Students Engaged in a Learn and Earn Program: Exploring Characteristics that Identify those Interested in a Career in Manufacturing

Amy M. Koning

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STUDENTS ENGAGED IN A LEARN AND EARN PROGRAM: EXPLORING CHARACTERISTICS THAT IDENTIFY THOSE INTERESTED IN A CAREER IN MANUFACTURING

by

Amy M. Koning

A dissertation submitted to the Graduate College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Education Leadership, Research, and Technology Western Michigan University June 2016

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STUDENTS ENGAGED IN A LEARN AND EARN PROGRAM: EXPLORING CHARACTERISTICS THAT IDENTIFY THOSE INTERESTED IN A CAREER IN MANUFACTURING

Amy M. Koning, Ph.D.
Western Michigan University, 2016

The 2008 recession proved to be difficult for the manufacturing industry. As a result, strategies for succession and talent attraction are now important for the resurgence of the industry. The purpose of this study was to describe and interpret how community college students, preparing for entry-level technician positions in manufacturing, experience a “learn and earn” industry and education partnership. For this study, “learn and earn” can be defined as students enrolled full-time in an associate degree program while working at a company that is sponsoring a full ride scholarship for their education.

Past studies have focused on (a) preparing young adults for specific disciplines other than manufacturing, (b) evaluations of partnership programs, and (c) the analysis of the learning characteristics of young adults preparing for a career in manufacturing. This study advanced that body of research in that the young adults’ characteristics were thoroughly explored to understand the type of person who is a good fit for a specialized “learn and earn” program in manufacturing.

Using qualitative research methods, I explored the students’ experiences in five phases: (a) analysis of the community college’s semester surveys, (b) phone interviews, (c) classroom observations, (d) work setting observations, and (e) face-to-face interviews. With a set of research questions developed from a review of academic literature, I was
able to better understand what can be learned from the experiences of students who enrolled in such a program. Seven major themes emerged. Participants:

- valued mentorship both in the classroom and on the job,
- were academically strong and preferred challenging work both in the classroom and on the job,
- were active both in and out of the classroom,
- desired to move to a professional career, with defined future goals,
- valued on-the-job training and formal education,
- preferred applied learning and were willing to apply their work ethic to both school and while on the job, and
- were not overwhelmed by the balance of school and work.

I then used a typological framework to provide a lens to distill the elements of students’ experiences in order to better inform the planning and recruitment for “learn and earn” types of programs. This analysis identified the following themes. Participants:

- disliked repetitive work,
- were accurate in both their coursework and work setting projects and valued quality,
- understood the monetary value of an education,
- possessed strong math skills,
- liked problem solving, and
- engaged in physical hobbies.
ACKNOWLEDGEMENTS

As I reflect over the completion of this program, there are so many people who have helped me along the way. The words of encouragement, advice, and a listening ear provided me the extra spirit I needed to continue to move forward and eventually complete this life goal.

To my committee, thank you for your time, patience, and guidance throughout this entire journey. Dr. Sue Poppink, your countless hours of review and subsequent revisions have led to this final product. Thank you, as it is right where I wanted to be! To Dr. Patricia Reeves, thank you for your guidance in the development of the conceptual framework and also your thorough reviews. And Dr. Richard Zinser, thank you for all of your previous and current work in career and technical education as it was through your work that this study was originally born.

To my daughter, Brooke, while you have given many “mom hours” to this program, I hope you realize that as a woman all things are possible: a career, a family, and yes even your personal goals in life. Don’t settle for anything less!

To my son, Blake, may you focus on your passion and achieve great things—I’ll be right behind you as your biggest supporter.

And to my parents, you have been my rock, you provided the support and encouragement to achieve all things. Dad, I dedicate this dissertation to you. We are so blessed that you decided to fight the good fight to see myself and so many other family members celebrate their achievements. Keep fighting!
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CHAPTER I
INTRODUCTION

The 2008 recession proved to be difficult for the manufacturing industry in West Michigan. And as that industry rebounded, a new problem emerged—difficulty in the attraction of young talent into the manufacturing field. This study sought to describe and interpret how community college students, preparing for entry-level technician positions in manufacturing, experienced a “learn and earn” industry–education partnership. Using a qualitative research approach, I examined how (a) they engaged in and experienced the program, and (b) the program influenced their career planning. In doing so, this study enabled me to understand the characteristics of, and subsequently create, a limited profile of students engaged in the program.

Background

As the 2008 recession took a foothold, the West Michigan manufacturing industry had already been declining for some time. However, between 2007 and 2009 the industry's job losses accelerated (Barker, 2011). In fact, Governor Snyder’s 2014 Economic Summit address (State of Michigan, 2014) spoke to the fact that at the peak of the 2008 manufacturing recession, 4.2% of Michigan’s young people had moved out of the state (p. 38). While this loss decreased some to 2.2% in 2012, Michigan is still experiencing knowledge migration to such states as Wisconsin, Illinois, Indiana, and Ohio (p. 39).

In addition to Governor Snyder’s report on the migration of the state’s young people, the 2014 Summit Report attempted to take a deeper dive into Michigan’s aging workforce by identifying the fastest growing sectors that had an abundance of people who were 55 years of age or older. The report attempted to inform companies about the need for succession and talent attraction strategies. The manufacturing sector tied for third place in the state of Michigan, with
13.7% of its total workforce of 20,549 employees being ages 55 years or older. This sector trailed just slightly behind the transit and ground passenger transportation (14.5%) and air transportation (14.9%) sectors (p. 36).

The 2008 recession was devastating to the manufacturing sector’s workforce, its image, and the talent pipeline for this industry. As the media reported the hundreds of jobs that were lost each month, many families living in West Michigan were directly affected as friends and family lost their jobs. According to Haglund (2013), “Many employers cut wages and laid off workers throughout the 2000s, reinforcing manufacturer’s reputation as an unstable industry” (para. 13).

Due to the recession and subsequent media coverage, parents and the community were led to believe that manufacturing was dead. Manufacturing was not dead, but instead required a different skill set. Schmitt and Boushey (2010) described this shift as a decline in demand for the less-skilled workforce. According to Carnevale and Smith (2011), “Trends in hiring for manufacturing jobs have favored skilled workers with postsecondary credentials.” They went on to state that “the days when someone could get a well-paying job in manufacturing with relatively few skills upon entry are long gone—and they aren’t coming back” (p. 4). Governor Snyder’s 2014 Economic Summit address described the following skilled trades occupations to be in the highest demand over the next five years: “welders, tool and die fabricators, line workers, machinists, mechanical maintenance technicians, pipe fitters, designers, electricians, and mold makers” (State of Michigan, 2014, p. 11). These occupations require some sort of post-secondary education often referred to as a technician-level skill set. Collins (1993) described the preparation for a technician position as “the Associate of Applied Science (A.A.S.) degrees that produce entry-level qualifications for many technicians” (p. 3).
The talent shortage in manufacturing is a result of various factors colliding: (a) the increased skill set needed to be successful, (b) the migration of talent after the manufacturing recession of 2008, and (c) the resulting tarnished image of manufacturing. In 1994, articles, such as “Gaining the Competitive Edge: Critical Issues in Science and Engineering Technician Education,” were focused on the need to supply a more advanced technician (Collins, 1994). Additionally, it was reported in the “Blueprint for Jobs in the 21st Century” that “even in the current period of high unemployment, certain jobs are going begging, and many of them are skilled trades and other ‘blue collar’ positions” (HR Policy Association, 2011, p. 31). The advancement of technology infused with the changing demographics due to the declining Michigan economy led to a gap in qualified manufacturing technicians, otherwise termed a talent shortage (State of Michigan, 2014).

This talent shortage led manufacturing companies to look to educational institutions as a means for addressing their need for young people prepared with an associate degree for technician-level, or entry-level, jobs. Industry and educational relationships have been in existence dating back to the 1960s (Clark, 1998). In fact, reviews of the research conducted on these partnerships have been published in such journals as *International Journal of Technology Management, R & D Management, Research Policy*, and many others. Orr’s (2001) definition of industry–education partnership was: “Collaborations (and partnerships, as they are often classified) refer to some form of strategic joint relationship between two or more organizational entities” (p. 41). Furthermore, in 2002, Valentín and Sanchez conducted a review of the 469 papers published in the journal, *Industry and Higher Education*, on this very topic. This review spanned articles published from 1990 to 2000 and resulted in evidence of the increase of such partnerships as well as emergent themes (p. 56–57).
Only recently have such partnerships played a critical role in bridging the talent gap that many industries are experiencing. As skilled workers are in demand, “it is critical that businesses establish reliable, long-term pipelines of qualified workers and improve the skills of their current workforce. Community colleges, with the purpose of providing the two year degrees necessary for the technician preparation have the infrastructure to provide such services and the flexibility to customize training that meets the needs of local businesses” (Dunphy, 2001, p. 3).

**Problem Statement**

The state of Michigan is experiencing a talent shortage in the skilled trades industry, specifically manufacturing, both now and into the near future due to the retirement of an aging workforce. Companies must attract young people to the pipeline. In order for that to be accomplished, a robust understanding of the type of talented young adults who would be attracted to, and successful in, the manufacturing sector is needed.

Previous research has been conducted to determine the process for developing industry–education partnership programs in the manufacturing sector and to measure their effectiveness. However, the focus of that research was not on the characteristics of individuals interested in those programs (Zinser & Lawrenz, 2004; Kemple, 2001; Gray, 2001). While previous research is important in the development of future programs, it does not address the characteristics of young adults who may be a good fit for such a program.

Another set of studies were conducted on broad, generalized student learning characteristics. These studies did not focus on specific career sectors, but instead on groups of students such as Generation Y’s characteristics and academic success (Miller & Slocombe, 2012) and the learner characteristics of undergraduates (Frederick, 2009). Li, Swaminathan, and Tang
(2009) conducted a study on the characteristics of engineering students that influenced student enrollment and retention.

While many studies have focused on preparing young adults for specific disciplines, evaluations of industry–education partnership programs, and even the analysis of learning characteristics, the research does not address the need to understand the entry characteristics of the young adult who chooses to participate in an industry–education workforce program to begin a career in manufacturing.

The current study differed in that the young adults’ characteristics were thoroughly explored along with their experiences while they participated in a specialized industry–education partnership program in which students “learn and earn.” For this study, “learn and earn” was defined as students enrolled full-time in an associate degree program while working at the company that was sponsoring a full ride scholarship for their education. According to Gardner and Bartkus (2010), “optimal programs combine career-oriented academic curriculum, relevant work experience, and student financial assistance” (p. i). The program under study provided all three criteria: (a) relevant coursework, (b) relevant work experience, and (c) a full ride scholarships for each participant. While these criteria were crucial to the success of the program, they did not address the fit of the student who participated in the program. This study therefore placed emphasis on the type of person who was a good fit in a manufacturing program that prepared students to enter as (a) a machinist or (b) a tool and die fabricator, and partnered companies and institutions to accomplish this preparation through an associate degree program that blended classroom and on-the-job learning.

Only students who were currently participating in this specialized manufacturing program were invited to participate. These students were able to contribute to the field of study by
describing their school and work experiences while in the program, as well as their prior experiences that led up to their desire to be chosen for such an opportunity. Furthermore, once the students were participating in the program, this research explored that decision in relation to how they felt about their future chosen career path as influenced by participating in the program.

**Purpose Statement and Research Questions**

The purpose of this study was to describe and interpret how community college students, preparing for entry-level technician positions in manufacturing, experienced a “learn and earn” industry–education partnership. Using a qualitative research approach, I examined (a) how they engaged in, and experienced, the program, and (b) how the program influenced their career planning. In doing so, this study enabled me to understand the students’ characteristics and subsequently create a limited profile of students engaged in this program.

The research questions were developed from a review of the academic literature to understand what can learned from the experiences of students who enrolled in such a program in an effort to better understand the characteristics of these students. The overarching question was: What can be learned from the backgrounds and experiences of students who enrolled in a “learn and earn” manufacturing program to better understand for whom and how this type of program is a good fit? The resulting themes helped to shed some light on what makes this type of program a good fit for some students. Specifically, the research questions were:

1. How did students engage in and experience the program?
   a. How did students engage with the coursework portion of the program and how did they describe their experiences in the classroom?
   b. How did students engage with the industry portion of the program and how did they describe their experiences in the work setting?
c. How did students’ backgrounds and previous experiences relate to their experiences in the program?

2. How were students influenced by the program in their career planning?

A typological framework provided a lens for organizing the data as to the (a) nature of the students’ experiences in both the classroom and industry settings, (b) the students’ responses to these experiences, (c) the meaning that the students took from their experiences in the program, and (d) any background experiences of the students. This framework was used to distill elements of students’ experiences that related to understanding (a) who the students were, (b) how they experienced the “learn and earn” program, and (c) how participating in the program influenced their future planning. This was utilized to develop a limited profile of students who were interested in this specialized program in order to better inform the planning and recruitment for “learn and earn” types of programs.

**Methods Overview**

A qualitative methodology was chosen for this research, as it is one of the accepted methodologies for examining adult education (Taylor, Beck, & Ainsworth, 2001). Creswell (2009) defined qualitative research as “a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (p. 4). While this research did not address a problem, Patton (2002) encourages qualitative research as a means for learning how people experience a particular phenomenon. More importantly, the basis of a qualitative study is an effort to “learn something new, rather than test something that is known” (Richards, 2009, p. 13). In fact, this study was based on that philosophy of qualitative research. It was my desire to learn about the student experiences in this “learn and earn” program in order to understand the
type of individual who is interested in a program that prepares them to enter into a career in manufacturing.

While this research used a specialized industry–education partnership program in manufacturing, the unit of analysis was the students’ experiences: (a) in both the classroom and work setting, (b) their background experiences and how they related to their chosen career path, (c) the meanings the students made of their experience while in the program, and (d) how those meanings influenced their career planning.

The data collection for this study was conducted in five phases. The first phase analyzed the host institution’s existing semester surveys to determine any concerns or gaps that were not already accounted for in the design of this study. In phase two, I conducted phone interviews with all participants to collect their background information. The third phase consisted of a classroom observation of the participants in one of their skill development courses. A skill development course was chosen, as this allowed me to observe the student’s comfort and confidence in completing a real world simulation to prepare him or her for a career in manufacturing. During the fourth phase, I conducted a work setting observation to focus on the company culture and interactions between the participants and fellow employees. The final phase consisted of a final face-to-face interview. This interview allowed for any line of inquiry that arose serendipitously from both the classroom and work setting observations.

**Conceptual Framework**

Student profiles in other disciplines have previously been created to understand the type of student interested in those various types of career paths; although this research not only studied students interested in manufacturing, it also those studied those who participated in a “learn and earn” partnership program. Previous research has been conducted to create the
profiles of nursing students (Penprase, Oakley, Ternes, & Driscoll, 2013; Auerbach, Staiger, Muench, & Buerhaus, 2012; Wieck, 2003), engineering students (Li, Swaminathan, & Tang, 2009; DeFraine, Williams, & Ceci, 2014; Li, McCoach, Swaminathan, & Tang, 2008), and even business students (Okoye, 2011). This study continued that line of inquiry by researching students’ experiences while they participated in an industry–education partnership program that prepared technicians in an attempt to create a profile of the students interested in such a program for entering into the manufacturing field (see Figure 1).

Student background experiences and how those may or may not relate to the decision to follow a career path in manufacturing played a role in developing the profile. An understanding of each student’s demographic information as well as previous work and school history and any hobbies or interests were explored to help build that profile. Further exploration of each students’ favorite and least favorite subjects, their learning preferences, what they considered to be their strengths and weaknesses, as well as their parents’ or siblings’ occupations was included in building the profile.

Student perceptions while actively experiencing the industry–education partnership was also explored. While there have been numerous programmatic evaluations done on such entry-level technician programs (Walker, 2009; Zinser & Lawrenz, 2004), very little research has been conducted on how the individual experiences the quality of their school and work experiences. The student experiences with course relevancy, the semester schedule, the instructors, and their preparation for the manufacturing field were explored. Because this specialized program had students both attending coursework to gain knowledge in manufacturing and also working in the field, this study explored the students’ experiences with employer mentorship and support, the
on-the-job training conducted at the work site, the experiences with the number of hours worked, as well as the company culture.

Figure 1: Student experience of industry–education partnership conceptual framework used in this study.

Summary

Many initiatives have been implemented in an attempt to address the manufacturing talent shortage in Michigan. While these efforts are ongoing, the need for additional young people to work in manufacturing is growing as the industry is rebounding and impending retirements loom. The purpose of this study was to describe and interpret how community college students preparing for entry-level technician positions in manufacturing experienced a “learn and earn” industry–education partnership. Additionally, this study explored the characteristics of students who enrolled in this type of program and, through an examination of
the participants’ backgrounds and experiences, described how such a program is a good fit for some students.

Using a qualitative research approach, I examined how the students (a) engaged in and experienced the program, and (b) were influenced by their career planning. In doing so, this study enabled me to understand the students’ characteristics and subsequently create a limited profile of the students engaged in this program.

The resulting themes provide insights for marketing similar programs to young adults interested in a “learn and earn” model, the future development of these models, and the necessary information for companies to position themselves to attract talent into the manufacturing pipeline.
CHAPTER II
LITERATURE REVIEW

Background

This chapter begins by providing an overview of the literature that has previously profiled various cohorts of students, followed by an overview of the existing literature of student perceptions with both work and school experiences. It should be noted that those experiences were explored through the student’s perceived satisfaction of both experiences. According to Elliott and Shin (2002), “student satisfaction refers to the favorability of a student’s subjective evaluation of the various outcomes and experiences associated with education” (p. 198). Specifically defined for this study, satisfaction was achieved if the actual performance exceeded the expected performance.

I used this definition to explore the students’ experiences and their satisfaction with their course experiences as they were participating in an industry–education program in manufacturing. To assure a thorough review of all pertinent existing literature, this chapter reviews literature on the following topics: (a) student profiles, (b) preparation of technicians, (c) “learn and earn” models, (d) student course experiences, and (e) student work-based experiences.

Student Profiles

Studying student characteristics to form a profile is not foreign to research. There have been many studies conducted on groups of students from many genres. Such studies include, but are not limited to gifted students (Meier, Vogl, & Preckel, 2014), doctoral students (Graham & Yang-Hyang, 2011), transfer students (McQuire & Belcheir, 2013), and engineering students (“Student and Career Profiles,” 2009). As a detailed example, Trank, Rynes, and Bretz (2002) conducted a qualitative study of 378 secondary sophomore, junior, and senior students who were
enrolled in two business honors classes. This research sought to determine if student ability and achievement levels might be correlated with job preferences. The data was obtained by examining demographic information, academic ability, the Wonderlic Personnel Test that measures general problem solving ability, as well as student surveys to measure work preferences. The Wonderlic Personnel Test (WPT) is a standardized, self-administered assessment of general mental ability. It is often used in industry and business settings as an aptitude test for prospective employees. 

This study examined achievement for both academic and social levels. The focus of this study was the correlation between the high performing students and their perceived challenge of the job in question as well as the existing rewards or recognition systems in place at the potential employer.

The results of this study concluded that students who are high achievers, both academically and socially, prefer interesting and challenging work. Furthermore, these students prefer the opportunity for promotions and recognition in a company. Trank, Rynes, and Bretz (2002) state that these finding may be difficult to implement for new graduates as employers seldom give challenging projects to new graduates. Furthermore, the study indicated that the most difficult group to place would be the social achievers. These students not only want a challenge in the workplace, but also faster promotions resulting in higher wages (p. 342).

Trank, Rynes, and Bretz (2002) acknowledged that while student demographic information as well as extracurricular and academic achievements were easily obtained by employers, “further research on various indicators of applicant achievement and their implications for organizational preferences should be conducted” (p. 342). Of relevance to the current study are the results from Lubinski, Benbow, and Ryan’s (1995) research that is
“consistent with related research on vocational (as opposed to job or organizational) choice. Specifically, students with very high cognitive ability and those with strong records of extracurricular activities have both been found to prefer ‘investigative occupations’” (as cited in Trank et al., 2002, p. 343).

In the current study, the demographics and historical experiences of students and how they experienced the industry–education partnership in manufacturing differed in both methodology and industry focus than from previous literature. And while academic or social achievement may not be an indicator of a potential young adult interested in manufacturing, prior to conducting the research, that conclusion could not be drawn. What is evident is that the current study attempted to more thoroughly understand the experiences and the students who were participating in a specialized “learn and earn” model in manufacturing. This understanding was accomplished through individual interviews where a line of inquiry could be conducted easier than surveys and mental ability tests.

**Preparation for Technicians**

Community colleges can be defined as “any institution accredited to award the associate degree as its highest degree” (Cohen, 1990, p. 428). These degrees prepare our society for occupational careers such as law enforcement, nursing, manufacturing, heating and cooling, and many more. In fact, the “occupational and technical programs offered at community colleges are especially important in today’s rapidly changing job market” (Zinser & Lawrenz, 2004, p. 85). More importantly, the role of the community college in preparing technician-level individuals is critical. Zinser & Lawrenz (2004) stated that “working with community colleges, consortia of companies are beginning to develop and manage a knowledge supply chain to ensure a pipeline
of qualified technicians. The community colleges can become one of the ‘preferred suppliers’ for these industries” (p. 88).

President Obama agreed. As recently as January 2015, President Obama is quoted as saying “In the coming years, jobs requiring at least an associate degree are projected to grow twice as fast as jobs requiring no college experience. We will not fill those jobs—or keep those jobs on our shores—without the training offered by community colleges” (The White House, para. 1). This statement is yet another declaration from the current administration’s American Graduation Initiative in which the president seeks to reform and strengthen community colleges in an attempt to educate an additional five million people with the necessary skills to be productive in the workplace (Brandon, 2009).

“Learn and Earn” Programs

According to Gardner and Bartkus (2010), “learn and earn” programs have not been adequately defined to date. They described such programs as having four pillars: (a) academic rigor, (b) relevant work experience, (c) funding, and (d) strategic alliance (p. 1). With these four elements, there are many models for a “learn and earn” program. The most common ones are internships, cooperative education, and apprenticeships. These three programs will be defined to distinguish this study’s “learn and earn” model from the three traditional ones.

With many models of “learn and earn” programs, the first is a traditional internship. While there isn’t a common definition for an internship, many institutions share common characteristics when implementing internships. Those characteristics include: (a) a supervised discipline work experience, (b) an agreement that allows students to study and experience their chosen profession, and (c) the student earns academic credit (Gardner & Bartkus, 2010, p. 3). As the most researched model of a “learn and earn” program, there are many benefits to both
students and employers (Weible, 2010). Such benefits include that students are more apt to present themselves favorably to employers and develop a wider network of employer possibilities. In addition, students’ resumes show affirmation of relevant job experience and they are subsequently paid higher wages than others competing in the job market (Weible, 2010). While internships are obviously valuable experiences for the student, it is a limited experience in one or two classes in their chosen field of study.

As a second “learn and earn” model, cooperative education has been defined by the National Commission for Cooperative Education in 1994: “Cooperative education is a structured educational strategy integrating classroom studies with learning through productive work experiences in a field related to a student’s academic or career goals” (School Grants For, para. 3). According to the Cooperative Education Association (1999), “Cooperative education is a structured educational strategy integrating classroom studies with learning through productive work experiences in a field related to a student’s academic or career goal. It provides progressive experiences in integrating theory and practice” (p. 10). Most commonly referred to as co-ops, internships and co-ops are often confused. To distinguish between the two, California State University defines the difference by stating “While an internship may be paid or unpaid, a co-op position is always a paid position and students are required to enroll in an academic course for variable credit. Additionally, students must be a junior, senior or graduate student. Co-ops are high-level positions that allow students to directly apply what they have learned in their coursework” (“How Does a Co-op Position Differ From an Internship” section, para. 1). While all of the student benefits from an internship as described above remain, the additional benefit of a co-op is the assurance of a paid position. This can off-set the cost of tuition needed for the academic credit requirement. This type of “learn and earn” model is yet again a valuable
experience to the student, and it is confined to a course that usually only spans a semester at a higher education institution.

As yet another model of a “learn and earn” program, apprenticeships have had a rich 75-year history with the United States Department of Labor (USDOL). Registered apprenticeships through the USDOL are defined as:

The "Earn and Learn" training model of Registered Apprenticeship provides a unique combination of structured learning with on-the-job training from an assigned mentor. Related instruction, technical training or other certified training is provided by apprenticeship training centers, technical schools, community colleges, and/or institutions employing distance and computer-based learning approaches. The goal is to provide workers with advanced skill sets that meet the specific needs of employers. (“It's On-the-Job Learning and Education” section, para. 1)

An apprenticeship model represents the entire educational experience for the student, not just a course experience as evident in either an internship or co-op. The apprentice is required to work at the sponsoring company from day one. Paired with an approved mentor, the student experiences both coursework and on-the-job training to obtain a nationally recognized credential in their chosen industry. The entire experience typically lasts four years to complete the required coursework as well as the United States Department of Labor (USDOL) required on-the-job hours.

The apprenticeship model is close to the model used for the current study. Similarities were that students are sponsored by a company and on-the-job training plays an important role, as does identified coursework. Contrary to the apprenticeship model, the “learn and earn” model
studied was not USDOL approved, students obtained an associate degree not a credential, there was no required on-the-job hours, and the entire experience lasts two years.

**Course Experiences**

In this study, the student’s experience with their coursework was explored during the interview and focused on three categories: (a) course instructor, (b) course meeting schedules, and (c) course relevancy. Student educational experience has long been evaluated both quantitatively as well as qualitatively, and more frequently with questionnaires that do not allow for reflection on the “why” behind yes or no answers. Recent research has suggested that student satisfaction is made up of a multitude of variants: low course workload for the student, reputation of the course, the grade that was received, instructor gender, how the opinions of students are solicited, the point in the semester at which feedback was obtained, etc. (Thornton, Adams, & Sepehri, 2010; Remodios & Lieberman, 2008; Heckert, Latier, Ringwald, & Silvey, 2006; Abbott, Wulff, Nyquist, Ropp, & Hess, 1990).

The following section examines existing literature on the student perspective of classroom experiences in relation to the course instructor, the course meeting schedules, and the preparedness for a chosen career.

**Course Instructor**

Previous research agrees, the course instructor plays an important role in the student experience while they are attending school. In fact, many studies have focused on that specific element of student satisfaction with their educational experience. As a note of differentiation, this study explored the experience as only one element of the student’s course experience.

Dyer (1991) placed instructor knowledge of the subject matter as well as the interaction with the students at the forefront of students’ perceptions of the instructor.
The faculty have a unique place in the learning process. While teaching methods must be diversified to better meet diverse learning styles, an objective which can be met to some extent by modern technology, the faculty is still at the core of teaching and learning. (p. 5)

Emanuel and Adams (2006) conducted a qualitative study of customer service satisfaction; it was their perspective that the students were the customers and the instructors were the service providers. Through this customer service lens, the study was conducted in three phases: (a) student focus groups, (b) modification of the SERVQUAL questionnaire, resulting in the Quality of Instructor Service to Students (QISS) questionnaire, and (c) the deployment of the QISS to 457 undergraduate students at a historically Black college/university. The SERVQUAL questionnaire was developed by Parasuraman, Berry, and Zeithaml (1988) as a multiple-item scale used to measure customer perceptions of service quality.

It was Emanuel and Adams’ (2006) belief that students played a significant role in the customer service model. Students must be “present and must participate in the service interaction in order to realize the full effect of the service being provided” (p. 537). Results of Emanuel and Adams’ focus groups revealed that student responses mirrored Garvin’s (1984) customer service attributes: (a) classroom comfort and arrangement, (b) the instructor’s ability to deliver course content, (c) the instructor’s response to questions, (d) the instructor’s knowledge, and (e) the empathy that the instructor showed the students.

While Emanuel and Adams’ (2006) research is certainly noteworthy and important in existing literature on instructor effectiveness as perceived by students, it does not provide a holistic view of a student’s experience with their coursework. Instead, it focuses on the instructor as a separate entity from the course experience.
A study by Heckert, Latier, Ringwald, and Silvey (2006) questioned other elements that may influence student satisfaction with instructors. They hypothesized that a variety of background characteristics such as: (a) the expected grades, (b) time of day, (c) instructor gender, (d) instructor age, (e) student gender, (f) student year in school, (g) student’s expected grade, and (h) the student’s interest in the content plays a significant role in overall experience with the instructor. The purpose of the study was to determine if there was a relationship between course, instructor, and student characteristics when a student evaluates the effectiveness of the instructor.

Interestingly, the study did not wholly support a relationship between student background characteristics and their perception of teacher effectiveness. In fact, only four of the eight characteristics were significantly related; expected grade, interest in content, time of day, and instructor gender. Of greatest importance was that a “background characteristic may affect legitimately a student’s experience in a course” (p. 201). The current research identified those legitimate characteristics and used that information to form a profile for students interested in participating in an industry–education partnership to prepare for a manufacturing career.

In addition, Thornton, Adams, and Sepehri (2010) conducted similar research. While their results support Heckert et al.’s findings, they also noted that there is support for the fact that “the amount of effort that a class requires is negatively related to the overall evaluation [of a course]” (p. 4).

**Course Meeting Schedules**

Historically, the times and day patterns that a course meets influences the student’s experience within individual courses. Vernick, Reardon, and Sampson (2004) conducted a study of a career course offered to upper-level students at a university. This was a follow-up study
conducted at the same university and with the same course from 1995. The purpose of both studies was to determine (a) if the student ratings of the career course were different in the 1999–2000 study as compared to the 1995 study, (b) were the ratings in the most recent study different than similar courses that were evaluated in 1995, and (c) did the ratings of the recent offerings of this career course alter by class meeting times and days?

The quantitative study adapted the Student Instructional Rating System developed at Michigan State University in 1969. This evaluation survey is divided into five areas: (a) instructor involvement, (b) student interest, (c) interaction between the student and instructor, (d) course workload, and (e) course organization. Results from the 219 anonymous students across 11 sections pertaining to the third focus area are relevant to this current study. It was noted that:

Course sections meeting once per week were uniformly rated lower than course sections meeting multiple times during the week. It is likely that students in course sections meeting one day per week were overwhelmed with information from a two hour and forty minute class and did not have adequate time to reflect and assimilate what they learned about one topic before another topic was started. (Vernick, Reardon and Sampson, 2004, p. 211)

While these results could directly correlate student satisfaction due to the number of times per week a class met, it cannot surmise the reasoning behind that satisfaction. The current study had the opportunity, through individual interviews, to follow the line of results and document the reasons behind the perceptions related to course meeting patterns.

In yet another quantitative study, where the course meeting schedule was the focus, Reardon, Leierer, and Lee (2012) proposed to determine if the class meeting schedules of four different meeting patterns significantly impacted students’ grades, their expected grades, and
their evaluations of the overall class and teaching effectiveness. Again using the Student Instructional Rating System previously described and the university’s State University System Student Assessment of Instruction, 1,479 student participants over a six-year timeframe and 57 individual sections of the class were used in this research. The results were that the fewer times a course met throughout the week, the increased difference between what a student’s expected grade and actual grade were. And contrary, the more times a course met throughout the week the less difference between the expected and earned grade. The researchers concluded that the more times a class met during the week, the closer the expected and earned grades were, and therefore classes meeting multiple times per week were more conducive to learning.

Reardon, Leierer, and Lee’s (2012) study has the quantitative significance to state the above results, although it does not provide for the reasons behind such evidence. The current study provided the experiences that students have with multiple course meeting patterns and the resulting perceptions related to those patterns.

While course meeting patterns play a role in student expected and earned grades as well as their evaluations of the course, it does not take into account the number of credit hours per semester and how that may influence the experiences of the students. D’Amico, Morgan, and Robertson (2011) conducted a study on workforce clusters to determine student retention and achievement. Advanced Manufacturing was one of the five workforce clusters. While their study was broader than course meeting patterns, one of the guiding questions was “What differences emerge among students in identified clusters?” (p. 778). The results indicated that the Advanced Manufacturing cluster had four significant predictors of student retention and graduation: (a) the more credits taken per semester the more likely students would graduate, (b) adult learners were less likely to complete, (c) students not requiring developmental English
were more likely to graduate, and (d) students residing in a distressed country were more likely to graduate. Of notable relevance to this study, the number of credit hours earned each semester was significant when examining the likelihood of a student graduating. D’Amico, Morgan, and Robertson recommend conducting a qualitative study that explores the student experiences within a specific cluster.

**Preparation for Career and Coursework Relevancy**

The student’s perception of how well they are prepared for their chosen career and any coursework relevancy is yet another element of their course experiences. Feutz and Zinser’s (2012) qualitative study of engineering graduates and their perceptions of how they were prepared for their impending careers reported that “graduates are well-prepared for work” (p. 8) when asked the overarching question of “How do graduates perceive they were prepared for the industry as measured by what they know and know how to do as compared to what they need to know and be able to do?” (p. 12). The program that was evaluated was small in nature, and one might call it a niche program with a focus on curriculum that is more hands-on instead of the traditional engineering program; it was very similar to the program being studied in this research, although the small graduating classes were being prepared for national and international markets, not for regional demand.

There are many similarities between Feutz and Zinser’s (2012) study and the current research that examined the students’ experiences with an industry–education partnership program. The first is that both were niche programs, playing a specific role in preparing students for a specialized industry. Secondly, both curricula are more application focused than theory focused. And while Feutz and Zinser’s study involved an internship, the industry–education partnership examined for the current research involved both course and work-based learning.
throughout the entire curriculum. Of notable difference is that the current study was a partnership between industry and education wherein the industry partner was providing a full ride scholarship to the student whom they hired.

As reported above, Feutz and Zinser’s (2012) study reported that graduates felt that the coursework delivered in their engineering program aligned with the industry standards. It should also be mentioned that it was “difficult—if not impossible—to extract and then separate salient points related to curriculum and work” (p. 12). Repeatedly, the student comments used post-graduate work examples to provide supporting evidence when remarking about the curriculum and vice versa. Conversely, in the current study, both the course and work-based learning played a vital role in the uniqueness of the program. It was my desire to continue Feutz and Zinser’s (2012) line of research on the coursework relevancy and the perceptions of preparedness for career, but not in an attempt to evaluate the strengths and weaknesses of a program, rather to develop a profile of the students who would be interested in participating in a manufacturing “learn and earn” program.

While Feutz and Zinser’s (2012) study reported that students felt their coursework was relevant, Torraco’s (2008) study of 39 graduate students from various community college occupational degrees expressed the irrelevancy of the general education courses required to complete their associate degrees. Of notable relevance is that the current study has both general education and programmatic curriculum. Following the literature, an effort was made to distinguish between the student experiences in both of those curricula areas.

Supported by literature, many background factors including course relevancy, instructor, meeting pattern, and preparation for career, play a significant role in the experience a student has
with their coursework. This study further investigated those influences by qualitatively exploring the reasons behind the students’ experiences.

**Work-Based Experiences**

The student work-based experiences were investigated through the lens of any support or mentorship obtained while working, any on-the-job training, the number of hours that were worked at the partnering company, as well as the perceived company culture. Historically, work-based experiences can be delivered under many genres—co-ops, internships, on-the-job training, apprenticeships—and all have been the subject of review in some form or another as far back as 1964 (Bonnell, 1964; Millis and Cottell, 1998; Kolb, 1984; Boud and Garrick, 2000; Harris, 2004; Abeysekera, 2006; Hsu, van Eijck, & Roth, 2010; Bartkus & Higgs, 2011). As far reaching as the research, the names for work-based experiences have varied: work-integrated learning (Abeysekera, 2006), experiential learning (Harris, 2004), and cooperative learning (Millis and Cottell, 1997). It should be noted as a definition for this study, that work-based experience is defined as the student experience when working at the sponsoring company while participating in an industry–education partnership in manufacturing. Furthermore, this paid position and the work conducted by the student were theoretically relative to the degree they were obtaining.

As early as 1997, the National Committee of Inquiry into Higher Education (Dearing, 1997) reported that work experience plays an important role in teachers’ curriculum development and perception, informing employers of the higher education role and motivating students. To further that acknowledgement, Torraco (2008) examined the work experiences of nine different occupational education programs at the community college-level. Interviews with 39 graduates led to the beginning of further research that would be conducted on the student perceptions of the
work experience that was coupled with their education. Recently, Eames, and Cates (2011) and Johnston (2011) conducted research of work-based experiences and the student learning that may or may not occur during these experiences. But a call for further qualitative research from Eames (2000) stated that “there is increasing recognition that qualitative methods may reveal a richer vein of data about the student[s]’ experience in the workplace (Coll, 1998)” (p. 77). In the pages that follow, existing literature on employer mentorship, hours worked per week, and company culture is explored through the student experience.

**Employer Mentorship and Support**

In Torraco’s 2008 study of 39 post-graduate students of occupational programs, the degree of satisfaction with their work experience depended on the level of mentorship and employer support received. “The value of these work based and co-op experiences seemed to depend on the degree to which cooperating employers were willing and able to serve as mentors and guide students through this type of learning” (p. 221). This pointed to the fact that not all work experiences were of value to the participating students and the degree of support from the employer plays a vital role in that experience.

In agreement was Eames’ (2000) research of graduate students who had been placed in a work-based experience where little relevant industry experience was provided on the job. To further define the mentorships that were of value, Eames’ study described the value of both supervisor and co-worker relationships. While both were vital to the work-based experience, the students described supervisors as providing the “theoretical knowledge and technical skills” and co-workers supporting those technical skills (p. 78).

Gold (2002) reported that “employers who treat interns and co-ops as valuable members of their organization stand out in the minds of students” (p. 20); but the type of experiences that
employers provide is just as meaningful. In fact, Gold suggested best practices from employers who have made their internship programs successful. These best practices included formal mentoring, frequent and prompt communication, valued experiences, compensation, flexibility, and opportunities for improvement. Interestingly, Jackson and Jackson (2009) reported some of these best practices as suggested areas of improvement from student responses.

Major areas needing improvement include better communication between the university and intern employers about the need to minimize the use of interns for simple secretarial duties; better explanation by intern mentors/supervisors of the purpose and strategy of assigned projects; more clear recommendations to interns about improvement on future assignments; and intern involvement in post-performance assessment of work. (Jackson and Jackson, 2009, p. 66)

**On-the-Job Training**

Smith, Henry, and Munro (2000) conducted a longitudinal study in Australia’s secondary and post-secondary schools where an industry–education partnership existed in manufacturing. This quantitative study utilized questionnaires in which four questions were key. The first three questions focused on data relative to completion and employment outcomes, but the fourth was “What value did the trainees place on their experiences whilst participating in the traineeship?” (p. 284). All reported responses were either evaluative of the program or of the specific industry-related skills that were obtained while the students were working. One such response was introspective of the respondent’s experience: “The greatest positive from the program was teaching me how to adapt to difficult situations and how to relate to people from different backgrounds” (p. 287). While the results of the study were utilized to better develop more
industry–education programs in Australia, they were not used to define a profile of the type of student who would be interested in such an experience.

Jackson and Jackson (2009) conducted a survey to determine student perceptions of internships, another type of work-based experience. The results reported that the students’ reactions to their work-based experiences were overwhelmingly positive with “94 percent of the students who ranked their experience as either good or excellent indicates that students generally perceived their internship favorably” (p. 65).

Lastly, students who participated in an undergraduate research internship reported on “how they learned greater flexibility and adaptability, more comfort in working in community settings, and a deeper understanding of goals, processes and challenges of applied settings” (Hynie, Jensen, Johnny, Wedlock, & Phipps, 2011, p. 52). This capacity to build and apply knowledge was a trademark repeatedly reported across research.

**Work Experience Hours**

Young people have historically held jobs while attending school, whether high school or college, and whether related to their desired career path or not, work has played a significant role in the educational journey of young adults (Fowler, Hodgson & Spours, 2001; Dundes & Marx 2006).

In an attempt to understand student perception of their school and work-based experiences, Fowler, Hodgson, and Spours (2001) surveyed students aged 16–19 years on the significance of part-time work in comparison to their school work while enrolled in secondary education in southwest England. From the students’ perspectives, they believed the following:

- their curriculum vitae was enhanced,
- their chance of future employment was enhanced with the work experience,
they could effectively balance school and part-time work,

- on the job work did not impose on their school work but instead on their social time,

- employers did not recognize the school work demands placed upon them and would add to the stress level of the students by not doing so,

- school or college did not actively help them balance their school and work responsibilities; and

- part-time work made students manage their time better.

While the above study involved part-time work experiences, the current study of student experiences in an industry–education partnership required more than part-time work and work could range from 20–40 hours per week.

To this point, a study conducted by Dundes and Marx (2006–2007) narrowed the effect of off-campus work for students who worked 10 or fewer hours per week, 10–19 hours per week, and over 20 hours per week. While the quantitative data was interesting, the meaning behind the data was hypothesized. The findings reported that students who worked “20+ hours per week seem to develop compensatory skills that allow them to perform roughly equivalent academically to both those working fewer than 10 hours per week as well as non-working students” (p. 119). The authors hypothesized that perhaps that “level of employment helps students focus and prioritize their responsibilities” (p. 119). Noteworthy was the impact on social time, the level of effort put into studies, and the level of fatigue associated with this group. Students working 20+ hours per week reported that they did not apply themselves as they should to their studies. Interestingly, they did not report themselves to be fatigued at any higher rate than the other two groups (10 or less hours worked or 10–19 hours worked). Regardless of the hours worked each
week, all student workers believed that work forced them to be more efficient and increased their level of stress. Furthermore, working students reported that their social time was used as a reward after both work and studies were completed. The data presented in this study did not provide the opportunity for students to explain or tell their stories behind the answers on the survey. The current study provided that opportunity in an attempt to better understand the work-based experience and how the number of hours influenced that experience.

**Company Culture**

Company culture can be defined in many ways, and for the current study it was defined as the “values, ideas, beliefs, norms, rituals, and other patterns of shared meaning that guide organizational life” (Morgan, 2006, p. 6). This section will review the previous literature regarding how students in work-based learning experience the company culture.

A 2001 study conducted by Coll, Zeqwaard, and Lay of students participating in a work-based experience while enrolled in a psychology or science program focused on student efficacy. While the results gravitated towards efficacy discussions, of notable relevancy to the current study was the students’ perceptions of the company culture and how that influenced their behavior. If the students felt their employers would react positively towards any perceived inadequacies, they felt more confident. And vice-versa, the student felt insecure in their abilities if they felt their supervisors would negatively react. This finding indicates that the company culture in which a student is placed will influence how a student perceives their work experience.

In Zeqwaard & Coll’s (2011) study of students who participated in a work-integrated learning experience, it was noted that the work-based experience allows students “to develop an identity and potentially become enculturated within a science community of practice (Eames & Bell, 2005)” (p. 285). This suggests that the student experience enables students to develop a
deeper understanding of the principles of a particular industry and could possibly be transportable into other companies throughout their career.

As illustrated in the mentorship section, Eames’ (2000) study of graduate students participating in a work-based experience complimented co-workers for their mentorship contribution, and reported that these same co-workers helped to provide the “workplace language, rules, and relationships” (p. 78), otherwise known as culture. Furthermore, the “graduates pointed to the social and environmental influence in the workplace which they felt were different from the university. The notion of the change in mindset points to a cultural movement in ways of thinking” (p. 79). The current study provided a platform for students to express their perceptions of the effect of a company’s culture on their work-based experiences while participating in an industry–education partnership.

Summary

The state of Michigan is experiencing a talent shortage in the skilled trades industry, particularly in manufacturing. In an attempt to attract young people to the sector, a community college and manufacturing companies partnered to form a specialized “learn and earn” industry–education partnership program in manufacturing. This study resulted in the creation of a limited profile of students who are interested in such a specialized program, in order to better inform the planning and recruitment for “learn and earn” types of programs.

This literature review was divided into five sections: (a) student profiles, (b) preparation for technicians, (c) “learn and earn” programs, (d) course experiences, and (e) work-based experiences. From previous studies, we know that student profiles for groups of students such as engineering, business, gifted students, and doctoral students have successfully determined the characteristics of the student, leading to the belief that this study’s attempt to create a profile can
lead to success as well. Likewise, from the literature we know that community colleges play an important role in preparing technician-level workers. This work will be increasingly more important, as jobs requiring an associate degree are anticipated to grow at a much faster rate than jobs that do not require any college experience.

“Learn and earn” programs are not new, but are also not defined with great specificity. From the literature, we know that there are various models of such programs: (a) internships, (b) cooperative education, and (c) apprenticeships. While we know that all three types of “learn and earn” models are successful and contribute to a student’s learning both in class and on the job, none of them depict the scope and length of the “learn and earn” program being studied. Internships are short-term experiences, usually lasting one semester, and which focus on providing a student the opportunity to apply their knowledge in the workplace. And, not always in a paid position. Cooperative education is very similar to an internship but is always a paid work position. Additionally, we know that apprenticeships are likely the most similar model to this study’s “learn and earn” program. Although this unique industry–education program provides an associate degree, it does not require specific on-the-job hours and spans two years.

As part of this study’s description of the student experience, both the course and work-based experiences were explored. Literature in these two areas was limited to student satisfaction with either their coursework or work-based experience. The literature showed that student satisfaction with the coursework is influenced, in part, by the course instructor, course meeting patterns, and perceived course relevancy. Furthermore, the literature on work-based experiences revealed that employer support, on-the-job training, and the company culture plays a significant role in the student experience. Conversely, we learned that the number of work hours did not play a significant role in the perception of students’ experiences.
CHAPTER III

METHODOLOGY

Introduction

The purpose of this study was to describe and interpret how community college students, preparing for entry-level technician positions in manufacturing, experienced a “learn and earn” industry and education partnership. Using a qualitative research approach, I examined (a) how they engaged in and experienced the program, and (b) how the program influenced their career planning. In doing so, this study enabled me to understand the characteristics of, and subsequently create a limited profile of, students engaged in this program.

I developed one set of research questions, and conducted two analyses. The overarching question was: What can be learned from the backgrounds and experiences of students who enrolled in a “learn and earn” manufacturing program to better understand for whom and how this type of program is a good fit? This understanding has helped to shed some light on what makes this type of program a good fit for some students. Specifically, the research questions were:

1. How did students engage in and experience the program?
   a. How did students engage with the coursework portion of the program and how did they describe their experiences in the classroom?
   b. How did students engage with the industry portion of the program and how did they describe their experiences in the work setting?
   c. How did students’ backgrounds and previous experiences relate to their experiences in the program?

2. How were students influenced by the program in their career planning?
A typological framework provided a lens for organizing the data as to the (a) nature of the students’ experiences in both the classroom and industry settings, (b) responses to these experiences, (c) the meaning the students took from their experiences in the program, and (d) any background experiences of the participant. This framework was used to distill elements of students’ experiences that related to understanding (a) who the students are, (b) how they experience their “learn and earn” program, and (c) how participating in the program influences their future planning. This was utilized to develop a limited profile of students who were interested in the specialized program, in order to better inform the planning and recruitment for “learn and earn” types of programs.

Methodology Overview and Rationale

A qualitative methodology was chosen for this research as it is one of the accepted methodologies for adult education (Taylor, Beck, & Ainsworth, 2001). Creswell (2009) defined qualitative research as “a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (p. 4). While this research did not address a problem, Patton (2002) encourages qualitative research as a means of learning how people experience a particular phenomenon.

Qualitative research is traditionally conducted in the social sciences. Beginning in the early 1900s through today, this methodology continues to be shaped by such authors as Jacob (1987), Lancy (1993), Strauss and Corbin (1990), Stake (1995), Denzin and Lincoln (2005), Creswell (2007, 2009), Richards (2009), Marshall and Rossman (2011), and Yin (2011). All authors support the notion that qualitative research is best used when a hypothesis has not been created, but instead a goal for the research has been established (Richards, 2009). In order to
fulfill the goal of the research, qualitative methods provide for the flexibility in diving deep into the phenomenon to understand the shared experiences.

**Study Setting and Subjects**

Currently, Michigan manufacturing companies and community colleges are collaborating to provide full ride scholarship opportunities for students in the manufacturing field of study. Students who are selected for this scholarship, which is funded by the company, attend a higher education institution to receive an associate degree while working for the sponsoring company. These students not only experience the manufacturing field through the lens of educational preparation, but also through the on-the-job experiences while working for their sponsoring company. Various companies have joined together to offer this opportunity and students attend their college courses as a cohort.

As of 2015, there were 30 Michigan manufacturing companies participating with five community colleges to offer this specialized program in manufacturing. Throughout the state, over 100 full ride scholarships have been awarded to young people interested in pursuing a career in manufacturing and desiring to participate in a “learn and earn” delivery model. Regardless of the community college or company, all students complete the education necessary for an associate degree as well as have the opportunity to receive on-the-job training at their sponsoring company.

It was important to recruit participants from a single community college as the site for conducting the research, as Michigan does not have a state controlled community college system and all colleges deliver a different curriculum. Using one community college as the setting for this research ensured that the school curriculum was uniform, allowing for the research to focus on the student experiences and not the differences in curriculum. The setting recruited for this
study had 28 active scholarship participants and 13 partner companies at the time of this study. These numbers help generate a larger student enrollment, which increased the pool of students available to be recruited as participants.

An additional advantage of the site recruited for this study was that I worked at the community college at the time of the study. This facilitated gaining access to the pool of potential participants. Also, by being an employee of the community college, I was better able to accommodate the potential participants’ schedules both in the school and work settings. It was also my desire to conduct work setting observations. I had the contact information for all of the participating companies, which provided an increased likelihood of the work place observations occurring, as many of the companies had confidentiality processes and potentially dangerous equipment, and thus would not allow outside observers. Since the community college also has an HSIRB process, I gained approval for the study through both IRB systems (the college’s and my university).

This study utilized a purposeful sample strategy that Creswell (2007) described as selecting “individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon in the study” (p. 125). The study did not include students involved in traditional manufacturing apprenticeships, internships, or cooperative education experiences. While those experiences are valid and have been studied in the past, this study explored the students’ experiences while they were participating in this specialized “learn and earn” model.

The goal of the study was to garner seven consented participants. Each participant was interviewed twice in addition to a classroom and work setting observation. Richards (2009) addressed the question of how much data is needed by noting: “Well-designed qualitative
research projects are usually small, the data detailed and the techniques designed to discover meaning through fine attention to content of texts or images” (pp. 19–20). Therefore, the goal of two transcribed interviews and the classroom and work setting observation notes for each consented participant allowed enough data to gain the detail necessary for creating a limited profile of young adults interested in a manufacturing career and who have chosen this specialized career preparation. More information regarding recruitment strategies and data collection is described below.

**Recruitment and Consent Procedures**

Prior to recruiting students, an application to the community college’s Institutional Review Board was submitted to obtain permission to conduct this study. The submitted application and approval is required by the National Research Act of 1974 (U.S. Department of Health and Human Services, 1979) to safeguard persons involved in behavioral research. According to this Act, any higher education institution that receives federal funding for biomedical or behavioral research must have such a board and process for research approvals. To comply with this law, the research site not only had an existing board that reviewed the research proposal, but also an application that was completed and approved (see Appendix A for the institution’s approval letter).

After obtaining the approval of the research site’s Institutional Review Board, all 28 active students at the chosen research site received an email invitation to participate in this study. The email invited potential participants to contact me via phone or email within ten days to learn more about this study. This invitation allowed me to answer any questions from potential participants, and explain the study as well as the commitment level. If after the phone or email conversation a potential participant was interested in participating in the study, I emailed a
consent form. This form disclosed the intent of the research, my role as the researcher, the commitment level of participants, the assuredness of complete anonymity, the $20 compensation gas card for participating, as well as the plan for distribution of the final report. The form was signed and dated by the student. A consenting participant was defined as a potential recruit returning the signed informed consent form until I reached seven participants.

At the same time the initial email invitation was distributed, I also sent an email of explanation to the students’ current instructors to enable them to help personalize the invitation. This email asked the instructors of the current students to announce this research opportunity. Marshall and Rossman (2011) reported that “more personalized requests will have larger and more committed responses from potential participants” (p. 101). By asking the instructors to announce the research opportunity, it was my hope that the established instructor–student relationship would add a more personal touch to the invitation.

It was the plan of this recruitment strategy to garner seven potential participants for the study, and in fact, seven participants were recruited. If that level of commitment was not achieved, then a second email invitation would have been sent to encourage participation through a seven-day extension of the original deadline. The one-week extension was to provide additional time for those potential recruits who perhaps had missed the first deadline but still wanted to participate.

**Data Collection**

Phase one of this study was to analyze the existing semester surveys conducted by the host institution specializing in this “learn and earn” model in manufacturing (see Appendix B for a sample of the survey results). These surveys were previously conducted via email and did not provide a rich description of the student experience but instead their satisfaction with such
elements as course, instructor, and schedule. In looking through these surveys, I did not see any consistent themes to influence my research. If those concerns or gaps had added to my research questions, I would have added the results to the data set. In addition, public documents such as brochures, semester course schedules, and information from the institution’s website were examined and utilized where necessary to explain the interview responses from the participants as well as to develop a full description of the program.

Appendix C shows a sample of one of the semester course schedules for the students enrolled in this “learn and earn” program. As noted from the figure, students attended school two days per week. The exact times varied by semester and day, but the fact remained that these students were at school for two days while working at their sponsoring company the other three days. Furthermore, this figure shows that students attended as full-time students; again, another unique attribute of this program.

**Individual Phone Interviews**

Phase two of the study was to collect each participant’s background information. This phase was conducted using individual phone interviews for collecting the necessary information to document the background history and experiences of each participant (see Appendix D). The background information that was collected included: (a) demographic information, (b) participants’ high school experiences, (c) past work experiences, (d) parent and/or sibling occupations, (e) self-perceptions of their strengths or weaknesses, and (f) hobbies and interests. A phone interview was chosen over a survey as it provided flexibility in the line of inquiry with any developing topics.

Yin (2014) described two levels of questioning when conducting interviews. Level one is comprised of a list of specific questions that are asked of each interviewee. Yin explains that
these questions can be intermixed throughout the interview. They are typically questions that put the interviewee as ease; questions that are friendly and perhaps nonthreatening. The initial phone interview attempted to establish that friendly, nonthreatening relationship with the participants as the data collection process began.

With the interviewee’s consent, each interview was recorded. These recordings were transcribed by me. The review of the transcribed interviews allowed me to reflect on the role I may have played during the interview. This vital data collection protocol, referred to as reflexivity by Richards (2009), is to “reflect constantly on how these data are made and the part you play in them” (p. 49).

**Classroom Observations**

Phase three of the data collection process consisted of a classroom observation of each participant in one of their skill development courses (see Appendix E for observation log). A skill development course was chosen, as this allowed me to observe their comfort and confidence when each student completed a real world simulation in an effort to prepare him or her for a career in manufacturing. Part of this observation was also to observe instances in which the student was reliant upon the instructor for direction, as that had an impact on the follow-up interview during the last phase of data collection.

**Work Setting Observations**

Phase four of the data collection process consisted of a work setting observation to focus on the company culture and interactions between the participants and fellow employees. An observation log was utilized during this one-hour visit (Appendix F). A follow-up interview allowed for any line of inquiry that arose from the work setting observation. Additionally, this follow-up interview allowed me to explore the fit of the participant and the on-the-job experience
that was provided by this industry–education program as well as provide an opportunity for a cumulative line of inquiry regarding how the program has influenced the participant’s future career pathway.

**Final Interviews**

The last phase of the data collection process consisted of a final face-to-face interview. This follow-up interview was conducted to pursue any line of inquiry that arose from any of the data collected during phases two through four. This final interview began Yin’s (2014) second level of questioning when conducting interviews. The level two questions were directly related to the case study. These questions were the backbone of the data collection from the interviews. They involved following the line of inquiry to obtain the data outlined to be relevant to the experiences and were more probing in nature. Therefore, the level one questions asked in the initial phone interviews began to develop a rapport with the participants before exploring this deeper line of inquiry.

Additionally, the follow-up interviews allowed me to explore the fit of the participant and the on-the-job experience that is provided by this industry–education program as well as provided an opportunity for a cumulative line of inquiry regarding how the program has influenced the participant’s future career pathway.

This final phase provided a form of data triangulation that was used in “an effort to see if what we are observing and reporting carries the same meaning when found under different circumstances” (Stakes, 1995, p. 113).

**Data Analysis**

This study utilized a categorical aggregation data analysis approach. This type of approach was important to use in order to not just directly interpret the findings but to take those
instances and combine them until something can be said about those experiences. This allowed me to understand the data in relation to the research questions as a means to lead to the development of the characteristics of students interested in a “learn and earn” program in manufacturing. I was able to analyze the experiences and backgrounds of the participants in an attempt to help distinguish those characteristics and eventually make sense of a limited profile. Stake (1995) describes the need for a categorical aggregation strategy as a means to “forego attention to the complexity of the case to concentrate on relationships identified in our research questions” (p. 77).

I conducted two phases of data analysis using two templates with two different sets of categories. The first phase of analysis (Figure 2) was more inductive, utilizing the research questions formed from the academic literature review. The second phase of analysis (Figure 3) used a typological lens created by drilling deeper into the essential elements embedded in the research questions.

The first phase of analysis, as depicted in Figure 2, was focused on deriving the textual and structural elements of students’ experiences related to the research questions. Thus, the phase of analysis was focused on what can be learned from the experiences of students who enrolled in such a program in an effort to better understand the characteristics of these students. The overarching question was: What can be learned from the backgrounds and experiences of students who enrolled in a “learn and earn” manufacturing program to better understand for whom and how this type of program is a good fit? These characteristics helped to shed some light on what makes this type of program a good fit for some students.
Figure 2: First data analysis plan diagram.

The second phase of analysis used a tighter lens with a template analysis process around the following four essential elements embedded in the research questions in order to drill deeper into the essence of the “learn and earn” experience for the study participants: (a) the nature of the experiences, (b) the responses to the experiences, (c) the meaning the participant took from the experiences, and (d) any background experiences of the participant. This second set of typological categories was utilized to help further develop a limited profile of students who were interested in such a specialized program. Figure 3 depicts a visual representation of the data analysis plan that was utilized for the second phase of analysis.
Figure 3: Second data analysis plan diagram.

For each analysis, the two interviews were transcribed immediately and coded for any salient points relevant to each of the two sets of analysis categories (i.e., the analysis templates). By transcribing the interviews immediately, I was provided an opportunity to continue a line of inquiry after the first two interviews. Utilizing Foss and Waters’ (2007) in vivo coding process, the initial coding of the transcribed interviews focused on identifying meaning units that provide nuance and detail around the essence of the experience. This coding approach was good for this study because the unit of analysis was the student experience. Therefore, every time I saw an excerpt that I believed described a student experience relevant to the coding categories, I noted that in the margin. This notation converted in vivo codes to crystalized codes that distilled the essence of experiences and made it easier to organize the distilled codes into coding categories.
In naming the distilled codes, I used language derived from the in vivo code in order to ensure that the distilled codes were descriptive of the excerpt, and not of an abstract idea that was interpreted broadly from the excerpt. This allowed me to stay closely aligned to the reported experiences.

The process described below was followed for each phase of the analysis in this study. Following Foss and Waters’ (2007) process, the excerpts with the codes written next to them were cut out and placed in the appropriate initial category piles for both version of the template analyses. According to Richards (2009), this study utilized two sorts of coding: (1) descriptive coding and (2) analytical coding. Descriptive coding involved the demographic information about each participant resulting from the first phone interview and most likely provided the most data for the background information. That is, it involved “storing information about the cases being studied” (p. 96). As outlined in the conceptual framework, information such as GPA, age, gender, race, and ACT scores were collected as a means of helping to establish a profile for young adults interested in the manufacturing field while participating in a specialized training model. As defined by Richards, analytical coding “leads to theory ‘emergence’ and theory affirmation” (p. 96). It was this advanced coding that was written in the margins of the transcribed post-observation interviews that further defined the profile of a student who is a good fit for a “learn and earn” industry–education partnership in manufacturing.

The course and work setting observation forms were also coded using this process, but instead of excerpts from a transcribed interview, the annotations were results from my written observations.

I also created an “emergent ideas” pile for when an initial category could not be determined as a match for any excerpt. This is also called a “do not know” pile. This pile was
repeatedly examined for any similar experiences that perhaps were not addressed in the initial categories.

Once all of the codes were sorted into categories, I then examined the codes to determine any similarities between them. Any similar ideas were then combined into clusters that represented one abstract idea. The resulting clusters of codes represented a classification of data. These data within these classifications represented the variety of meanings that the participants had within each initial coding category. These clusters of codes were examined a second time to assure that all of the codes in each pile were related to the label, or code, that I assigned to it.

According to Foss and Waters (2007) it was now time to design the explanatory schema. “An explanatory schema is an explanation for what you see across your piles (i.e., clusters) of coded data” (p. 196). In order to accomplish this schema or roadmap, I typed up and cut out the codes that emerged during the above process. In order to begin developing this schema, I began putting topics together within each coding category that appeared related. Most likely due to the nature of this inquiry, this resulted in an outline form. I reiterated this process several times, and each time I forced myself to organize differently. After completing this process for both phases of analyses with each of the two analysis templates, I cross-analyzed the yield from each phase. In doing the cross-analysis, I looked for both confirming and extending ideas in order to distill the final set of themes that resulted in the characteristics of the study participants. Foss and Waters described an ending to this repetition when the schema meets several criteria: (a) all of the major categories are utilized, (b) the relationship between the categories is functional and explanatory, (c) the schema is logical from the codes that are created, and lastly, (d) the schema is insightful. “You don’t want your schema to be an obvious one—one that almost anyone
would derive from a quick review of your data. You want to produce new insights and new understandings as a result of your analysis of data” (p. 206).

**Delimitations and Limitations**

Due to the fact that this study was directly related to Michigan’s manufacturing economy, all research was conducted within the state of Michigan. Furthermore, the study only focused on students who were participating in a specialized industry–education partnership established to address the manufacturing talent gap. It did not include any students enrolled in various programs throughout the state that involved other means of preparation for a manufacturing career such as students in traditional apprenticeships, internships, or cooperative education experiences. Instead, this study only included the experiences of students in a specialized “learn and earn” program designed to offer full ride scholarships, provided by the sponsoring company, to students interested in pursuing a career in manufacturing. This specialized program involved a partnership between the companies, a community college, and the students.

** Reflexivity**

As someone who has been invested in higher education workforce development for the past 15 years, I believed this “learn and earn” program had the potential to become a model that can help reduce Michigan’s talent shortage in manufacturing and I wanted to see the program attract young talent. While the program had been established by both the education and industry partners, the next step was to identify the type of student who would be interested in such an opportunity. And, I believed this truly was a great opportunity, as this unique partnership assured the student a full ride scholarship as well as a paying job both during school and after graduation.
As disclosed previously, I worked for the community college in which the study was conducted. Throughout this work, I served as the coordinator of the coursework for the students in this industry–education partnership, which I did for all occupational courses at the college. Due to this involvement, I was the educational contact person for this partnership. Companies that wanted to offer a full ride scholarship to students contacted me each year so that they could be included in that cohort. Additionally, my office collected, by means of website applications, information from any student who was interested in being interviewed by the participating companies. Neither the community college, nor myself, had any involvement in the selection of the students. This selection was done by the individual companies by means of aptitude testing and interviews.

Creswell (2009) described backyard research as “studying the researcher’s own organization, or friends, or immediate work setting” (p. 177). Due to the fact that this study was conducted in my “backyard,” I conducted several validation strategies to assure data accuracy: (a) triangulation, (b) thick description, and (c) member checking, all of which are described below.

By means of minimizing participant risk and privacy, the Institutional Review Board required an approval to conduct the research at this location. This was provided to Western Michigan University’s Human Subjects Institutional Review Board for overall research approval (Appendix A). Furthermore, information that was not (a) made public, (b) approved through the institution’s review board, or (c) agreed upon through the participant consent form was not used to conduct this research.
Data Validation

Due to the fact that this research was a “backyard” study, it was essential that several forms of data validation were conducted to assure data accuracy. The first method was triangulation. Yin (2014) described the use of data triangulation as a convergence of evidence in which “you have multiple sources as part of the same study but that nevertheless address different findings” (p. 121). As described previously, this study used several data sources: institutional surveys, initial phone interviews, classroom and work setting observations, and face–to-face interviews. Each source was coded and added to the study findings, and not individually coded with individual findings.

The second validation method was thick description. Thick description, as described by Richards (2009), “contains detail of recall and imagery, interpretative comment and contextual knowledge” (p. 57). As noted previously, the interviews were tape recorded, which allowed me to write down my side observations while conducting the interviews. These could later be incorporated into each transcribed interview. Furthermore, my classroom and work setting observations allowed for such thick description as well.

Lastly, I allowed each participant the option of reviewing my interpretation of interviews and work setting observations. Member checking is conducted at the end of the study, for the purpose of validating the researcher’s interpretations with the participants’ judgments. Richards (2009) states that questions like, “Do ‘they’ see the situation as you, at the conclusion of your project, now see it?” (p. 149). Member checking can be a good “leg” in a validation approach, but it is not suggested to be solely relied upon. In fact, there are several concerns with member checking that should be considered. Richards describes some of those as: (a) how to interpret agreement, and (b) how to interpret disagreement. Surprisingly, Richards states that “if your
participants agree with your analysis, given that they are probably not researchers, this would be surprising” (p. 187). In fact, good research should expose something that isn’t seen. Richards goes on to speak of disagreement, “It is very likely that if you have made a good job of your research, the report exposes or even hurts some participants” (p. 187). While this can be disturbing, the understanding of a new phenomenon can be unsettling at times.

Summary

In summary, to address the purpose of this study, seven participants were interviewed and observed in both the classroom and work setting. All data collected from these sources were twice analyzed using two templates with two different sets of categories for the research questions and the development of cross-analysis themes were finalized for the research interpretation. As a means of validating this backyard research, this study employed triangulation, thick description, and member checking to assure data accuracy.
CHAPTER IV

RESULTS

Overview of Purpose and Questions

In this chapter, I present the findings of the data analysis obtained through the study of how community college students, preparing for entry-level technician positions in manufacturing, experienced a “learn and earn” industry–education partnership. This study aimed to answer the following overarching research question: What can be learned from the backgrounds and experiences of students who enrolled in a “learn and earn” manufacturing program to better understand for whom and how this type of program is a good fit? Therefore, the research questions were:

1. How did students engage in and experience the program?
   a. How did students engage with the coursework portion of the program and how did they describe their experiences in the classroom?
   b. How did students engage with the industry portion of the program and how did they describe their experiences in the work setting?
   c. How did students’ backgrounds and previous experiences relate to their experiences in the program?

2. How were students influenced by the program in their career planning?

I conducted two phases of data analysis using two templates with two different sets of categories. First, in alignment with the research questions above and second in alignment with the four predetermined coding categories: (a) nature of the experience, (b) responses to the experience, (c) meaning the participant is taking from the experience, and (d) the participants’ background experiences. Yin (2011) states that this approach allows “the concepts—if only
taking the form of initial “categories” (which are another common form of concepts)—lead to the definition of the relevant data that need to be collected” (pp. 93–94). In keeping with Yin’s definition, my two initial “categories” when conducting the analyses were: (a) the research questions, and (b) the four coding categories.

By analyzing the data twice, this study also enabled me to understand the characteristics of, and subsequently create a limited profile of, students engaged in this program. This limited profile may help to better inform the planning and recruitment for “learn and earn” types of programs.

As a means of collecting the data for both analyses, phone interviews took place prior the classroom and work setting observations. A follow-up, face-to-face interview then provided the opportunity to probe any line of questioning that arose from the observations. This added to the richness of the data obtained for analysis. Questions asked during both interviews were open-ended to allow for in-depth responses. As outlined in Chapter 3, a set protocol for all interviews and observations was followed in an attempt to address the research questions while still allowing for a fluid conversation to occur.

**The Context and Participants**

Prior to presenting the results of both data analyses, it is important to understand the context and participants for this study. All seven of the consenting participants were part of a program wherein Michigan manufacturing companies and a community college were collaborating through the provision of full ride scholarships in the field of manufacturing. Student scholarships were funded by the companies, and the participants attended the community college to receive an associate degree while working for the sponsoring company.
As noted in Chapter 2, at the time of this study, there were currently 30 Michigan manufacturing companies participating, with five community colleges offering this specialized “learn and earn” program in manufacturing. The participants for this study were from one of the five community colleges to assure parallel curricular experiences in an attempt to solely focus on the student experience.

To assure confidentiality of the participants, each participant and company was given a number and those were used in lieu of the actual names of the participants or their sponsoring company. Each of the phone and face-to-face interviews were recorded and transcribed verbatim.

Table 1 depicts the participants’ ages, genders, and races. The participants’ race and ethnicities are indicative of the race and ethnicities of national averages published by the United States Department of Labor, Bureau of Labor Statistics. In fact, that report, entitled Labor Force Characteristics by Race and Ethnicity, 2014, stated that 88.8% of machinists were white and 15.4% Hispanic or Latino (p. 32). Those percentages were closely aligned to the participant population in this study with five out of seven participants identifying themselves as white (71.4%) and two out of seven (28.6%) as Mexican/Hispanic/Chicano.

Of notable difference, was the percentage of females enrolled in this “learn and earn” program. The national average of women in the manufacturing industry in 2014 was 6.4% (United States Department of Labor, Bureau of Labor Statistics, Labor Force Characteristics by Race and Ethnicity, p. 36). With two out of seven (28.6%) of the participants in this program being female, this specific institution has attracted more females to the manufacturing field than the national average.
Furthermore, the average age of the participants in this program was 20.5 years of age. This was not indicative of the average age of the population that currently makes up the labor force in manufacturing.

Table 1

Participants’ Genders, Ages, and Races

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>19</td>
<td>Mexican/Chicano</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>19</td>
<td>White</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>20</td>
<td>White</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>19</td>
<td>White</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>19</td>
<td>White</td>
</tr>
<tr>
<td>6</td>
<td>Female</td>
<td>25</td>
<td>Hispanic</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>23</td>
<td>White</td>
</tr>
</tbody>
</table>

In fact, the report entitled *Employed Persons by Detailed Industry and Age, 2013 Annual Wages*, shows the national percentages of the labor force, with the majority of the employees between the ages of 45 and 54 years of age (Table 2). In contradiction, the majority of the students engaged in this “learn and earn” program were between the ages of 16 and 19 years of age. This is a good finding, as the purpose of this program was to grow talent within the industry. Also of importance, although not by design, all participants were in their second year of the program.

**Themes Aligned to Research Questions**

As described previously, the first data analysis that I conducted was to answer the research questions that were a result of the academic literature review. It should be noted that a thorough evaluation of the host institution’s semester surveys was conducted but did not lead to any revision of the prescribed research questions or scope of the study. Therefore, I organized the coding themes under the following research questions, which were serving as the coding categories (Yin, 2011):

1. How did students engage in and experience the program?
   a. How did students engage with the coursework portion of the program and how did they describe their experiences in the classroom?
   b. How did students engage with the industry portion of the program and how did they describe their experiences in the work setting?
   c. How did students’ backgrounds and previous experiences relate to their experiences in the program?
2. How were students influenced by the program in their career planning?
Research Question 1.A

Question 1.A specifically focused on the coursework portion of the program. Table 3 provides a summary of the themes that participants used to describe their coursework experiences or that I observed in the classroom.

Table 3

*How do Students Engage with the Coursework Portion of the Program?*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Mentorship</th>
<th>Hands-on</th>
<th>Problem Solving</th>
<th>Real Life</th>
<th>Enjoy Learning</th>
<th>Teacher Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All seven of the participants either expressed the desire for a classroom mentor or were observed mentoring or being mentored. The classroom observation played a significant role in this theme. While conducting the classroom observations, it was apparent that the students not only desired mentoring but also did not hesitate to provide mentorship to a fellow classmate. During the class observation, I noticed that they did not hesitate to ask questions of each other and that they were very comfortable approaching the instructor for help, often seeking him out. Participant 6 agreed that support from the students in the classroom was desired, stating that, “They’ve all been really helpful, same thing at work, and anytime I need help with anything someone usually is ready to help me. I like that.”

Six out of seven of the participants in this “learn and earn” program described how they liked courses that involved hands-on activities. They felt most engaged when the activity involved a real life situation that provided an opportunity to problem solve. Participant 7
described it as, “If there’s something that I don’t really understand, I almost have to see it or physically touch it or interact with it to understand it.” Participant 3 agreed, “I actually like to physically do it. Like obviously watch someone first and then actually physically do it.”

Perhaps more surprising is how many participants described the fact that they enjoyed the learning process. Participant 6 expressed this well:

I guess I’m very open to learning new things and I like trying different things, experiencing different things. I’m a pretty flexible, open-minded person. I’m open to experimenting and learning and trying new things and I enjoy all those.

This theme was also supported as one of the participant’s weaknesses, “Sometimes I’m kind of stubborn and I like to do things my way. I like to figure things out on my own before I ask for help” (Participant 1).

Historically, a preconceived attribute of students who enjoy a vocational setting over an academic setting has been that they are not engaged or do not care for the learning process. To compare my discovery with the national norm, I decided to investigate how many current manufacturing workers actually have engaged in an educational setting beyond high school, with the premise that if they enjoyed the learning process then they would have continued their learning beyond high school. Table 4 shows the educational attainment of employees in the labor force for 2012–13. As evidenced by this national research, the majority of the workforce involved in some sort of machining work only has a high school diploma or equivalent.
Table 4

Educational Attainment for Workers 25 Yrs and Older

<table>
<thead>
<tr>
<th>Industry</th>
<th>Less than HS diploma</th>
<th>HS diploma or equivalent</th>
<th>Some college, no degree</th>
<th>Associate degree</th>
<th>Bachelor’s degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lathe and tooling machine tool setters</td>
<td>20.9%</td>
<td>51.5%</td>
<td>19.3%</td>
<td>5.1%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Milling and planning machine setters</td>
<td>20.9%</td>
<td>51.5%</td>
<td>19.3%</td>
<td>5.1%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Machinists</td>
<td>9.8%</td>
<td>47.6%</td>
<td>27.6%</td>
<td>11.2%</td>
<td>3.3%</td>
</tr>
</tbody>
</table>


This data would contradict the findings that five out of seven participants (71.4%) referenced that they enjoyed the coursework portion of this program and therefore valued the extended education afforded through this “learn and earn” program. To support this theory, Participant 6 responded, “I’m very open to learning new things and I like trying different things, experiencing different things, I’m a pretty flexible, open-minded person. I like learning.”

The final theme that emerged from asking the participants about the coursework portion of the program is that the participants valued interacting with teachers. This was noted as both a positive and negative influence. For example, Participant 1 described how a teacher would have a positive impact on the class, resulting in a positive experience: “I like it when the teacher is really engaged in what they are teaching, like they’re actually excited about it and I guess like that makes me excited about it too.”

This theme could actually be a byproduct of the theme that participants in this program like the learning process and that the teacher contributes to that process. For example, Participant 5 told the story of how even though algebra normally was an easy class, the teacher actually made it harder due to her lack of caring for the students.
Algebra was a struggle, and it shouldn’t have been. I don’t like blaming professors for things that I know has a lot to do with students. But this time the teacher didn’t care. You’d email her to ask for help, she wouldn’t return your email. She was never there when we needed help. She said, well, the only time I’m available to talk is Thursday at 8:00 a.m. And we’re at work at that time.

**Research Question 1.B**

The second research question focused on the participants’ experiences in the workplace. Through various interview questions and the work setting observations, I was able to gain a better understanding of how the participants engaged in and described the work-based portion of this program. Table 5 displays the themes that emerged through this line of inquiry.

Table 5

*How do Students Engage with the Industry Portion of the Program?*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Likes Hands-on Work</th>
<th>Likes Rotation</th>
<th>Likes Company</th>
<th>Wants off Floor</th>
<th>Apprehensive OJT</th>
<th>Bad Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

The top two responses regarding the students’ work experiences were positive, with all seven expressing the fact that they (a) liked the hands-on nature of the work and (b) enjoyed the fact that the companies were rotating them throughout various departments. The fact that these students liked that their work experience involved hands-on work supports their responses about the types of classes that they enjoy. Additionally, I would propose that the reason that these
students liked that their company rotated them through various departments is because they enjoyed the learning process, and in this case, learning new skills. Participant 1 expressed the desire to work with her hands: “I realized that working with my hands and trying to solve problems is what I like to do best and, kind of like an engineer, thinking things through.”

Five out of seven participants also expressed that they liked the company that provided them the “learn and earn” experience. Explanations varied from how (a) they felt valued by their company, (b) they enjoyed the company culture, and (c) how their company provided future career opportunities for them. Participant 1 explained:

I don’t have anything else to do, so I might as well work, and I like to help out too because sometimes it depends what department you’re in, but some departments are really behind and they’re always working overtime. So I stay because I feel bad if I leave early.

Unlike the positive themes that emerged from talking to the participants about their work experiences, there were also some negative themes. Four out of the seven stated that they did not want to spend their career working on the manufacturing floor. Participant 4 explained:

I mean, assembly... I'm not really a fan, because you do the same thing over and over again. It’s just, repetition's good, but I mean for eight hours? It's just eight to ten hours a day. It’s just...I don't know how people can do it.”

Participant 3 agreed, “I don’t know that I want to be a machinist for the rest of my life because I want to be doing different things every day.”

Interestingly, four of the seven participants reported feeling apprehensive about their work. The responses involved the complexity of the machines and their fear of being the cause of monetary loss. Participant 7 explained, “One thing that makes me not want to operate a
machine is crashing a machine—it’s pretty scary. So just doing that, that alone, it's like always a fear because when I started operating machines, I was operating a machine that no one still at the shop knew how to run.”

Lastly, four of the seven participants stated they did not like the physical environment in which they worked. Participant 2 expressed concern for the oil that is prevalent throughout the machining floor: “A toolbox is just covered in oil after like three to four days and it's—that along with like cleaning out machines, that's not fun. I need to get away from that.” This was also a notation in my work experience observation at this particular company.

Participant 6 expressed concern with the ventilation:

I mean one like environment wise, I feel like they need better ventilation. It's so dusty. I mean they do powder coating right in there. There is welding that creates dust and there's a lot of metal grinding, grinding machines everywhere just like you know you could set something down for a couple of hours and then touch it and there'll be dust in there and I wear my mask a lot, as much as I can.

This theme supported the dirty stereotype of manufacturing and could play a role in hindering the process of attracting talent. Participant 1 explained that manufacturing didn’t even enter into the equation when considering a future career, due to the preconceived notion of what manufacturing entailed:

When I was in high school, I thought that manufacturing was pretty much where all the people who didn’t go to college go, so it’s this dirty place, you just do the same thing over and over again. Every day you get really hot, and then you just come out all nasty and stuff. That’s the way pretty much society puts it and my mom also told me that too.
So instead I was going to go onto engineering but I didn’t know exactly what type of engineering.

Research Question 1.C

The next research question pertained to the students’ experiences with the “learn and earn” program: How do students’ backgrounds and previous experiences relate to their experiences in the program? Through this line of questioning, I was able to understand the type of individuals who gravitate toward this kind of program. Table 6 shows the themes that were prevalent throughout the interviews of each participant.

Table 6

<table>
<thead>
<tr>
<th>Participant</th>
<th>Math</th>
<th>Extracurricular Activities</th>
<th>Physical Hobbies</th>
<th>3.0 or higher GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Students who were involved in this “learn and earn” program were academically strong, especially in math, with all seven stating that their favorite class was some type of math, and four out of seven achieving a high school grade point average of 3.0 or higher.

Furthermore, participants in this program were active students both in and out of high school. All seven were active in extracurricular activities while attending high school, and six out of seven still enjoyed at least one physical hobby at the time of the study.
Research Question 2

The final research question probed into how the students were influenced by the program in their career planning. Table 7 shows the influential themes.

Table 7

How are Students Influenced by the Program in their Career Planning?

<table>
<thead>
<tr>
<th>Participant</th>
<th>High School Career Plan</th>
<th>Post high school career plans</th>
<th>Means to a Professional Career</th>
<th>Defined Future Goals</th>
<th>Stay in Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineer</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Management</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Engineer</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Engineer</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Criminal</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Undecided</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Engineer</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

When I asked participants about their career plans when they were in high school, four out of seven responded that they wanted to be an engineer, and six out of the seven indicated that they wanted a professional career, with answers like engineering, management, and criminal justice. No one stated that they wanted to pursue a career in manufacturing as an entry-level technician. To that point, although this “learn and earn” program trains individuals at a technician level, six out of seven saw this program as providing an avenue to that professional career. Indicating that their experience in this program influenced how they saw their future career plans.
While the participants did not actively seek out a career in manufacturing, many of the participants were encouraged by a teacher to consider applying for this program. When asked why they thought the teacher encouraged those students to apply, Participant 6 said:

One day she [teacher] was just talking about how there is a lot of people who don’t take advantage of going into skilled trades and everyone is just focused on getting a four-year degree. But that may not be right for everyone. And it’s just something that’s not even thought about by most people and she brought it up. She was actually aware of [this program]. I emailed her for the link and I looked at it and saw the video which made it sound really interesting. I think she saw that I was creative and liked actually doing something instead of just having discussions.

Participant 6 viewed this experience as a stepping stone, although he was unclear of what that next step may be:

I had a friend, she definitely convinced me. She said this is a great stepping stone for your career, you will be completely without debt by the time you graduate and you have a guaranteed job for a couple of years.

To support the desire to move to a professional career, comments indicated that the participants did not plan to stay in their current role as a machinist as a future career choice. Instead, they wanted to further their education and experience and move into a position in which they weren’t on the shop floor. Participant 1 agreed:

I definitely don’t want to work in the office but I don’t want to be running a machine for the rest of my life, so I feel like the engineering is like a little bit of both because you’re working in the office and then somebody needs help.
Four out of the seven participants felt that this program helped to define their future goals for that professional career. Participant 3 agreed:

I don’t know that I want to be a machinist for the rest of my life because I want to be doing different things every day. For now it’s great but at some point I’d like to get into the engineering side of it.

For Participant 7, the long-term goal was to become a mechanical engineer. With exposure to this program, that goal had changed.

I’ve been edging more and more towards staying in manufacturing because what I really like about it is you can work with your hands and you’re not sitting down all day. So if I did become an engineer then I would need to find a job that still has hands-on work. No matter what I’m doing, I know for sure it’s going to involve manufacturing on some level.

Although some participants had a clearer focus in a manufacturing sector, for Participant 2 the nature of this experience had the opposite effect, “I kind of made a decision in the last couple months, I think after this program I’m going to pursue my bachelor in supply chain management.”

While the participants wanted to move into a professional career, four out of seven wanted to remain in the manufacturing industry, suggesting that the exposure to this program provided the appreciation for and opportunities within the industry for them to want to remain.

**Themes Aligned to Coding Categories**

After analyzing the data in alignment with the research questions, I then analyzed the data for emerging themes in four predetermined categories: (a) nature of the experience, (b) responses to the experience, (c) meaning the participant is taking from the experience, and (d)
the participants’ background experiences. It was my hope that this second look at the data would help me to further develop a limited profile of a student for whom this type of program is a good fit so that that information could be used for the planning and recruitment for “learn and earn” types of programs.

**Nature of the Experience in the Program**

Table 8 depicts three themes that emerged when I coded the research data according to the participants’ reaction to the nature of the program.

**Table 8**

*Participants’ Reactions to the Nature of the Program*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Mentorship/Inquisitive</th>
<th>Did not like repetitive work</th>
<th>Accurate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>3</td>
<td>X</td>
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<tr>
<td>4</td>
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<td></td>
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<tr>
<td>5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Participants are inquisitive and desire mentorship.** As previously discussed, participants desired mentorship. Not only did I observe them helping one another in the classroom, but I also observed them seeking the mentorship of the instructor. This was also observed in the workplace. Participants 3 and 6 were not afraid to approach a co-worker to ask for clarification or help. And the co-workers were encouraging with their responses both verbally and nonverbally. As a probing question, I asked each participant about this interaction. Participant 3 responded:
I’m not scared to ask people questions about stuff, in fact I like it that I can do that. I don’t want to be doing the wrong thing because you have to make sure you do it the right way.

Participant 7 told the story about a bad experience and how moving and obtaining a mentor changed the nature of the experience:

I actually ended up switching departments and I’m learning more on CNC-based stuff.

So that was something that turned into a blessing because I found a really good mentor.

He was able to start showing me how everything works more at a technical level.

This theme closely aligned to the theme that participants in this program enjoyed learning and were therefore going to seek out new knowledge through a mentorship activity.

**Participants do not like repetitive work.** Certainly the previously disclosed theme that participants viewed this program as a means to a professional career supports the notion that while students understand the need for the entry-level technician position that they were experiencing while in this program, they did not like the repetitive nature and hoped to advance out of that work.

Participant 4’s work was repetitive and while the work was fine now there was a desire to move into something more:

Assembly…I’m not really a fan because you do the same thing over and over again. I mean, repetition’s good, but a machining line is much better. I would like to eventually move to the tooling room. I like the tools. I like to see how they’re made and stuff like that, how they’re sharpened, where they go, how that works.
This theme was supported by a participant who had variety in the workplace. Due to this diversification, Participant 5 did not have long-term goals to move on to something different, instead he wanted to gain even more knowledge in the maintenance area of manufacturing.

I think that played a big role in making me really enjoy this because I did not want to be that person who sits in front of the machine and runs parts. I want to be the one in back working on it, making things and doing that kind of stuff.

**Participants are accurate and understand the need for quality.** While conducting both the classroom and work observations, it was evident that each participant understood the need for accurate work, and at times, the need for quality assurance checks. I probed this line of observation in the follow-up interviews, asking the participants about the inspection that they conducted and why that was important in their work. Participant 6 responded:

Every half hour we have to measure. We know whatever part we’re making, and that’s something that’s been emphasized in a few different classes, has to meet expectations. Luckily we already knew how to measure different equipment and what not.

Participant 5 agreed about the necessity for accuracy and felt that the Quality Science class was helpful: “Quality [class] has been a real good help this time. You get the whole feel of everything and how quality works, why we need it.”

**Responses to the Experience**

Although two of the responses that participants had regarding the experience have already been presented—(a) defined future goals, and (b) means to a professional career—two additional themes emerged from this new analysis—(c) balance between class and work place, and (d) the value of on-the-job training.
Table 9

Participants’ Responses to the Program

<table>
<thead>
<tr>
<th>Participant</th>
<th>Balanced Schedule</th>
<th>OJT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
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</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

As part of this “learn and earn” program, participants worked at least three days per week at their sponsoring company. While this was a great way to earn an income while attending school, four of the seven participants expressed the value placed on the actual learning and industry experience that they were building. For example, Participant 2 stated, “I mean you get to learn and we’re getting, what, three years of experience…on the floor which is hard to beat.” As participants build that work experience they are realizing the importance of that experience and how portable it is for advancing their careers.

I’m glad this program came into play. I mean, I wouldn’t have any work experience. So I would just be going on a job and not knowing what I’m doing. Where here I’m going to school and working at the same time. So I’m getting that job experience for the future.

(Participant 4)

To a fault, every work observation had some sort of on-the-job training element. With each participant partnered with a mentor while working, it was evident that this partnership also included an on-the-job training element.
Surprisingly, four of the participants felt that there was a good balance between the time invested in coursework and the time they worked. This program was very regimented. While one would think that this type of strenuous weekly schedule would be a burden, the participants did not express that concern, with four out of seven stating that they felt the coursework and work-based schedule were balanced. I would have thought that the participants would have felt stressed with the 40+ hour week they put in between school and work. Participant 5 described the importance of getting into a routine to help with that balance, “We kind of get into this routine where you go to school these two days then on the weekend you have time to do your homework or even after class on Mondays and Tuesdays.” Interestingly, Participant 7 described the fact that both the company and the school work together for this program, and that is the reason there is balance, “The fact that between school and work everyone is working together to balance our lives.”

**Meaning of the Experience**

One additional theme arose from my second analysis. Four out of the seven participants understood the monetary value of an education.

**Participants understand the monetary value of an education.** When participants were asked about what attracted them to this program, four out of seven cited the importance of a free education and the ability to create a career path.
Participant 4 described his father’s encouragement:

I mean the first time we heard of it [program] we looked into it. We went gradually, he wasn’t forcing it but he thought that it was a good idea. Before I was going to College for mechanical engineering and I mean prices are expensive. Four years is a lot of debt. In the long run we thought that this would be a better decision since we don’t have to pay for anything. We are going to be debt free for the first two years.

Many other participants described the same type of conversations, indicating that part of the attraction to the program was the fact that the first two years of their college education would be debt free. Participant 3 explained, “I won’t have to take out a loan to get my education.”

**Background Experiences**

Previously discussed background themes include: (a) participants were young, Caucasian males, (b) they thought they wanted a professional career, (c) they liked hands-on classes and activities, and (d) they were academically strong. Several other themes emerged in this second analysis regarding participants. Those included that participants:

---

### Table 10

**Participant’s Meaning to the “Learn and Earn” Program**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Free Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X</td>
</tr>
</tbody>
</table>

---
• had a strong work ethic,
• had strong math skills,
• liked challenging hands on coursework,
• liked problem solving,
• were applied learners,
• were active both in and out of school,
• engaged in physical activities, and
• enjoyed organized activities.

Participants have a strong work ethic.

Table 11
Participants Have a Strong Work Ethic

<table>
<thead>
<tr>
<th>Participant</th>
<th>Formal Job</th>
<th>Volunteer</th>
<th>Self-described Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td></td>
<td>• Hard Working</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td>• Quick Learner</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Problem Solving</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td></td>
<td>• Visualizer</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td>X</td>
<td>• Good Listener</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
<td></td>
<td>• Hard Working</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Focused</td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td></td>
<td>• Problem Solving</td>
</tr>
<tr>
<td>7</td>
<td>X</td>
<td></td>
<td>• Persistent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Problem Solving</td>
</tr>
</tbody>
</table>

Six out of the seven participants either held a job or volunteered in their church while attending high school, lending support to the notion that students interested in this “learn and earn” program have a strong work ethic. Participant 2 conveyed the strong work ethic in volunteer work:
We did quite a bit of volunteering for football my junior and senior year. Varsity had to volunteer quite a bit and then I went on quite a few mission trips in my church. I went on four mission trips throughout my high school career and those were all week-long so we would go and volunteer for the week.

When asked about their strengths, participants used the following words to describe themselves: hardworking, focused, problem solver, and persistent. Participant 1 explained:

I really like to work hard; I work really hard when I want something that I want. If there was a task that I was having trouble with and I just couldn’t grasp it, I would keep going and not give up. I would persevere until I got it, no matter how hard it was for me.

When observing the participants in the work setting, many of their supervisors described the participants as they did themselves. Using phrases such as “good worker,” “not afraid to work,” “always on time,” “eager to learn something new,” and “responds well to suggestions” when describing the participants. This data again suggests that participants in this “learn and earn” program were successful due to their strong work ethic.

Participants have strong math skills. Table 12 demonstrates that students participating in this technician preparation program were high performing in both their high school GPAs as well as their ACT scores. As already noted, four out of the seven participants graduated high school with a 3.0 GPA or higher.
Table 12

*Academic Evidence of Participants*

<table>
<thead>
<tr>
<th>Participant</th>
<th>High school GPA</th>
<th>ACT Composite</th>
<th>English</th>
<th>Math</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.38</td>
<td>18</td>
<td>19</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>3.17</td>
<td>19</td>
<td>15</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>2.62</td>
<td>23</td>
<td>24</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>3.66</td>
<td>20</td>
<td>20</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>2.31</td>
<td>23</td>
<td>21</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>2.37</td>
<td>25</td>
<td>25</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>7\textsuperscript{a}</td>
<td>3.82</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

\textsuperscript{a}. Participant 7 was not required to submit ACT scores for admittance into the program.

As one would assume due to the nature of this work, participants were strong in math. Table 12 provides evidence that indeed that was the case. Four of the seven participants’ math ACT scores were their highest score, and in two others cases, math was a close second. In fact, the next table (Table 12) also provides evidence for this theme, as six out of the seven participants stated that their favorite courses were math-related.

**Participants like challenging hands-on coursework.** Table 13 illustrates the answers that the participants gave when asked the interview questions, “Thinking back to your high school experience, what were your favorite subjects? Why do you think they were?” With six out of seven reporting that math was their favorite course, the evidence supports that students in this program enjoyed challenging courses. While several participants listed more than one favorite course, six out of seven reported a career and technical education course as one of their favorite subjects as well. Furthermore, it was evident that these students relished courses that were challenging to their intellect as well as courses that challenged their kinetic abilities, with six out of the seven participants expressing that they liked hands-on courses.
Participant 7 was especially strong in math, stating that physics was one of his favorite courses; thus liking both high intellectual math such as physics but also liking the courses that allowed problem solving and applied knowledge: “My favorite subjects were probably physics, plus I took a lot of auto tech classes like working on tires and engines and I took my drafting classes. Those are probably my top favorites.”

Participants like problem solving. Just as important as hearing that math and hands-on courses were the participants’ favorites, the question of why really got at the heart of the students’ motivations. As I proved for the “why,” a new theme emerged, participants liked to problem solve. Participant 1 explained the importance of problem solving: “I don’t know, I like things that involve making something out of my own mind and having to solve problems for myself. I guess, it’s not just reading but it’s making things come to life.” Participant 4 agreed: “I liked shop class because you weren’t just like sitting around in class, you were moving. I like math in general, I like numbers, and occasionally letters. I like to solve problems and figure
things out.” In fact, while conducting my classroom observation, it was noted by the instructor that Participant 4 had already successfully completed the project and was not required to be in the lab that day. Instead, this participant was in class and performing a hard task just for the sake of learning and problem solving.

**Participants are applied learners.** Table 13 also shows that six out of the seven participants preferred to learn concepts in an applied situation. Even with math as a favorite subject, it was how the math was taught that is key. Participant 5 explained:

> For math I started to get it more when I put it into real life situations. I was good at it but I didn’t like the whole idea of math where they give you all those problems that didn’t really apply in real life.

Participant 7 explained that the applied learning wasn’t enough to just be hands-on. Instead, the learning must be connected to an experience to facilitate grasping the concept.

> If there is something that I really don’t understand, I almost have to see it or physically touch it or interact with it to understand. Plus I have to see how the subject we are learning will be used when I’m out in the workplace. Otherwise I don’t see the value of learning the material.

Participant 3 described the need to learn the material both physically and by connecting it with a past experience.

> I actually like to physically do it, obviously watching someone else do it first. When I do it physically it’s like muscle memory and both my brain and my body have to remember it. In order for me to really remember it later though, I have to figure out how to see that working in the real world.
Participant 2 explained that out of all of the math classes, trigonometry “was a lot easier because there were a lot of story problems that were applied.” Perhaps Participant 5 stated it best:

I enjoy learning when I feel that I will benefit from what I’m learning. For instance when we first go to college and we have to do the gen eds I had trouble paying attention to things. I don’t think I’m going to benefit from these classes. But if it’s something like shop class or welding I think I’ll benefit from, then I have to no issue learning.

**Participants were active both in and out of school.** When asked about their hobbies and extracurricular activities in high school, it became apparent that the students who are interested in a “learn and earn” program were very active. Table 14 illustrates the responses that participants gave when asked about their extracurricular activities while in high school as well as any hobbies they currently enjoyed.

Table 14

*Participants’ Extracurricular Activities and Hobbies*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Extracurricular high school activity</th>
<th>Hobbies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student council</td>
<td>Fixing things</td>
</tr>
<tr>
<td></td>
<td>Sports</td>
<td>Organizing things</td>
</tr>
<tr>
<td></td>
<td>Christian athletes</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sports</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Youth group</td>
<td>Outdoor activities</td>
</tr>
<tr>
<td>3</td>
<td>Class officers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boy Scouts</td>
<td>Outdoor activities</td>
</tr>
<tr>
<td>4</td>
<td>Sports</td>
<td>Bowling</td>
</tr>
<tr>
<td></td>
<td>Church group</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sports</td>
<td>Fixing things</td>
</tr>
<tr>
<td></td>
<td>Church group</td>
<td>Building things</td>
</tr>
<tr>
<td>6</td>
<td>French club</td>
<td>Art</td>
</tr>
<tr>
<td></td>
<td>DECA</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sports</td>
<td>Fixing things</td>
</tr>
<tr>
<td></td>
<td>Science Olympiad</td>
<td>Outdoor activities</td>
</tr>
<tr>
<td></td>
<td>Church group</td>
<td></td>
</tr>
</tbody>
</table>
In fact, all participants were involved in some sort of extracurricular activity throughout their high school careers. Additionally, six out of seven of the participants currently enjoyed hobbies that involved physical activity. This tendency seems to support the nature of the program; with the coursework and on-the-job training, students average 40 hours per week if not more, indicating that these students liked a busy schedule.

**Participants engage in physical hobbies.** As part of the interview process, participants were asked about their hobbies. Not only were the answers physical in nature, such as weight lifting or bowling, but they also involved some sort of hand–eye coordination. Table 14 illustrates the specific data for this analysis. For instance, Participant 2 explained, “Right now my biggest hobbies are hunting and fishing and weight lifting and working on my car.” Participant 5 agreed, “I work on my truck a lot, I like working out so I like working with my hands. Whether that be working on a vehicle, working around the house, or building something.” Even the organized clubs that participants belonged to were physical in nature: “Right now at least, I bowl a lot. I also do small projects with my dad” (Participant 4).

**Participants enjoy organized activities.** When asked about their high school extracurricular activities, it was unanimously reported that students interested in this specialized “learn and earn” program enjoyed organized activities. As described in Table 14, those activities were not necessarily sports-related. For instance, Participants 1, 2, 4 and 7 all indicated their involvement with a church group. Participant 7 explained, “I was involved with my church. I was one of the leaders of the other school students. We basically led small groups and stuff like that.” Other examples of organized activities included Science Olympiad, Boy Scouts, and serving as a class officer. Participant 6 was an officer in the French Club and a member in DECA:
I was the vice president of the French Club. And then I also was in a club called DECA which is like a business and marketing club. There is actually competitions with regionals and nationals. You actually go in and present different business plans.

Organized high school sports was also a theme, although the type of sports varied. Participants reported that they were involved in wrestling, football, baseball, track and field, cross country, and swimming. Interesting to note, participants did not seem to place much emphasis on the popularity of the sport but instead their interest in the organized group.

Summary

The purpose of this qualitative study was to describe and interpret how community college students, preparing for an entry-level technician position in manufacturing, experienced a “learn and earn” industry and education partnership. This chapter presented the themes that emerged from two separate analyses. Between the two phases of analyses, the following eight themes emerged:

Participants:

- valued mentorship both in the classroom and on-the-job,
- enjoyed the learning process,
- were academically strong,
- liked variety in the workplace,
- valued on-the-job experience,
- were active both in and out of school,
- used this program as an avenue to a professional career, and
- valued the monetary value of an education.
By analyzing the themes that emerged from both analyses, I was able to understand the characteristics of a student engaged in such a program and subsequently created a limited student profile that will be presented in Chapter 5.
CHAPTER V
SUMMARY, INTERPRETATION OF FINDINGS, LIMITATIONS AND FUTURE RESEARCH

The talent shortage in manufacturing sector has led manufacturing companies to look to higher education institutions to help train young adults for entry-level technician positions. Such a shortage has led to educational institutions and companies partnering to help train for such positions. As partnerships form between the educational institutions and manufacturing companies, the real issue remains how to attract young talent into the pipeline. In an attempt to understand the characteristics of young adults attracted to the manufacturing industry, this qualitative study described and interpreted how community college students experienced a “learn and earn” program that prepared them for entry-level technician positions in the manufacturing industry.

In 2012, I became interested in this topic as I helped to create a “learn and earn” program that prepares young adults for work in the manufacturing industry. While such specialized programs in manufacturing are growing in momentum throughout the state of Michigan, the understanding of the type of individual who would be interested in the program remained unknown. Through the exploration of the participants’ experiences and backgrounds, I was able to distinguish promising student characteristics that may be of interest to other “learn and earn” programs for recruiting purposes.

While there is existing research on various student profiles such as gifted students (Meier et al, 2014), nursing students (Penprase et al, 2013; Auerbach et al, 2012; Weick, 2003), doctoral students (Graham & Yang-Hyang, 2011), transfer students, (McQuire & Belcheir, 2013) and even engineering students (Student and Career Profiles, 2009; Li et al., 2009; DeFraine et al, 2014; Li, McCoach et al, 2008), there is very little research on the entry-level positions in
manufacturing, and specifically, at the technician level. In fact, several of the past research studies called for further action to understand such a student experience (Emanuel & Adams, 2006; D’Amico et al., 2011; Trank et al., 2002; Feutz & Zinser, 2012; Meier et al., 2014; Graham & Yang-Hyang, 2011; McQuire & Belcheir, 2013; and Student and Career Profiles, 2009).

As President Obama (The White House, 2015) brings technician-level jobs to the forefront of his administrative agenda, there remains very little research on the type of individual who is best suited for these positions. In fact, even prior to President Obama’s spotlight on the importance of these entry-level positions, Zinser & Lawrenz’s (2004) research brought to light that a community college and employer partnership could help to develop the talent pipeline for which a shortage was anticipated prior to the 2008 recession. My research helps to provide promising student characteristics for recruiting individuals into such a talent pipeline.

Partnerships described as a “learn and earn” programs have yet to be defined (Gardner and Bartkus, 2010). A few commonalities do exist: (a) academic rigor, (b) relevant work experience, (c) funding, and (d) strategic alliance (p. 1). The “learn and earn” program studied in this research had all four elements. Students obtained an associate degree that was fully funded by their sponsoring company, while obtaining on-the-job work experience. The companies and the educational institution strategically determined the classroom schedule and the coursework to best prepare the students.

Previous research conducted on the course experiences of students have focused on their satisfaction with the course (a) instructor, (b) meeting schedule, and (c) relevancy. In fact, several of the studies have called for a more comprehensive understanding of the results (Emanuel & Adams, 2006; D’Amico et al., 2011; Feutz & Zinser, 2012; Eames, 2000; Coll, 1998; Dundes & Marx, 2006-2007). This study gathered the experiences of the students, not in
an attempt to understand their satisfaction level, but rather in an attempt to understand how they experienced the “learn and earn” program and what their likes and dislikes were with the coursework experience.

Work-based experiences have long been established as valuable to a student (Coll, et al., 2001; Zeqwaard & Coll, 2001; Eames, 2000; Gold, 2002; Jackson & Jackson, 2009; Weible, 2010; Feutz & Zinser, 2012; Torraco, 2008; Fowler et al., 2001; Dearing, 1997; Hynie et al, 2011). This research focused on the “why” behind the existing research that states on-the-job experiences are valuable. In fact, this study adds to that research in several instances, which will be described in detail further in this chapter.

**Interpretation of Findings**

In Chapter I, I presented my conceptual framework based on previous research of characteristics of students who were engaged in different career paths. These profiles combined the student demographic information, background experiences, and current “learn and earn” course and work experiences. This framework is presented in Figure 1 on page 10. This framework assumed a relationship between who the students were, how they experienced the program, and their future career planning.

Using a set of research questions, I conducted two phases of data analyses using two templates with two different sets of categories. The first phase was more inductive questions formed from the academic literature review. The second phase was a used a typological lens created by drilling deeper into the essential elements embedded in the research questions.

Due to the small sample size of my study, my findings may help to contribute to further research in the development of such a student profile but cannot claim to form a robust student profile. The remainder of this chapter will focus on the eight themes that outline promising
characteristics, and lead to a limited student profile of that may be of interest to other “learn and earn” programs in the preparation of entry-level technicians in manufacturing. These findings serve as considerations for educational institutions and manufacturing companies alike in their planning and recruitment for “learn and earn” types of programs.

**Relationship of Results to Existing Studies**

The findings are a result of my interpretations of data gathered through an initial phone interview, a classroom observation, a work-based observation, and a follow-up, in-person interview. The participants were all active students in a “learn and earn” program as described in Chapter III and the demographic information of the participants is outlined in Tables 1 and 2 in Chapter IV.

Eight major themes emerged from this study. A comparison of those themes with the previous research are presented in Table 15 and will be discussed in the pages that follow.
### Table 15

**Comparison of Research**

<table>
<thead>
<tr>
<th>Comparison Summary between Koning (2016) and Previous Research</th>
<th>Previous Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants value mentorship both in the classroom and on the job.</strong></td>
<td></td>
</tr>
<tr>
<td>- Increased understanding of the importance of the mentorship from the course instructor (knowledge, approachability, empathy, encouragement, career pathway)</td>
<td><strong>Affirms:</strong></td>
</tr>
<tr>
<td>- Changed how to model classroom and on-the-job mentors for future “learn and earn” programs</td>
<td>- Course instructor plays an important role in student experience (Dyer, 1991; Emanuel &amp; Adams, 2006)</td>
</tr>
<tr>
<td>- Increased understanding on the value of the on-the-job experience as a deciding factor for future career goals</td>
<td>- On-the-job mentors are desirable and help provide positive experience (Coll et al., 2001; Zeqwaard &amp; Coll, 2011; Eames, 2000)</td>
</tr>
<tr>
<td><strong>Participants are academically strong and prefer challenging work both in the classroom and on-the-job.</strong></td>
<td></td>
</tr>
<tr>
<td>- Reinforced the relationship between high achieving students and the desire for a cognitively challenging career</td>
<td><strong>Affirms:</strong></td>
</tr>
<tr>
<td>- Disputed the preconceived notion that students who work more than part-time and attend school full-time cannot manage both demands</td>
<td>- Students who are high achievers prefer interesting and challenging work (Trank et al., 2002)</td>
</tr>
<tr>
<td>- Disputed the notion that students who work more than part-time will not put in the effort to succeed in school</td>
<td>- Students with high cognitive ability have been found to desire investigative occupations (Lubinski et al., 1995)</td>
</tr>
<tr>
<td>- Disputed the preconceived notion that although high achieving students prefer challenging work, they are willing to work their way up through lower-level experience</td>
<td>- Students desire meaningful on-the-job experiences (Gold, 2002; Jackson &amp; Jackson, 2009)</td>
</tr>
<tr>
<td>- Disputed the notion that students preparing for a technician-level career do not enjoy the learning process</td>
<td><strong>Disputes:</strong></td>
</tr>
<tr>
<td><strong>Participants are active both in and out of school.</strong></td>
<td></td>
</tr>
<tr>
<td>- Increased the understanding of the relationship between how many credits a student takes and the likelihood they will graduate</td>
<td>- Students who worked more than 20+ hrs per week did not apply themselves to studies (Dundes &amp; Marx, 2006-2007)</td>
</tr>
<tr>
<td></td>
<td>- The amount of effort for a class negatively impacts the preference of the class (Thornton et al., 2010)</td>
</tr>
<tr>
<td></td>
<td>- Irrelevancy of the required general education courses (Torraco, 2008)</td>
</tr>
<tr>
<td></td>
<td>- The more credits a student takes the more likely they will graduate (D’Amico et al., 2011)</td>
</tr>
<tr>
<td>Participants desire to move to a professional career, with defined future goals.</td>
<td>Affirms:</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Increased understanding of student perceived preparedness in “learn to earn” programs</td>
<td>• Perceptions of preparedness for future careers (Feutz &amp; Zinser, 2012)</td>
</tr>
<tr>
<td>Removed preconceived notions of applicants for a technician-level position with a desire for a professional career</td>
<td>Adds to:</td>
</tr>
<tr>
<td></td>
<td>• Further research on the indicators of applicant achievement and organizational preference (Trank et al., 2002)</td>
</tr>
<tr>
<td>Disputes</td>
<td>• High achieving students will only desire challenging work with fast promotions (Trank et al., 2002)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants value the on-the-job training as well as the formal education.</th>
<th>Affirms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforced the understanding of the benefits students place on work- and school-based education</td>
<td>• Benefits include relevant job experience (Weible, 2010)</td>
</tr>
<tr>
<td>Added to the known reasons students place emphasis on course and on-the-job relevancy</td>
<td>• Course experience contributes to how well students perceive they are prepared (Feutz &amp; Zinser, 2012)</td>
</tr>
<tr>
<td></td>
<td>• Difficult to extract curriculum and on-the-job experiences (Feutz &amp; Zinser, 2012)</td>
</tr>
<tr>
<td></td>
<td>• Student perceptions of on-the-job training (Torraco, 2008)</td>
</tr>
<tr>
<td></td>
<td>• Students value on-the-job experiences (Jackson &amp; Jackson, 2009; Fowler et al., 2001)</td>
</tr>
<tr>
<td></td>
<td>• Work experience plays an important role (Dearing, 1997)</td>
</tr>
<tr>
<td></td>
<td>• Students desire a deeper understanding of the workplace (Hynie et al., 2011)</td>
</tr>
<tr>
<td>Adds to:</td>
<td>• Further research on course relevancy and preparedness for work (Feutz &amp; Zinser, 2012)</td>
</tr>
<tr>
<td></td>
<td>• Qualitative reasons for student perceptions of on-the-job relevancy (Eames, 2000; Coll, 1998)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants prefer applied learning and are willing to apply their work ethic to both school and on-the-job.</th>
<th>Affirms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased the understanding of the importance of hands-on, real-life learning for students</td>
<td>• Students must participate in the interaction to achieve the full effect (Emanuel &amp; Adams, 2006)</td>
</tr>
<tr>
<td>Increased the understanding of how students identified with this “learn and earn” program</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants are not overwhelmed by the balance between school and work in this “learn and earn” program.</th>
<th>Affirms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased knowledge of how the balance between work and school positively influences student success</td>
<td>• Part-time work helped students manage their time better (Fowler et al., 2001)</td>
</tr>
<tr>
<td>Removed the predetermined opinion that the number of times a class meets negatively impacts the preference for school</td>
<td>• Number of work hours helps students focus their time (Dundes &amp; Marx, 2006-2007)</td>
</tr>
<tr>
<td>Increased the knowledge of employers on the demands of school work</td>
<td>• Students who worked 20+ hrs per week did not report fatigue (Dundes &amp; Marx, 2006-2007)</td>
</tr>
<tr>
<td>Disputed the idea that schools and companies do not work together to create a balanced schedule</td>
<td>Adds to:</td>
</tr>
<tr>
<td></td>
<td>• Why the balance of work and school is manageable (Dundes &amp; Marx, 2006-2007)</td>
</tr>
<tr>
<td>Disputes:</td>
<td>• The days/times that a class meets negatively influences the student experience in a course (Vernick et al., 2004; Reardon et al., 2012)</td>
</tr>
</tbody>
</table>
• Removed the notion that students who worked more than part-time felt more stressed in balancing work and school

• On-the-job work imposed on social time (Fowler et al., 2001)
• Employers did not understand the demands of school (Fowler et al., 2001)
• School did not help balance school and work responsibilities (Fowler et al., 2001)
• Students who worked 20+ per week felt more stress (Dundes & Marx, 2006-2007)

**Additional themes not aligned to research.**

**Participants:**
- did not like repetitive work
- were accurate and understood the need for quality
- understood the monetary value of an education
- had strong math skills
- liked problem solving
- engaged in physical hobbies

**Adds to:**
- New genre of student profile (Meier et al., 2014; Graham & Yang-Hyang, 2011; McQuire & Belcheir, 2013, anonymous, 2009; D’Amico et al., 2011)

**Theme 1: Participants value mentorship both in the classroom and on the job.** The data from this study not only affirms the importance of mentors both in the classroom (Dyer, 1991; Emanuel & Adams, 2006) and in the workplace (Coll et al, 2001; Zegwaard & Coll, 2011; Eames, 2000), but also suggests why that mentorship is valued by students, adding to the research of Emanuel & Adams (2006), which called for a holistic view of the student experience. Participants’ comments supported that they actively engaged in conversations that benefited them as a mentee, whether in the classroom or on the job, so that they could be assured that they were completing the job or assignment as expected. In fact, participants were observed not only asking for the help of either the instructor or the on-the-job mentor, but they also did not hesitate to be the provider of mentoring to their fellow classmates and employees. This finding adds to the research of Torraco (2008) and Eames (2000) in that it provides the reason behind the value of employer support.

Participants also stated that they did not hesitate to ask for help or clarification while working on the job or in the classroom. This finding suggests that improvement is not needed between the classroom and on-the-job mentors as the participants held value for both. This
disputes Jackson & Jackson’s 2009 research that called for an improved mentorship program between the educational institution and the industry partner.

Another noteworthy finding was that students did not seem to be influenced by the gender of the instructor or their expected grade when interacting for help while in the classroom. This seems to dispute Heckert et al.’s (2006) findings that the student’s expected grades, interest in the content, and instructor gender influenced their perception of the instructor. In fact, none of those themes emerged from the interviews or observations during this study.

Theme 2: Participants are academically strong and prefer challenging work both in the classroom and on the job. The data from this study reinforced the relationship between students who are high achievers and their desire for interesting and challenging work (Trank et al., 2002; Gold, 2002; Jackson & Jackson, 2009). In fact, this theme disputed four findings previously reported by research: (a) students who work more than part-time and attend school full-time cannot manage both demands, (b) students who work more than part-time will not put in the effort to succeed in school, (c) students prefer challenging work and are not willing to work their way up through lower-level experiences, and (d) students preparing for a technician-level career do not enjoy the learning process.

Dundes and Marx’s (2006–2007) research found that students who worked more than 20 hours per week did not apply themselves to their studies. In fact, my study suggests differently. The background of the participants revealed that six out of the seven held a formal or volunteer job throughout their high school career. While doing so, four maintained a GPA of 3.0 or higher and demonstrated high achievement on their ACT scores (Table 12, p. 75), suggesting that even as high school students holding a part-time job, these students did apply themselves to their
studies. These same students enjoyed the learning process and expressed that the reason they enjoyed courses was that the classes were challenging (Thornton et al., 2010; Torraco, 2008).

**Theme 3: Participants are active both in and out of the school.** This theme supported D’Amico et al.’s research (2011) that stated the more credits a student takes the more likely they will be to graduate. This suggests that although this “learn and earn” program required students to work part-time and go to school full-time, the relationship between the number of credit hours and the likelihood for graduation only supported the notion that these participants would not only graduate but would also do so because they enjoyed being active both in and out of school. The explanation behind this statement was supported by the fact that participants engaged in extracurricular activities and some type of work while in high school (Tables 11, p. 73; Table 14, p. 78) as well as enjoying hobbies while participating in such a time-consuming program (Table 14, p. 78).

It is my theory that this theme was related to Theme 7 (Participants are not overwhelmed by the balance between school and work).

**Theme 4: Participants desire to move to a professional career, with defined future goals.** My research affirms and adds to Feutz & Zinser’s 2012 research in the perceived preparedness that was felt by students for their future career. My study’s participants repeatedly stated that they felt both the classroom and work-based experiences provided a means to a professional career, which was more defined as a result of participating in this “learn and earn” program. They cited that this program provided them an opportunity to obtain the education and experience needed for achieving their long-term goals. This finding adds to Trank et al.’s 2002 research that called for “further research on various indicators of applicant achievement and their implications for organizational preferences” (p. 342). It also disputes Trank et al.’s findings on
high achieving applicants only desiring challenging work with the promise of fast promotions. In fact, my research suggested that one of the implications for organizational preference is that applicants see the opportunity as a stepping stone in their career pathway, and therefore are willing to learn the basics as a technician. Furthermore, participants were quoted as valuing that experience and feeling that it provided a good foundation for moving into a professional career. They did not express the desire to immediately advance in the company.

**Theme 5: Participants value the on-the-job training as well as the formal education.**

This theme affirms previous research conducted on the benefits and values that students place on the work- and school-based education. In fact, the two seem to be intertwined in such a program. In an effort to determine how well students felt they were prepared for their chosen career in engineering, Feutz & Zinser (2012) reported that the coursework was a factor in their results. Feutz & Zinser also reported that it was difficult to extract the curriculum and on-the-job experiences when it came to the value that the students placed on such experiences. My research adds to these findings by providing quotes and examples that the students gave in supporting both the value of the on-the-job training as well as the formal education (Eames, 2000; Coll, 1998).

This theme also reinforced the relevancy that students placed on the work-based experience (Weible, 2010; Jackson & Jackson, 2009; Fowler et al., 2001; Dearing, 1997). In fact, with the interviews that I conducted, it was evident that this study supported that students desired a deeper understanding of the workplace and as they felt valued by their company, they enjoyed the company culture, and they liked how the company provided possible career opportunities for the future (Hynie et al., 2011).
My study supported that participants valued the formal education in such a “learn and earn” program. Perhaps the biggest contributor to the affirmation of this theme was that the participants enjoyed the learning process. This was coupled with their expressed desire for mentorship from the instructor, among fellow classmates, and from other employees on the job.

**Theme 6: Participants prefer applied learning and are willing to apply their work ethic to both school and on-the job.** The findings of this research suggested that students who may be interested in a “learn and earn” program desired hands-on, real-life learning. In fact, it was when these two things occurred simultaneously in the classroom that students felt the most engaged with their learning and therefore enjoyed the learning process. Ironically, this did not change if their class or on-the-job work was difficult. They continued to exhibit a strong work ethic and apply their learning to these situations. One such example was under Theme 2 (p. 89), wherein the students favored challenging courses. They did not shy away from the courses that challenged them, but instead cited that the reason why they liked these challenging courses was that they provided the opportunity to problem solve, thus providing evidence as to their willingness to apply their work ethic in the classroom. This is supportive of Emanuel & Adams’ (2006) research results that stated that students must participate in the interaction of their learning to achieve the full effect of that learning.

The work ethic among the participants was not only recognized by others, but it was also repeatedly a self-described strength. Not only did the students present information that proved that they were academically strong while simultaneously working either a formal job or a volunteer position (Table 6, p. 63), but they also described themselves as hard working (Table 11, p. 73).
Theme 7: Participants are not overwhelmed by the balance between school and work in this “learn and earn” program. Previous studies reported that students who worked part-time were able to manage their time better because working seemed to better focus their free time (Fowler et al., 2001; Dundes & Marx, 2006–2007). My findings supported this theory in that while participants both worked part-time and attended school full-time, their comments repeatedly provided evidence that they did not feel overwhelmed. In fact, their comments added to Dundes & Marx’s work as they provided an explanation as to why both working and attending school was manageable. Participants cited the importance of the regimented routine of the program as well as the companies and the educational institution working together so as to not present competition for their time. This statement disputed Fowler et al. (2001) and Dundes & Marx’s (2006–2007) theories that although students who worked part-time were able to better focus, they also felt that the employers did not understand the demands of school and the school did not help to balance the workload.

This theme also removed the notion that the number of times a class meets negatively impacts the preference for school (Vernick et al., 2004; Reardon et al., 2012). Reardon et al.’s results reported that classes that met multiple times per week were more conducive to learning. The schedule for this program had students only attending school two full days per week. In fact, my findings indicated that the number of times a course met during the week did not influence the participants’ perceptions of the balance between work and school. Perhaps the deciding factor for this particular study was that the participants were also academically strong and preferred challenging activities.

Theme 8: Additional themes not aligned to research. Although this study comprised a small sample size, the seven themes presented either affirmed, enhanced, or disputed existing
research. This study also exposed addition promising student characteristics for manufacturing technicians in a specialized “learn and earn” program. As described in Chapter IV, the following characteristics were derived from the data and should be considered as promising themes:

- Participants did not like repetitive work.
- Participants were accurate and understood the need for quality in both their workplace and coursework.
- Participants understood the monetary value of an education.
- Participants had strong math skills.
- Participants liked problem solving in both their workplace and coursework.
- Participants currently engaged in physical hobbies.

**Implications and Limitations for Future Research**

It is vital to attract young adults into the manufacturing sector to address the talent shortage in Michigan. In attempting to do so, the need for developing a profile of students suited for a “learn and earn” program for manufacturing technicians is still evident but also a challenge. The literature review that I conducted provided some guidance on various aspects of such a profile, but there is still a need for a comprehensive study specifically targeting the manufacturing technician genre. While my study provided many promising characteristics for such a profile, it was not without its limitations.

The first limitation was the fact that qualitative studies find it difficult to generalize the results if not based on a theory. According to Yin (2014), “having some theory or theoretical propositions will later play a critical role in helping you to generalize the lessons learned” (p. 40). While Yin is specifically speaking of case studies, a form of a qualitative study, the same can be said of this study. The better supported your study is by a strong theory, the more
generalizable it can be. Unfortunately, there were very few research studies in the manufacturing sector, and if those studies existed, then they focused on programmatic evaluations instead of the student experience. Therefore, the conceptual framework for this study was based on fragments of theories and perhaps was not as well supported at this time but certainly could be considered a starting point for developing a future theory.

The second limitation was the sample size. While Creswell (2007) would argue that “the intent in qualitative research is not to generalize the information…but to elucidate the particular” (p. 126), it is still important to realize that this study was conducted with only seven participants in a niche program. These findings certainly could not be extrapolated to a larger population that did not fit the defined study setting and subjects.

As a recommendation for future research, this study should be replicated in other “learn and earn” programs where the goal is to prepare technicians in manufacturing. This would have the potential to validate, dispute, or add to the formation of a student profile. Additionally, this study could also be expanded in any one theme to take a deeper look at the variables behind those particular findings.

With the current state of the talent shortage in Michigan, it would be not only relevant, but prudent to expand this research to explore the development of a student profile for preparing a technician in the manufacturing field.

**Implications for Practice**

These findings may be of interest to companies and educational institutions involved in a “learn and earn” partnership. The following section provides some ideas for how companies and educational institutions could use this information.
First, companies may be able to adapt these promising student characteristics to better position themselves to appeal to young adults and therefore to help attract talent into the manufacturing sector. For instance, manufacturing companies should form relationships with their neighboring school districts, and in particular with the coaches and math instructors. These individuals would be in a good position to identify students who have excelled at math or engaged in extracurricular activities throughout their high school careers. Additionally, companies should focus on not only high achieving students but also students who prefer to utilize that academic excellence in a career and technical education course. Overwhelmingly, participants in this research proclaimed their desire for an engineering career. It would be advisable to target those individuals first with the concept of a free education, and then emphasize the promising career potential when speaking with students and parents in promoting this specialized program.

Second, both companies and educational institutions may use these promising findings to help focus their marketing efforts. Educational partners should focus on students who excel in academics, something that historically has been reserved for a student attending a four-year post-secondary institution. Furthermore, the K–12 institution should evaluate high achieving individuals who have become a disciplinary problem, as this study indicates that students interested in a career in manufacturing do not like repetitive work and prefer to be challenged. Disciplinary problems can arise in a traditional educational setting if a student is not challenged. When interviewing, companies should focus on the student’s achievement both in and out of the classroom, what problems the student has solved, or perhaps even the review of a case study for which the student must determine a course of action. The student who excels in this type of
environment will not perform well on a written aptitude test, rather a test must involve real world scenarios.

Now that a more defined student has been identified, these promising findings may be useful for the future development of such a “learn and earn” manufacturing early college program. This entity would provide an avenue for students to utilize their skills and aptitudes in an environment in which they can excel. Additionally, providing accelerated skill attainment for both the student and the sponsoring company.
REFERENCES


doi:http://dx.doi.org/10.1080/02602930600679548


doi:http://dx.doi.org.libproxy.library.wmich.edu/10.3928/01484834-20130314-02


doi:10.1080/014119207071492043


Date: May 28, 2015

To: Sue Poppink, Principal Investigator
Amy Koning, Student Investigator for dissertation

From: Daryl Gardiner-Brown, Ph.D., Vice Chair

Re: HSRIB Project Number 15-05-26

This letter serves as confirmation that your research project titled “A Profile of Students Engaged in a Lean and Six Program for Manufacturing” has been approved under the expedited category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in your application.

Please note: This research may only be conducted exactly as the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under "Number of subjects you want to complete the study.") Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSRIB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: May 27, 2016

101 W. Homer Ave., Kalamazoo, MI 49008-4426
Phn: (269) 387-8991 Fax: (269) 387-3374
www.wmich.edu
## Appendix B

### Sample Semester Survey Results

#### 1. In which program are you a participant?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP</td>
<td>35.3%</td>
<td>6</td>
</tr>
<tr>
<td>GEM</td>
<td>64.7%</td>
<td>11</td>
</tr>
</tbody>
</table>

#### 2. Please answer the following statements regarding the AMP or GEM classes you took during Fall 2012.

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>B.</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>D.</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>E.</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>F.</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>G.</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>H.</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>I.</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>J.</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>K.</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>L.</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>M.</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>N.</td>
<td>5</td>
<td>12</td>
<td>0</td>
<td>1</td>
<td>18</td>
</tr>
</tbody>
</table>

#### 3. How many hours do you work in an average week?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 hours</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>16-20 hours</td>
<td>44.4%</td>
<td>8</td>
</tr>
<tr>
<td>21-30 hours</td>
<td>27.8%</td>
<td>5</td>
</tr>
<tr>
<td>31-40 hours</td>
<td>16.7%</td>
<td>3</td>
</tr>
<tr>
<td>40+ hours</td>
<td>11.1%</td>
<td>2</td>
</tr>
</tbody>
</table>

#### 4. On average, how many hours per week did you spend studying or completing homework?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 hours</td>
<td>27.8%</td>
<td>5</td>
</tr>
<tr>
<td>5-9 hours</td>
<td>55.6%</td>
<td>10</td>
</tr>
<tr>
<td>10-14 hours</td>
<td>11.1%</td>
<td>2</td>
</tr>
<tr>
<td>15-20 hours</td>
<td>5.6%</td>
<td>1</td>
</tr>
<tr>
<td>Over 20 hours</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

108
## Appendix C

### Sample Semester Schedule

#### Fall 2014, First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Description</th>
<th>Days</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF 114</td>
<td>4</td>
<td>Material Science - Lecture</td>
<td>M</td>
<td>9:00 - 12:00 PM</td>
</tr>
<tr>
<td>TF 114</td>
<td>0</td>
<td>Material Science - Lab (12 students)</td>
<td>T</td>
<td>7:45 - 9:45 AM</td>
</tr>
<tr>
<td>TF 114</td>
<td>0</td>
<td>Material Science - Lab (12 students)</td>
<td>M</td>
<td>1:15 - 5:15 PM</td>
</tr>
<tr>
<td>MA 107</td>
<td>4</td>
<td>Intermediate Algebra (hybrid online)</td>
<td>M</td>
<td>1:00 - 3:00 PM</td>
</tr>
<tr>
<td>CLS 100</td>
<td>2</td>
<td>Introduction to College: New Student Exp.</td>
<td>T</td>
<td>10:00 - 12:00 PM</td>
</tr>
<tr>
<td>MN 100</td>
<td>2</td>
<td>Manufacturing Principles</td>
<td>T</td>
<td>1:00 - 3:00 PM</td>
</tr>
</tbody>
</table>

12 credits

#### Winter 2015, First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Description</th>
<th>Days</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 101</td>
<td>3</td>
<td>English Composition 1</td>
<td>M/T</td>
<td>9:30 - 11:00 AM</td>
</tr>
<tr>
<td>MA 100</td>
<td>3</td>
<td>Trigonometry</td>
<td>M/T</td>
<td>11:15 - 12:45 PM</td>
</tr>
<tr>
<td>MN 119</td>
<td>4</td>
<td>Introductory Machine Operations</td>
<td>M/T</td>
<td>2:00 - 6:00 PM</td>
</tr>
<tr>
<td>MN 211</td>
<td>2</td>
<td>Machinery's Handbook</td>
<td>Online</td>
<td></td>
</tr>
</tbody>
</table>

12 credits

#### Summer 2015, First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Description</th>
<th>Days</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN 114</td>
<td>2</td>
<td>Machine Trades Blueprint Reading</td>
<td>M</td>
<td>9:00 - 11:30 AM</td>
</tr>
<tr>
<td>EN 102</td>
<td>3</td>
<td>English Composition 2</td>
<td>M/T</td>
<td>12:15 - 2:00 PM</td>
</tr>
<tr>
<td>MN 208</td>
<td>4</td>
<td>Intermediate Machine Operations</td>
<td>M/T</td>
<td>3:15 - 6:30 PM</td>
</tr>
</tbody>
</table>

9 credits

#### Fall 2015, Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Description</th>
<th>Days</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 110</td>
<td>3</td>
<td>Survey of American Government</td>
<td>M</td>
<td>9:00 - 12:00 PM</td>
</tr>
<tr>
<td>WE 156</td>
<td>1</td>
<td>First Aid</td>
<td>M</td>
<td>12:45 - 2:45 PM</td>
</tr>
<tr>
<td>MN 241</td>
<td>3</td>
<td>Quality Assurance</td>
<td>T</td>
<td>10:00 - 1:00 PM</td>
</tr>
<tr>
<td>MN 216</td>
<td>2</td>
<td>Basic Welding</td>
<td>T</td>
<td>2:00 - 6:00 PM</td>
</tr>
</tbody>
</table>

9 credits

#### Winter 2016, Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Description</th>
<th>Days</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR 212</td>
<td>3</td>
<td>Tool Design</td>
<td>M/T</td>
<td>9:00 - 11:00 AM</td>
</tr>
<tr>
<td>MN 249</td>
<td>3</td>
<td>Statistical Process Control</td>
<td>M/T</td>
<td>11:45 - 1:15 PM</td>
</tr>
<tr>
<td>MN 233</td>
<td>3</td>
<td>Basic CVC Programming</td>
<td>M/T</td>
<td>2:00 - 4:00 PM</td>
</tr>
<tr>
<td>EG 110</td>
<td>3</td>
<td>Industrial Graphics with CAD</td>
<td>Online</td>
<td></td>
</tr>
</tbody>
</table>

12 credits

#### Summer 2016, Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Description</th>
<th>Days</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN 234</td>
<td>2</td>
<td>Metallurgy - Lecture</td>
<td>M</td>
<td>7:45 - 9:45 AM</td>
</tr>
<tr>
<td>MN 235</td>
<td>3</td>
<td>Advanced CVC Programming</td>
<td>M/T</td>
<td>10:00 - 12:00 PM</td>
</tr>
<tr>
<td>MN 252</td>
<td>2</td>
<td>Geometric Tolerancing</td>
<td>M</td>
<td>12:30 - 2:30 PM</td>
</tr>
<tr>
<td>MN 234</td>
<td>1</td>
<td>Metallurgy - Lab</td>
<td>T</td>
<td>3:30 - 9:30 AM</td>
</tr>
<tr>
<td>COM-131</td>
<td>3</td>
<td>Fundamentals of Public Speaking</td>
<td>T</td>
<td>12:30 - 3:30 PM</td>
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11 credits

**TOTAL** 65 credits
Appendix D

Interview Questions

The interview questions will be used to address this study’s first set of research question.

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Interview Questions</th>
</tr>
</thead>
</table>
| How do students engage with the coursework portion of the industry-education program and how do they describe their experiences in the classroom? | 1. What courses did you feel were the most relevant to preparing you for a career in manufacturing? Why?  
2. What makes a course more or less comfortable for you?  
3. What aspects of the courses influence your thinking about a career in manufacturing?  
4. How did you manage/balance the school schedule with the work schedule? Were there semesters that were tougher than others? |
| How do students engage with the work-based portion of the industry-education program and how do they describe their experiences in the work setting? | 1. What of the job experiences did you feel were the most relevant to preparing you for a career in manufacturing? Why?  
2. What makes a work setting more or less comfortable for you?  
3. Where and how do you find support and mentoring in the work place? |
| How did the students’ background and previous experiences relate to their decision to enter into the industry-education program? | 1. Thinking back to your high school experience, what were your favorite subjects? Why do you think they were?  
2. What were your least favorite subjects? Again why do you think they were?  
3. Did you participate in any extracurricular activities in high school? If so, what were they?  
4. What are your hobbies or interests?  
5. If you had to describe how you like to learn, what would it look like?  
6. When you were in high school, what was your career plan?  
7. Did you hold any formal jobs while in high school? Any informal ones (babysitting, church work, volunteer work)?  
8. Out of those experiences what did you like and dislike?  
9. What do you parents/guardians do for a living? Did you influence you at all?  
10. Do you have any siblings that are working? What do they do? How has that influenced your career decision?  
11. What would you describe as your strengths? Your weaknesses? |
| How are students influenced by the program in their career planning? | 1. When thinking about this entire program, both in the classroom and at work, how have your experiences influenced your future career pathway? |
Appendix E
Classroom Observation Form

Case #
Date

How do participant interact with other students and the instructor.

<table>
<thead>
<tr>
<th>Inferences</th>
<th>Observation Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix F

Work Setting Observation Form

Case #

Date

How do the participants interact with other employees and is there any evidence of company culture, mentorship or support?

<table>
<thead>
<tr>
<th>Inferences</th>
<th>Observation Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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