participants in this study agree that the transition from school to work was much smoother due to the experiences they had while going through the program. S12 said, “No, no, it was pretty smooth and the internships were great. Going directly from school to an internship, and then back to school, and then graduate and go to work made it very smooth.” The industry partner participants also felt the internships were tremendously beneficial in providing a learning environment that aided in the transition. Further, the industry partners believed that the internships give their companies a chance to see if the intern is a good fit for their company.

Discussion of the Results in Relation to the Literature

There were several connections between this study and the literature concerning the transition from school to work. Goins (2015) stated that Career and Technical Education (CTE) programs are designed to equip students with skills that are needed to be effective in the workplace. Further, Goins (2015) reported that those who complete CTE training experience an

enhanced learning process, better decision-making skills, and a better understanding and use of the knowledge learned. Most of the students who enter the NGC program are in the exploratory phase of career development (Super, 1990). This phase of career development includes individuals who are trying to crystallize and implement some of the career choices they have been contemplating during their high school years. Super (1990) states that during this phase an individual engages in self-assessment of skills and values in order to identify a general field of work, narrows the set of careers to a specific vocation, and takes measures to realize career goals. Having narrowed their choices to becoming an industrial maintenance technician, students have chosen the NGC program to further their education. The NGC program is a tailored program that trains individuals to go directly from school to work. The internship period provides a transitional time for the graduate to become accustomed to the routine of the job and continue to practice skills that are needed to complete the tasks required on the job. Initially borrowed from the field of medicine, internships were intended for practitioners to gain “on-the-job” experience near the completion of their formal schooling (Shoho, Barnett, & Martinez, 2012). During this time, the student is paired with a mentor. The mentor is a very important part of the internship and is often the determining factor of the success or failure of an internship experience (Wan et al., 2013). Silberman and Ginsburg (1976) stated that both technical and social skills are needed for work-ready competence.

The focus of on-the-job experience is described in a variety of ways. However, the definition of Fry, Bottoms, and O’Neill (2005) was used in this study. Fry et al. (2005) explained, “A well-designed internship expands the knowledge and skills of candidates while also gauging their ability to apply new learning in authentic settings as they contend with problems that have real-world consequences” (p. 3). The NGC program internships are

structured traditionally as a one-to-one pairing of a senior level employee mentoring a new employee. The relationship often results in benefits on both sides. Business organizations today are faced with a multitude of challenges: increased globalization, rapid technological advancements, and the need to retain a high-quality workforce.

In an effort to increase employee retention and satisfaction, many companies utilize mentoring programs. The mentor and the NGC graduate develop both personally and professionally, and the company experiences increased retention, commitment, and employee motivation (Hegstad & Wentling, 2004). According to the participants of this study, both graduates and industry partners, the NGC program's curriculum prepares graduates to make the transition from school to work smoothly.

This study found that lack of experience was one of the chief detriments to making a smooth transition from school to work. Many of the graduate participants in this study experienced anxiety when they began their internship; time and experience allowed anxiety to subside and confidence levels to increase. Again, social aspects of transition are resolved chiefly through life experience and development of maturity. The transition from school to work is often a crucial time in the lives of young people; the timing of the transition has a major impact on the sense of identity that is developed by those who are making the transition (Hodkinson, Sparks, & Hodkinson, 2012).

This study examined the thoughts, feelings, and opinions of graduates of the NGC program and industry partners who are involved in the program. According to Marcotte (2010), secondary and postsecondary education benefits both the student and the employer. Shavit and Muller (2000) pointed out that although some scholars feel that vocational schools are nothing more than a postsecondary avoidance strategy for those who are reluctant to commit to going to

college, most research points toward vocational education being beneficial to all who are involved. The graduate participants of this study agreed that the NGC program provided opportunities that they would not have had otherwise. The industry partner participants also agreed that the NGC program is a logical pathway into the natural gas compression industry.

Montague's (2001) study examined the mitigating conditions and factors that prevent young people from becoming apprentices and concluded that students who were exposed to nontraditional technology classes were more likely to develop mature perspectives and attitudes about work. The industry partner participants of this study agreed the NGC program graduates possessed a high level of maturity and attributed this to the program. The NGC curriculum does have some content that encourages individuals to take responsibility for their own outcomes; however, the credit for the maturity level of the students lies mostly in their upbringing and home environment.

This study further contributed to the current literature that graduates who attended an NGC program enhanced their ability to achieve a good career in the field of their choice. Fitzsimmons (2015) emphasized that in Western countries, education is a key determinant of future performance in the job market. Marcotte (2010) pointed out that earnings of workers with a postsecondary education are substantially more than those with only a high school education. Buddelmeyer et al. (2011) examined the effects of vocational education on future wages following their graduation and found that CTE education has a long-term effect on the salaries of those who complete the training. Further, this study supports the theory by Shavit and Muller (2000) that secondary and postsecondary CTE education is a steppingstone rather than a stumbling block, not only to employment but to achieving higher education. This research study, along with the studies that are included in the literature review, contribute to the theory that CTE

programs provide a less impeded pathway to employment and aid in the transition from school to work.

Limitations

This study was limited because it was a single case study design. The results of this study are transferable in that comparisons may be made with the phenomenon explained in this research document (McMillan, 2012). Yin (2003) stated that the results from case studies are not generalizable to other populations. However, Yin further stated that the purpose of a case study is to expand and generalize theories. Additionally, many qualitative studies that have fewer than 20 participants have limited external validity (Adams & Lawrence, 2015). This study focused on 15 graduates of the NGC program and five industry partners. Therefore, generalizing the findings was not a critical consideration (Creswell, 2013).

This study was also limited to the shared opinions, experiences, and feelings at the time of the interviews. Because the researcher was one of the instructors in the NGC program when the graduate participants were attending, there may have been some personal bias on the part of both the researcher and the participants. The attitudes of both the graduates and the industry partners may have been slightly different if they had not previously known and had experiences with the researcher. All of the interviews were conducted during the summer which is one of the busiest times of the year. During the summer there are many heat related engine and compressor failures. The graduate participants of this study were working long hours. This could have had a slight effect on the interviews and the findings.

Implications of Theory and Recommendations for Practice and Policy

As a result of learning and practicing new tasks, graduates of the NGC program developed confidence in their ability to perform these tasks. Chickering and Reisser (1993)

developed seven vectors of student development. Chickering's Student Development Theory formed the theoretical underpinning of this study and can account for, in some degree, how students were able to utilize the NGC curriculum to develop both the technical and personal skills needed to transition from school to work. The study of the development of students can give educators a much clearer understanding of the needs of students and how to respond to them with empathy. It gives educators a lens through which to view students that puts their behavior in context with their stage of development (Chickering & Reisser, 1993).

The first step or vector of Chickering's theory is the development of competence and the one most applicable to this study. Chickering stated that an intellectual level of competence involves understanding thoughts and points of view. This vector of student development is supported by the NGC program's practice of continually developing mechanical skills in the area of engine and compressor repair. Chickering and Reisser (1993) further stated that time and experience is needed to effectively make the transition from any established lifestyle, especially school to work. The development of competence is accomplished slowly through being exposed to developmental environments over an extended period of time. It involves managing one's emotions, which is Chickering's second vector of development, and moving through autonomy toward interdependence, Chickering's third vector.

The curriculum of the NGC program is designed to expose students to concepts and skills needed to perform daily tasks in the natural gas compression industry. Emotional management and motivation are needed to complete the program. Emotional independence is achieved when one is separated from established support groups such as parents and peers and builds new relationships—Chickering's fourth vector—that provide support and provide new pathways to move from dependence to independence. NGC students are sent out on internships as a part of

the curriculum. This involves the student being separated from known relationships and forming new ones. Establishing identity and developing a purpose in life are Chickering's fifth and sixth vectors of student development. These two stages of life occur after one has developed competence, which in turn gives an individual confidence. The final vector of Chickering's theory of development is developing integrity. Integrity, or doing what you say you can or will do, is established and is a result of moving through the other stages of development and achieving confidence in one's own abilities and skills. The college experience likely moves students along the first four steps or vectors, which ultimately will help them develop their own identity. After establishing identity, which is vector five, students move into the final stage of developing purpose and integrity (Chickering & Riesser, 1993). Chickering and Reisser (1993) pointed out that students' cognitive development parallels their ability to move through these vectors or steps.

Effective curriculum should take into consideration the concepts and theories that have been researched and tested and use them as a benchmark to build a foundation of effectiveness. Time and experience are needed to complete a smooth transition from any established lifestyle, especially the transition from school to work. This transition is one of the first and most demanding facing young people graduating from high school or college.

Participants of this study believed that the curriculum of the NGC program was beneficial and effective in providing a smooth transition from school to work and a logical pathway into the natural gas industry. Industry partners and graduate participants recognized the importance of hands-on training and suggested that more should be incorporated into the present curriculum.

The results from this study showed that the curriculum of the NGC program does indeed aid in making a smooth transition from school to work and provides a pathway to employment into the natural gas compression industry. IP3 explained,

Initially, my feelings are that I see the program as the most logical pathway to get students from the program into the industry (talking about internships). It enables them to dive headfirst into the industry with some experience in that industry. The more chances they have to interact with the industry, the more opportunities they have to work with different companies.

Despite the anxiety and lack of experience faced by graduates of the NGC program upon leaving the program and going to work in the natural gas compression industry, the transition from school to work is indeed less stressful and smoother because of the curriculum and instruction received while attending.

Recommendation 1: Incorporate More Hands-on Training into the Current Curriculum

The participants of this research study, both graduates and industry partners, have an in-depth knowledge of what “need-to-know” tasks should be included in a comprehensive training program for compressor mechanics. All of the participants were of the opinion that more “hands-on” training should be incorporated into the NGC curriculum. S12 stated,

I just say the most important thing when you get started in the industry is just hands-on. There’s a whole lot you just can’t teach in a book. It is all going to have to come from experience. Just as much hands-on stuff as possible.

IP5 said “That’s just school in general and you can’t teach everything until you actually get on the job and start doing things.” IP5 explained that classroom learning activities give the student a basic knowledge of the subject matter but until they get their “hands on it” it is just theory.

The curriculum of the NGC program currently incorporates hands-on training. However, more of this type of training could easily be incorporated into the courses. Hands-on science is defined mainly as any instructional approach involving activity and direct experience with natural phenomena or any educational experience that actively involves students in manipulating objects to gain knowledge or understanding (Haury & Rillero, 1994). Hagen (2010) stated that if a student develops competence, emotional management, and independence their employment outcomes are far better and Montague (2001) found that curriculum alone does not adequately prepare students. An atmosphere of support and encouragement must be provided to complete the process. It was clear during this case study that all the participants felt hands-on learning developed skills that could not be obtained in a normal classroom setting. S6 stated “The curriculum was good for the most part. I felt we should have probably gone in and torn apart compressors more. It would have been nice to go into it knowing exactly how it works.” S6 felt like if he could have had his hands on the compressor more he would have been better prepared to go directly to work. As it was he (S6) had to learn it out in the field. It is recommended that additional hands-on learning experiences be added to the program.

Hands-on training does not necessarily have to be in the form of an internship. During the 2-year NGC program, several of the courses are considered lab/theory courses. During the lab portion of the course, activities are set up to mimic actual repairs that might occur in the field. The participants of this study would like to see the ratio of lab time to lecture time be adjusted in favor of hands-on learning activities.

Recommendation 2: Return to a Two Internship Model to Increase the Amount of Field Training

Historically, there were two internships during the 2-year NGC program. This allowed one year of class time and then a 15-week internship. After the first internship the student returned and completed the second year of classroom courses. This structure benefited the students and the industry. Recently the program went to one internship at the end of the program, which allowed students to go directly to work as a full-time employee straight out of school. All of the graduate participants and industry partners felt that the two internship program was more effective than the one internship program. S14 said, “That transition from school to work was really easier when you have already completed one internship out in the field. It helped out getting your feet on the ground.” Two internships allowed both the student and the industry partner to “try each other out” for a good fit.

The industry partners of this study believe that on-the-job training is crucial to the success of technicians. Because there are so many tasks and skills that are needed to become a seasoned natural gas compressor mechanic, it is impossible to replicate everything in a 2-year NGC program. The NGC program historically had two internships that provided a four-month period after one year of the 2-year program that allowed them to go to work for an industry partner as an intern. The second internship was after the second year of classroom instruction. These two internships together provided substantial learning opportunities that enhanced the learning that occurred in the classroom. The graduate participants of this study graduated from the program when there were two internships. All 15 graduates were surprised that the first internship was removed from the curriculum. S14 showed his concern about transitioning from school to work by saying,

I really didn't have any transition problems. I think one of the things that really helped me out was interning. Interning really helped out, you know, that was the transition for me right there.

The data from this case study points to two internships as important to the smooth transition from school to work.

Recommendations for Further Research

This study examined graduate participant perceptions of the efficacy of the curriculum of the NGC program in providing a smooth transition from school to work. Additionally, industry partner perceptions were examined on the effectiveness of the curriculum on meeting on-the-job demands. Through this qualitative research study, several themes emerged from the investigation of the thoughts and feelings of graduate and industry partner participants. Due to the limitations of the study and various factors that became evident during careful examination of the data, the following recommendations for further research are suggested.

Recommendation #1: Replicate This Study With Different Students and Industry Partners

Qualitative case studies should not be used to generalize to other populations (Yin, 2003). Because this study was not generalizable, it would be beneficial to do this study again in the future and see if the results are the same after any changes to the program occur. Expanding the current study to validate research findings would assist in adding to the research. This could be done by increasing the number of participants, both graduates and industry partners. Doing research such as this can point out possible areas that could be made more effective.

Recommendation #2: Replicate This Study in a Similar Program and Compare Results

There are many other industrial maintenance programs throughout the nation that could be used to do similar research. Researchers could conduct a comparative study using

participants from a similar program and compare the results. McMillan (2012) notes that participants of a study have certain characteristics, such as age, race, ability, and socioeconomic status. Results and conclusions are limited to other individuals who have the same, or at least similar, characteristics. This being said, it is important when replicating this study to find a program that is similar, with similar participants. Examining other CTE programs and investigating the effectiveness of the curriculum in transitioning from school to work would be beneficial to educational practice.

Larger sample populations would provide more extensive qualitative research by providing more interviews. These additional interviews would provide a deeper insight into the thoughts, feelings, and opinions of participants. Each additional study would provide contributions to the literature on the school-to-work transition and necessary program components.

Conclusion

The purpose of this study was to understand how the curriculum of the NGC program provided a smooth transition from school to work and how industry partners related their thoughts and feelings about the program. This qualitative single case study involved one CTE program at a university in the midwestern United States. While not generalizable, this study is distinctive and is a valuable addition to the current research (Chickering & Reisser, 1993; Goins, 2015; Haury & Rillero, 1994; Marcotte, 2010; Shavit & Mueller, 1998) on the topic of school-to-work transition. There was a total of 13 themes that this study uncovered by analyzing the data from graduate and industry partner participants. These themes led to three definitive findings. In the future, CTE educators may be able to use these findings to improve the transition from school to work.

The interviews with the participants provided a platform for them to state their thoughts, feelings, and experiences in the natural gas compression industry after graduation from the NGC program. Each graduate and industry partner participant in this study had unique experiences that provided valuable information about the NGC program and the effectiveness of its curriculum. The participants of this study answered all of the open-ended interview questions carefully and deliberately, which allowed the researcher to reach saturation with the data through the coding process, from which the themes and subthemes of this study emerged.

Results from this study support the literature on school-to-work transition. The results of this study are not unanticipated, but strengthen conclusions drawn. Consistently, the theme of hands-on learning being a very important aspect of the learning endeavor arises and is supported by the current literature (Chickering, 1993; Goins, 2015; Haury & Rillero, 1994; Marcotte, 2010; Shavit & Mueller, 1998). The hope is that additional studies will find the same results and educational leaders will see the importance of nontraditional, hands-on learning in providing a smooth, logical transition from school to work. Participants of this study, all seasoned in the natural gas compression industry, believe that hands-on learning and on-the-job training (internships) are the key to getting individuals into the workforce in a smooth manner.

The results of this study found that the NGC program provides an opportunity for individuals to go directly from school to work with a relatively smooth transition period. Areas of concern were identified by carefully examining the data which came from open-ended discussions with graduates of the NGC program and natural gas compression industry partners. These areas of concern will be examined and current practice will be analyzed to make sure the best curriculum available will be used to educate future natural gas compression students.

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Appendix A: Statement of Original Work

The Concordia University Doctorate of Education Program is a collaborative community of scholar-practitioners who seek to transform society by pursuing ethically-informed, rigorously-researched, inquiry-based projects that benefit professional, institutional, and local educational contexts. Each member of the community affirms throughout their program of study, adherence to the principles and standards outlined in the Concordia University Academic Integrity Policy. This policy states the following:

Statement of academic integrity.

As a member of the Concordia University community, I will neither engage in fraudulent or unauthorized behaviors in the presentation and completion of my work, nor will I provide unauthorized assistance to others.

Explanations:

What does “fraudulent” mean?

“Fraudulent” work is any material submitted for evaluation that is falsely or improperly presented as one’s own. This includes, but is not limited to texts, graphics and other multimedia files appropriated from any source, including another individual, that are intentionally presented as all or part of a candidate’s final work without full and complete documentation.

What is “unauthorized” assistance?

“Unauthorized assistance” refers to any support candidates solicit in the completion of their work, that has not been either explicitly specified as appropriate by the instructor, or any assistance that is understood in the class context as inappropriate. This can include, but is not limited to:

- Use of unauthorized notes or another’s work during an online test
- Use of unauthorized notes or personal assistance in an online exam setting
- Inappropriate collaboration in preparation and/or completion of a project
- Unauthorized solicitation of professional resources for the completion of the work.

Statement of Original Work (Continued)

I attest that:

1. I have read, understood, and complied with all aspects of the Concordia University–Portland Academic Integrity Policy during the development and writing of this dissertation.
2. Where information and/or materials from outside sources has been used in the production of this dissertation, all information and/or materials from outside sources has been properly referenced and all permissions required for use of the information and/or materials have been obtained, in accordance with research standards outlined in the *Publication Manual of The American Psychological Association*

Digital Signature _____ Peter James Brown Sr. _____

Name (Typed) _____ Peter James Brown Sr. _____

Date _____ March 25, 2019 _____

Appendix B: Graduate Informed Consent Form

Research Study Title: The efficacy of postsecondary vocational curriculum in preparing students to transition from school to work.
Principal Investigator: Peter James Brown M.Ed.
Research Institution: Concordia University, Portland Oregon
Faculty Advisor: Dr. Brianna Parsons

Purpose and what you will be doing:

The purpose of this survey is to investigate your perspectives on the Natural Gas Program and how the curriculum that you studied had an impact on your transition from school to work. We expect approximately 15 volunteers. No one will be paid to be in the study. We will begin enrollment on June 1, 2018 and end enrollment on August 1, 2018. To be in the study, you will participate in an interview with the researcher, answering several open-ended questions. The interview will be conducted using Zoom, a web-based online program. This interview should take no more than 90 minutes of your time.

Risks:

There are no risks to participating in this study other than providing your information. However, we will protect your information. Any personal information you provide will be coded so it cannot be linked to you. Any name or identifying information you give will be kept securely via electronic encryption. When we or any of our investigators look at the data, none of the data will have your name or identifying information. We will refer to your data with a code that only the principal investigator knows links to you. This way, your identifiable information will not be stored with the data. We will not identify you in any publication or report. Your information will be kept private at all times and then all study documents will be destroyed 3 years after we conclude this study.

Benefits:

Information you provide will help improve the program of study of the OSUIT Natural Gas Program.

Confidentiality:

This information will not be distributed to any other agency and will be kept private and confidential. The only exception to this is if you tell us abuse or neglect that makes us seriously concerned for your immediate health and safety.

Right to Withdraw:

Your participation is greatly appreciated, but we acknowledge that the questions we are asking are personal in nature. You are free at any point to choose not to engage with or stop the study. You may skip any questions you do not wish to answer. This study is not required and there is no penalty for not participating. If at any time you experience a negative emotion from answering the questions, we will stop asking you questions.

Contact Information:

You will receive a copy of this consent form. If you have questions you can talk to or write the principal investigator, Pete Brown at email [redacted]. If you want to talk with a participant advocate other than the investigator, you can write or call the director of our institutional review board, Dr. OraLee Branch (email obranch@cu-portland.edu or call 503-493-6390).

Your Statement of Consent:

I have read the above information. I asked questions if I had them, and my questions were answered. I volunteer my consent for this study.

Participant Name _____ Date

Participant Signature _____ Date

Investigator Name _____ Date

Investigator Signature _____ Date

Investigator: Pete Brown; email: [redacted]
c/o: Professor: Dr. Brianna Parsons
Concordia University–Portland
2811 NE Holman Street
Portland, Oregon 97221



Appendix C: Industry Partner Informed Consent Form

Research Study Title: The efficacy of postsecondary vocational curriculum in preparing students to transition from school to work.
Principal Investigator: Peter James Brown M.Ed.
Research Institution: Concordia University, Portland Oregon
Faculty Advisor: Dr. Brianna Parsons

Purpose and what you will be doing:

The purpose of this survey is to investigate your perspectives on the OSUIT Natural Gas Program and how the curriculum that graduates from the program studied had an impact on their transition from school to work. We expect approximately 8 volunteers. No one will be paid to be in the study. We will begin enrollment on June 1, 2018 and end enrollment on August 1, 2018. To be in the study, you will participate in an interview with the researcher, answering several open-ended questions. The interview will be conducted using a web-based program online. This interview should take no more than 90 minutes of your time.

Risks:

There are no risks to participating in this study other than providing your information. However, we will protect your information. Any personal information you provide will be coded so it cannot be linked to you. Any name or identifying information you give will be kept securely via electronic encryption. When we or any of our investigators look at the data, none of the data will have your name or identifying information. We will refer to your data with a code that only the principal investigator knows links to you. This way, your identifiable information will not be stored with the data. We will not identify you in any publication or report. Your information will be kept private at all times and then all study documents will be destroyed 3 years after we conclude this study.

Benefits:

Information you provide will help improve the program of study of the Natural Gas Program. You could benefit by improving the quality of the education of those you hire from the program.

Confidentiality:

This information will not be distributed to any other agency and will be kept private and confidential. The only exception to this is if you tell us abuse or neglect that makes us seriously concerned for your immediate health and safety.

Right to Withdraw:

Your participation is greatly appreciated, but we acknowledge that the questions we are asking are personal in nature. You are free at any point to choose not to engage with or stop the study. You may skip any questions you do not wish to answer. This study is not required and there is no penalty for not participating. If at any time you experience a negative emotion from answering the questions, we will stop asking you questions.

Contact Information:

You will receive a copy of this consent form. If you have questions you can talk to or write the principal investigator, Pete Brown, at email [redacted]. If you want to talk with a participant advocate other than the investigator, you can write or call the director of our institutional review board, Dr. OraLee Branch (email obranch@cu-portland.edu or call 503-493-6390).

Your Statement of Consent:

I have read the above information. I asked questions if I had them, and my questions were answered. I volunteer my consent for this study.

Participant Name _____ Date

Participant Signature _____ Date

Investigator Name _____ Date

Investigator Signature _____ Date

Investigator: Pete Brown; email: [redacted]
c/o: Professor: Dr. Brianna Parsons
Concordia University–Portland
2811 NE Holman Street
Portland, Oregon 97221



Appendix D: Participant Interview Questions

1. I understand that you are working in the natural gas industry. Could you tell me what you are doing on the job on a daily basis right now?
2. Could you explain to me any problems you are encountering at work that involve a lack of training you have received?
3. Were there any problems transitioning from school to work? If so, could you talk to me about them?
4. What were some areas you studied during your time at school at OSUIT that have been the most beneficial to your transition from school to work?
5. Explain to me your thoughts and feelings concerning the curriculum of the OSUIT Natural Gas program.
6. Could you expound upon changes in the curriculum that would be beneficial to future students of the program?
7. Talk to me about any technical challenges that you have encountered that you do not feel you were prepared to meet, upon graduation from the program.
8. Explain to me what measures your employer has taken to fill any gaps in your education.
9. Explain your feelings about your level of skill upon graduation from the natural gas compression program.
10. What is your overall feeling about the training you received at OSUIT?

Appendix E: Industry Partner Interview Questions

1. Could you explain your thoughts and feelings about hiring interns and graduates from the OSUIT Natural Gas Compression program?
2. What is your opinion of the quality of employee OSUIT graduates make? Why?
3. Describe a time when an OSUIT graduate performed at an above average level.
4. If you could change something about the program, what would it be?
5. What are your mentor policies?
6. What is your favorite attribute of graduates of the OSUIT Natural Gas Compression program?
7. Could you explain to me any problems you are encountering at work that involve a lack of training interns have received?
8. Did any of the graduates you hired as interns have any problems transitioning from school to work? If so, could you talk to me about them?
9. Could you expound upon changes in the curriculum that would be beneficial to your company in the future?
10. Explain to me what measures your company as the employer has taken to fill any gaps in the graduate's education.