TECHNICAL COLLEGE STUDENT ATTITUDES TOWARD LEARNING 21ST CENTURY WORK SKILLS

A dissertation presented

by

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ABSTRACT

The United States faces a shortage of well-qualified, technically skilled individuals entering manufacturing and energy production fields. Compounding this shortage, employers want graduates to possess technical knowledge foundational for these highly-skilled positions, as well as less tangible 21st century work skills. Technical colleges are charged with developing a workforce able to meet current and future employment needs. Colleges need a comprehensive framework for facilitating the internalization of 21st century work skills. The current research explores student attitudes toward learning 21st century work skills. The findings indicate students’ awareness that they need to exhibit effective written and oral communication, a strong work ethic, a good attitude, the ability to work well with others, collaboration, and problem solving. The research participants believe that parents, work experience (especially work-based learning), interactions with the college career center, sports, and church impacted their understanding of 21st century work skills. Furthermore, learning in class and labs helped grow these skills. The most influential 21st century skill development experience in their formal education has been the required Employability Skills Class. Research participants reflected on their strengths and weaknesses regarding individual skill development and articulated a desire to have more opportunities to work hands-on solving real-world problems, believing that both technical and soft skills would improve. Colleges must nurture and leverage partnerships with business and industry to create more work-based learning opportunities. The focus of colleges should shift from traditional teaching to a learning environment in which knowledge acquisition is a facilitated student-instructor partnership guided by the needs of business and industry.

Keywords: 21st Century Work Skills, Soft Skills, Traditional-Aged College Students, Manufacturing-Related Jobs
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DEDICATION

This dissertation is dedicated to the students I have had the pleasure to work with over the course of my career who continually inspire me to learn more, do more, and become more.
CHAPTER ONE: INTRODUCTION

College graduates face uncertainty about their ability to secure and maintain employment in their chosen field following graduation (Hodge & Lear, 2011). Many Tri-County Technical College students lack the 21st century work skills necessary to secure or retain a job in their chosen career field (Harvey, 2000; Quieng, Lim, & Lucas, 2015). The purpose of this phenomenological study is to understand the attitude that Tri-County Technical College students pursuing manufacturing-related careers have toward learning 21st century work skills.

For this research study, 21st century work skills will be defined using turn-of-the-century research that was completed by the CEO Forum (2001), that identified the 21st century skills students need to be effective employees, as communication (teamwork/interpersonal/collaboration, personal/social responsibility, and interactivity), digital-age literacy (basic, scientific, and technical; cultural literacy and global awareness), inventive thinking (adaptability/managing complexity, curiosity/creativity/risk taking, and higher order thinking/sound reasoning), and high productivity (prioritizing/planning/managing for results, using real-world tools effectively, and creating relevant high-quality products).

The knowledge generated by this research is expected to inform how colleges can better facilitate the learning of 21st century work skills in order to prepare community or technical college students to possess the skills necessary for employment in today’s modern manufacturing environment.

Background and Context

Research has shown the need for 21st century work or soft skills development, but little information can be found regarding a comprehensive plan on how to best equip technical college students with those skills by the time they graduate (Dede, 2010; Duderstadt, 1999; Jerald, 2009;
Stuart & Dahm, 1999). Nor is there substantial literature about students’ attitudes toward learning those skills. One explanation for the lack of employability of technical college graduates may be insufficient knowledge on the part of the students regarding what business and industry expects of new graduates (Grubb & Lazerson, 2005; Mellander, 2013). Business and industry are requiring a greater variety of skills from workers now than ever before. The skills needed to be successful in most jobs today are not only academic or technical in nature but require employees to possess certain personal attributes and characteristics that have not traditionally been taught in colleges, such as excellent communication skills, the ability to collaborate effectively, and the ability to think critically and to solve problems (Casner-Lotto & Barrington, 2006; Cranmer, 2006; Dede, 2007; Eisner, 2010; Harvey, 2000; S. Tomlinson, 2007; M. Tomlinson, 2012).

Higher education must take the lead and develop effective methods for instilling the 21st century work skills that employers desire and that college graduates must be competitive in today’s global job market (Bennett, Dunne, & Carré, 2000; Mellander, 2013).

The community or technical college is tasked with workforce development in the United States. According to the U.S. Department of Education’s Office of Vocational and Adult Education, community colleges must collaborate with local business and industry to develop curricula that result in mid- and high-level workforce training. Enabling students to think critically should be the fundamental goal of education (Kwon, 2008). The acquisition of soft skills is actually life skills that increase the link between education, employers, and career opportunities for students (Ellis, Kisling, & Hackworth, 2014). According to Dede (2010), “Workers must be prepared to shift jobs and careers more frequently, to be flexible and adaptable in acquiring job skills, and to integrate and focus a changing mix of job-derived and education-based knowledge on business processes and problems” (p. 2).
The purpose of this research is to determine technical college students’ attitudes toward learning 21st century work skills. According to Robinson and Garton (2007), students believe that mastery of discipline-related skills is all they need to secure a job in their field, often not realizing the importance of having transferable skills (Makasiranondh, Maj, & Veal, 2011). Researching traditional-aged technical college students’ attitudes toward learning 21st century work skills will provide valuable information to TriCounty Technical College about how to create meaningful learning experiences that will hopefully translate into skill attainment, facilitating student development of the 21st century work skills needed to secure and retain employment. The college will benefit with the understanding of how to better prepare students to face the demands of employment. Business and industry will benefit by having a more knowledgeable, better prepared workforce from which to recruit talent into their facilities. Therefore, this study seeks to understand traditional-aged technical college students’ attitudes toward learning 21st century work skills.

**Rationale and Significance**

The rationale for this study is the researcher’s interest in the 21st century work skills that graduates need to function within the world of employment may not be taught or learned on the scale necessary to allow companies to maximize their human capital in a way to be successful in the global market economy (Casner-Lotto & Barrington, 2006). The research conducted with the Mechatronics and Industrial Electronics Technology students at TriCounty Technical College has the potential to have implications at the national, state, and local levels as well as for the college, business, industry, and the students.

Across the United States there is a shortage of well-qualified workers to fill the ever-growing demands created by the new technology-driven economy and baby boomer retirements.
(U.S. Government Accountability Office, 2008). In 2015, the Manufacturing Institute and Deloitte completed a survey of over 450 manufacturing executives, determining that by 2025 over 2 million jobs will go unfilled due to the skills gap, which is an increase from 600,000 unfilled jobs in 2011. A scenario for a perfect storm of skilled job vacancies is being created by work that requires increased demands related to education and skill levels, while the well-educated, highly-skilled baby boomers are retiring and leaving the work-force (Dychtwald, Erickson, & Morison, 2013; Kirsch, Braun, Yamamoto, & Sum, 2007). There will be an increase in the prevalence of jobs requiring postsecondary education, thus intensifying this shortage (Torraco & Hamilton, 2013). Based on data collected by the Office of Institutional Research at Tri-County Technical College, 95% of graduates find employment within the state and the remaining 5% are employed out-of-state. The lessons learned from this study have the potential to be applied across numerous community and technical colleges, thus improving the employability skills of graduates across the state and potentially the nation.

At the state and local levels, the economy, especially manufacturing, is booming. The state of South Carolina has done an excellent job of attracting substantial foreign and domestic investment, especially from the automotive and aerospace industries. In 2014, South Carolina recruited 146 economic development projects that added more than 19,000 jobs, marking the third time in four years that the state recruited over $5 billion in capital investment (Wilkerson, 2015). This type of growth expands the need for workforce development and necessitates that the technical college system facilitates educating students in all aspects of employability. These companies require a workforce that is both highly technically skilled and has the 21st century work skills necessary to be competitive in a global market (Hodge & Lear, 2011). Industry requires graduates who are equipped to meet the challenges of increased competition in global
and local markets, understand their roles in building their organizations, and know how to execute their roles effectively (Musa, Mufti, Latiff, & Amin, 2012).

Higher education must develop effective methods for teaching the 21st century work skills that employers desire and that college graduates must have to be competitive in today’s global job market.

More and more, community colleges are viewed as the engine of economic development for companies that are making plans to relocate and are interested in growing a larger workforce and in training the existing workforce so there is a pipeline of skilled workers ready to step in without lengthy training necessary. (Nickoli, 2013, p. 69)

There is some question as to whether students and professors are knowledgeable about what skills are needed for today’s workforce (Hodge & Lear, 2011). Understanding the attitudes of the traditional-aged, technical college students toward learning 21st century skills is a necessary first step to creating educational opportunities that will facilitate that learning.

One of the greatest hindrances to employment faced by students is their lack of 21st century work skills (Dede, 2010). Higher education practitioners should be focused on seeking solutions to the problems students face in obtaining the 21st century skills that employers are seeking. By determining best practices for developing 21st century work skills in students at the technical college level, the gap between the skills employers expect and the skills technical college graduates possess could be greatly narrowed.

Increased employability of TriCounty Technical College students and graduates results in increased enrollment of new students and greater retention and better placement opportunities for current students. With the exceptional financial assistance available through South Carolina Lottery Tuition Assistance Program, Federal Pell Grants, and the college’s Foundation
Scholarships, many students can complete their Associates Degree with little to no out-of-pocket expense and no debt. Parents and family members do not have to bear the burden of having a student who is unemployable or under-employable and is a drain on the family resources. Students and graduates will know that by learning and exhibiting 21st century work skills, coupled with technical skills, they will have the opportunity to enter career fields that are high paying and challenging with exceptional opportunities for advancement. The community benefits by having an educated populace that is positively contributing to society, helping area business and industry continue to be successful and lead to more opportunities for future generations.

**Research Problem and Question**

The goal of higher education, specifically technical education, is to prepare a workforce (Brand, 2008). Advances in technology and the demands of an ever-changing economy require businesses to do more with fewer resources, in turn, requiring the people they hire to do more to help the companies to be successful (Hodge & Lear, 2011). According to Schuele and Madison (2010), job seekers must be able to convince a potential employer that they will bring value to the organization, have current knowledge in the field, and possess the skills important for employment in the 21st century. The purpose of this research is to seek to answer the following question: What is the attitude of traditional-aged, technical college students entering manufacturing-related careers, toward the necessity of attaining 21st century work skills? The following sub-questions provided direction and focus for the researcher and participants:

- What skills do students view as necessary to become employable?
- Where and how do students feel that they have learned these skills?
- What experiences as a college student contributed to learning and being able to exhibit 21st century work skills?
• What role should the college play in developing these skills?
• What 21st century work skills do students feel need greater development prior to their completing college?
• What is the college’s responsibility in facilitating the development of 21st century work skills?

Developing a framework for collecting, analyzing, and understanding the data demands the clear definition of several key terms.

**Definitions of Key Terminology**

**21st Century Work Skills:** Soft skills, life skills, interpersonal skills, work-force skills, and non-cognitive skills are all a part of 21st century work skills (Ellis et al., 2014). For this study the skills will be limited to effective written and oral communication, digital literacy, collaboration, cultural competency integrative learning, and problem-solving.

**Manufacturing-Related Jobs:** Manufacturing jobs are defined by the U.S. Census Bureau as those that create new products either directly from raw materials or components (Bureau of Labor Statistics, 2009). These jobs are usually in a factory, plant, or mill but can also be in a home, as long as products, not services, are created (Bureau of Labor Statistics, 2009). For the purpose of this study, the targeted students will be enrolled in the degree programs of Industrial Electronics or Mechatronics Technology. Both of these programs typically graduate students who seek work as technicians in manufacturing or production environments.

**Soft Skills:** Non-technical skills. For the purposes of this research, this term will be interchangeable with 21st century work skills (The CEO Forum on Education and Technology, 2001).
**Traditional-Aged College Students:** The commonly held definition of a traditional undergraduate student is one who enrolls in college immediately after graduation from high school, pursues college studies on a continuous full-time basis at least during the fall and spring semesters, and completes a bachelor’s degree program in four or five years at the young age of 22 or 23 (Keup, 2008). Traditional students are also typically financially dependent on others, do not have children, consider their college career to be their primary responsibility, and are employed only on a part-time basis if at all during the academic year. For the purpose of this study, traditional-aged will be 18-23 years old (Adelman, 2005).

The following section describes the theoretical framework chosen for the research and how it is applicable to the topic of 21st century work skills.

**Theoretical Framework**

This study is grounded in the theory of connectivism. Connectivism is a learning theory created by Siemens (2004). It has been presented as a learning theory for the digital age, with four key principles for learning: autonomy, connectedness, diversity, and openness (Tschofen & Mackness, 2012). The theory begins with the individual, while leaving space for human agency (Bell, 2011). Siemens (2008) has suggested that learning in the modern day occurs through network connections as individuals share their interests, knowledge, perspectives, opinions, and expertise in online and virtual learning environments. Distinguishing which of the abundant and diverse information that is available online is reliable and sustainable activates higher order thinking skills, which is one of the principles of connectivism (Siemens, 2008).

Connectivism has its historical underpinnings in the educational theories of constructivism, behaviorism, and cognitivism. Siemens (2004) identifies three limitations of these theories: their interpersonal view of learning; their failure to address the learning that is
located within technology and organizations; and their lack of contribution to the value judgments that need to be made in knowledge-rich environments (Bell, 2011). Connectivism has been criticized as a learning theory that claims to replace its predecessors, yet some argue that the theories can be complementary (Bell, 2011).

**Tenets of the Theory**

The basic tenets of connectivism as described by Siemens (2004) are:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision. (p. 4)

This study focuses on connections, continual learning, and decision-making as it relates to learning 21st century work skills, therefore, the tenet related to non-human appliances, such as a computer, a smart phone, or a library may only have relevance if it is a source for student learning. The other tenets have applicability to both the individual and the collective learning of 21st century work skills. When relating the tenets of connectivism to 21st century work skills,
“the capacity to know is more critical than what is known” is foundational to creating the employee for the 21st century (Siemens, 2004, p. 4). The other tenets of diversity of opinions, connecting information, nurturing and maintaining connections, and the ability to see connections all feed into the idea of the knowledge economy. The idea that decision-making is a learning process and how one chooses to use information and new knowledge, both have implications for the learning and use of the 21st century work skills of communication, collaboration, problem-solving, and digital literacy.

The concepts of connectivism address the challenges that many corporations in the knowledge economy are dealing with involving management activities and the flow of information. According to Siemens (2004), connectivism begins with the individual, which is comprised of personal knowledge from a network that feeds into organizations and institutions, which in turn feed back into the network, and then continues to provide learning to individual. Workers can stay current in their field through the connections (personal to network to organization) they form in this cycle of knowledge development (Siemens, 2004).

Connectivist theory informs the research questions by focusing on the learner as the driving force in his or her education as well as determining how digital natives perceive the need for developing 21st century work skills as a way to increase their employability. The framework of connectivism provides the opportunity to research both the learning of the individual as well how advances in technology and the networked nature of learning is changing what students and workers need to know, how they learn, and what they should learn. By beginning with the individual and moving to the network and then the organization, a more comprehensive examination of attitudes, skills, learning, and workforce needs can be formulated. The limitations surrounding the theory relate more to the fact that it is relatively new and that research to date
has mainly been focused on Massive Open Online Courses; however, this is an opportunity to explore the use of a new theory that is grounded in long-standing learning theories and contribute new learning to the literature.

Not all scholars believe that connectivism is a theory. According to Verhagen (2006), connectivism does not add to principles in existing theories; however, there is recognition that there is a paradigm shift taking place in learning. Downes (2005) is credited with having elaborated on a framework for distributed knowledge that provides a strong philosophical basis for the connectivist learning framework. According to Bell (2011), connectivism has two connected yet slightly different strands: “connectivism” (in the post-2004 Siemens sense) and the “connective knowledge” (the epistemology argued by Downes). Both Downes and Siemens have continued researching projects related to connectivism; however, to date there has been a relatively small amount of scholarly publishing utilizing this emerging theory of connectivism.

Tschofen and Mackness (2012) reviewed the work of Siemens and Downes in relation to personality and self-determination theories to gain insight into the dimensions of individual experience in connective environments and to further explore the meaning of autonomy, connectedness, diversity, and openness. They found that parallels exist in the relation to both networks and the individual in applying the principles of connectivism. Wenger (2011) notes that learning is not merely the acquisition of a body of knowledge but a journey of the self. In applying self-determination theory and personality theory to the connectivist landscape, it becomes apparent that limiting the definitions and roles for individuals may be counterproductive to the furtherance of connectivist theory (Tschofen & Mackness, 2012).
Conclusion

Business and industry expect more from their employees than ever before. Employees must have the necessary technical skills but also are expected to possess a variety of less tangible skills, broadly identified as 21st century work skills. According to Hodge and Lear (2011), “People at every level in an organization are going to be able to solve problems, think critically, be innovative, collaborate with others and communicate effectively” (p. 31). Technical and community colleges have the opportunity to lead the way in preparing students for the demands of the workforce by continuing to provide the technical skills needed but also by helping students acquire the 21st century work skills employers are requiring. Determining the attitudes of students toward learning these skills will be a solid first step in developing a framework that could be created, used, and replicated by higher education institutions seeking ways to better prepare students for the workforce. The following chapter explores information found in the literature about what skills employers are expecting graduates to possess, the ways that higher education can educate students about 21st century work skills and their attitudes toward learning those skills.
CHAPTER TWO: LITERATURE REVIEW

Since the turn of the century there has been a growing demand for those employed in manufacturing-related careers to have excellent soft skills in addition to the technical skills required to perform their job well (Mellander, 2013). According to advisory committee members who serve to provide feedback to programs, many traditional-aged Mechatronics and Industrial Electronics Technology students at Tri-County Technical College lack the soft skills or 21st century work skills necessary to maximize their employability in today’s high-tech, global manufacturing facilities (Tri-County Technical College, 2011).

Many repetitive jobs are being replaced by automation, resulting in a greater number of highly-skilled occupations, requiring employees at every level of an organization to be able to communicate and collaborate effectively, be innovative and able to solve problems as well as able to think critically (Hodge & Lear, 2011). Community and technical colleges are tasked with preparing a workforce, yet the growth of the knowledge economy is requiring that two-year graduates have both technical skill and 21st century work skills (Brand, 2008). Higher education is being challenged to help students meet the increasing employability requirements of business and industry. The purpose of this research is to determine the attitudes of traditional-aged, technical college students entering manufacturing-related careers toward attaining 21st century work skills. The research examines how 21st century work skills are taught, learned, and internalized by technical college students during their two-year educational experience in order for them to maximize their ability to secure and maintain a job in their chosen career field.

The literature review is presented in three parts: employability, higher education’s role in 21st century work skill attainment, and students’ attitudes toward and their perceptions of learning 21st century work skills. The current expectations that business and industry have for
new graduates and the role that higher education plays in preparing students for these roles will be explored. The literature review focuses on how higher education can prepare students for the workforce by examining what 21st century work skills employers’ desire new graduates to possess, what curricula or teaching strategies can be utilized to accomplish soft skill acquisition to meet employer needs, and the role and the attitude of the student in learning these skills. The nature of work in industrial production has shifted to positions requiring the higher order skills of communication, problem-solving, and reasoning (Grubb & Lazerson, 2005). Determining what methods have been developed and utilized to teach 21st century work skills at the college level will be analyzed. A discovery of how work-based learning, project-based learning, capstone courses, and the use of technology and other teaching methods help students learn and internalize 21st century work skills were examined. Student attitudes and values regarding the various ways that they internalize and learn 21st century work skills were investigated.

**Discovery**

The idea of what makes a good employee is a very broad concept. The discovery and implications of the literature surrounding what 21st century work skills employers’ value and desire new graduates to possess have a lot of consistency and overlap. Employers want new graduates to be able to work in teams, communicate effectively across all levels of an organization, participate in and facilitate conflict resolution and negotiation, display leadership qualities, build positive relationships, develop good decision-making skills, be self-regulating, and display a positive attitude and work ethic (CEO Forum, 2001; Ingols & Shapiro, 2014; Robles, 2012). Based on interviews with several hundred businesses, education and non-profit leaders, Wagner (2008) proposed that students need the skills of critical thinking and problem-solving, collaboration and leadership, agility and adaptability, initiative and entrepreneurialism,
effective oral and written communication, assessing and analyzing information, and curiosity and imagination. Leveson (2000) stipulated that oral communication skills, which are highly valued in industry, are rarely fostered or assessed on a collegiate level.

The literature review indicates that students internalize and learn 21st century work skills best when higher education provides a comprehensive and holistic approach by embedding these skills throughout the educational process. Placing an emphasis on greater student responsibility for their own personal development during academic activity is also key (Fallows & Steven, 2000). Employment development services provided by career centers, such as career counseling, resume preparation, mock interviews, career fairs, and workshops, all positively influence the internalization of 21st century work skills (Andrews & Russell, 2012). Course design, which includes employer participation, work-based learning experiences, project-based learning, and capstone courses are all successful methods by which college students internalize 21st century work skills (Brennan, 2005; Cranmer, 2006; Fairchild & Taylor, 2000; Mason, Williams, & Cranmer, 2009). The research conducted by Rae (2007) provides a framework for colleges to provide an education experience for students that allows for personal development, applied learning, skill development, work-based learning, and career management.

Further review of the literature provides evidence that there are numerous methods that can be used to successfully teach 21st century work skills at the college level. When there are clearly defined outcomes and students are required to reflect on their learning experiences, traditional teaching methods, such as lecture, discussion, and case studies, are all effective ways to introduce students to 21st century work skills (Hassan & Maharoff, 2014). The literature review also reveals that active learning strategies, by which students participate and have ownership in the learning process and teachers are responsible for facilitating students’ ability to
make discoveries are also a very effective method to teach 21st century work skills (Audu, Bin Kamin, Bin Musta'amal, & Bin Saud, 2014; Hassan & Maharoff, 2014).

**Employability**

Employability is a broad concept, whereby graduates do not just secure a job; they are able to be productive members of society, transition within a company from one position to another, or between different jobs in other organizations, throughout their career (Yorke, Knight, Moon, Layer, & Moreland, 2004). Employability indicates that a person has the capacity to acquire the skills to do the work required, even if they are unable to perform the work immediately or without additional training (Cox & King, 2006). A more encompassing definition of employability is provided by Yorke et al. (2004) as understandings, personal attributes, and skill achievement that allow graduates greater likelihood of gaining employment and success in their chosen occupation, which in turn benefits themselves, the community, the workforce, and the economy.

Employability is also referred to as work-readiness by which new graduates possess the skills, knowledge, and attitudes to be contributing members to the company soon after being employed (Mason et al., 2009). The days when obtaining a bachelor’s degree all but guaranteed white collar employment or a high school diploma meant blue collar jobs, have been replaced by the need for some form of specific postsecondary education (Mellander, 2013). The attainment of a degree now is seen as a first step in the recruitment process in which graduate attributes are viewed as more important than the type of degree one has obtained (Harvey, 2000). Bureau of Labor Statistics (2009) estimated that between 2008 and 2018, half of all new jobs created would require at least some postsecondary education. Yet, employability is increasingly being defined by employers around the idea of “behavioral competence and the capacity for graduates to
demonstrate and deploy a wider range of personal, performative and organizational abilities” (M. Tomlinson, 2008, p. 51). For the purposes of this research, the broad concept of employability divides neatly into three areas of concern: business and industry needs, 21st century work skills, and transferable skills.

**Business and Industry Needs**

Establishing and maintaining open and highly communicative relationships between higher education and business and industry is of utmost importance if both are to be successful in reaching the goal of highly employable graduates. By developing programs that integrate academic and professional learning that connect classrooms to the workplace in mutually beneficial ways, it is possible to strengthen occupational preparation and academic learning (Grubb & Lazerson, 2005). Historically, employers have done a poor job of communicating the expectations they have for college graduates to higher education. When they have, higher education is historically slow to make the changes that employers are asking for, choosing to focus greater attention on academic skills rather than employability skills (Rosenberg, Heimler, & Morote, 2012). Often, those in academia perceive that employers want graduates with specialized academic skills, when, in reality, employers maintain that their greatest need is for employees to have basic employability skills (Rosenberg et al., 2012).

Rosenbaum (2002) suggested that work habits are better predictors of job performance than academic skills. As industry faces greater shortages of skilled employees through expansions, reshoring (reintroducing domestic manufacturing to a country), and the retirement of the baby boomers, a productive dialogue between higher education and industry is necessary now more than ever. There seems to be broad consensus among practitioners that college graduates today need to possess strong interpersonal skills, be adaptable, driven, and able to
conceptualize and readily use information (Eisner, 2010). In recruiting new graduates, employers tend to place a high value on social skills, attitudes, and motivation (Saunders & Machell, 2000). In a study completed by Brown, Hesketh, and Williams (2004) regarding student recruitment, employers are placing increasing importance on personal attributes and skills, while the importance of academic credentials is declining.

There is a belief among politicians, educators, and business leaders that students need 21st century skills, such as critical thinking, problem-solving, information literacy, and global awareness, to be successful in the changing world economy (Rotherham & Willingham, 2010). CEO Forum (2001) identified the 21st century skills that students need to be effective employees, as communication (teamwork/interpersonal/collaboration, personal/social responsibility, interactivity), digital age literacy (basic, scientific, and technical; cultural literacy and global awareness), inventive thinking (adaptability/managing complexity, curiosity/creativity/risk taking, and higher order thinking/sound reasoning), and high productivity (prioritizing/planning/managing for results, using real-world tools effectively, and creating relevant high-quality products). The National Association of Manufacturers’ (2005) Skills Gap report determined that over 50% of the respondents indicated that employees were lacking basic employability skills, with the lack of effective communication skills being the most prevalent. There seems to be little disagreement in the literature that most employers are looking for graduates to possess some combination of the previously stated skills in addition to a strong work ethic and self-regulatory ability (CEO Forum, 2001; Saunders & Machell, 2000). Business and industry identifies 21st century work skills as a critical employability skill set. The following section addresses this issue in detail.
**21st century work skills.** The terms 21st century work skills and soft skills are often used interchangeably. According to Ingols and Shapiro (2014), most scholars refer to soft skills as the intra- and interpersonal skills that enable a person to successfully contribute in an organization and include teamwork, communication, conflict resolution, leadership, relationship building, negotiation, and decision-making. Robles (2012) described the intangible, personality-specific and non-technical aspects of character traits, attitudes, and behaviors as soft skills rather than knowledge or technical aptitude. For the purpose of this study, the terms 21st century work skills are used and include soft skills.

In an effort to better equip graduates for the job market in both the United States and abroad, there is a strong focus on integrating into the higher education curriculum the 21st century work skills of communication, team working, and self-management (M. Tomlinson, 2012). Personal attributes and interpersonal skills are components of soft skills (Robles, 2012). The integration of soft skills into the curriculum needs to be correlated with the technical or hard skills that must be learned. This integration will better prepare graduates to possess the 21st century work skills necessary to be employable. The best way to describe the essence of 21st century work skills is that there should be an emphasis on what students can do with knowledge, rather than just what knowledge they have (Silva, 2008). The 21st century work skills set can develop in a variety of environments. Wherever the skills originate, they transfer neatly from one environment to another.

**Transferable skills.** The idea that soft skills are transferable from one job to another as well as from an educational setting to the workforce, make adapting to the fluidity of the job market and the need for continual career management somewhat more manageable (Ellis et al., 2014). The workforce must be adaptable to the changing nature of work as organizations become
less rigid and more fluid with employees at every level of that have the skills that enable them to be flexible (Hodge & Lear, 2011; Romaniuk & Snart, 2000). More is being required of fewer workers; therefore, companies need employees with exceptional soft skills. Even in middle-skilled jobs, such as those in manufacturing, are requiring both postsecondary education and the critical thinking and analytical skills that facilitate worker adaptability in an ever-changing workplace (Mellander, 2013). The need for interpersonal skills is above the need for academics, technical skills, and hands-on training (Robles, 2012). The core interactive and personal attributes that employers are looking for are problem-solving, the ability to think critically, be innovative, and possess the interpersonal skills that allow for communication, collaboration, and teamwork (Harvey, 2000; Hodge & Lear, 2011). Workers are increasingly expected to cross boundaries between the varying activity systems and contribute to new forms of knowledge and social practice and transform contexts within the workplace (Engeström, 1996).

**Conclusion.** Employability is a multilayered concept that encompasses the ability to become employed and remain that way. In the knowledge intensive and rapidly changing global economy, workers “not only maintain and develop knowledge and skills that are specific to their own discipline or occupation, but must also possess ‘generic’ skills, dispositions and attributes that are transferable to many occupational situations and areas” (Bridgestock, 2009, p. 32). Understanding the needs of business and industry are key to preparing the workforce of tomorrow. Relationships between higher education representatives and business and industry personnel need to be established and fostered. A lack of common terminology in the literature regarding 21st century work skills, soft skills, or generic skills adds to the difficulty of establishing a comprehensive approach to employability skill development within higher
education. The following section explores the role of higher education in preparing students and graduates to possess the 21st century work skills that employer’s desire in new recruits.

**Higher Education**

Higher education needs to take the lead in teaching students the 21st century work skills that are necessary to be competitive in today’s global economy because every country needs an education system that produces expert knowledge workers (Bennett et al., 2000; Greenlaw, 2015). According to Trilling and Fadel (2009), education becomes the key to economic survival in the 21st century. The nation’s higher education system must change because academics business as usual will not produce the type of employees necessary for the 21st century economy (Mellander, 2013). The Association of American Colleges, Universities, & National Leadership Council (2007) created essential learning outcomes for higher education to use as a framework to have intentional learning occurring throughout the educational process so that meaning is provided for the degree that students are receiving.

The community or technical college is tasked with workforce development in the United States. According to the U.S. Department of Education’s Office of Vocational and Adult Education, community colleges must collaborate with local business and industry to develop curricula that result in mid- and high-level workforce training (Casner-Lotto & Barrington, 2006). The role of higher education is increasingly becoming one of transforming students by enhancing their knowledge, skills, abilities, and attitudes while empowering them as lifelong, critical, reflective learners (Harvey, 2000). There is a general consensus that in industrialized societies, higher education should be preparing students with a foundation upon which they can become lifelong learners by being effective workers in a constantly evolving knowledge economy (Greenlaw, 2015; Teichler & Kehm, 1995). M. Tomlinson (2008) indicated that while a
postsecondary degree is necessary for employment, students need to develop other aspects of their personality and skills to maximize their employment potential. Higher education must play a vital role in exposure to and development of 21st century skills. To move beyond exposure to these skills, students must spend time and effort to learn and internalize the skills.

**Learning and Internalizing Skills**

Technical college students must learn and internalize the traits defined as 21st century work skills. A skilled technician who understands the broader perspective of an organization and how problem-solving, working in teams, and how teams fit into the system is incredibly valuable to the organization (Meier, Williams, & Humphreys, 2000). Dede (2009) indicated that technical proficiency in addition to troubleshooting systems and applications is a key subskill for 21st century learners; yet, the typical higher education learning environment does not lend itself to problem-solving or troubleshooting. However, within the curricular frameworks at the technical college level, there are numerous possibilities of ways in which the 21st century work skills can be learned, practiced, and ultimately incorporated into an individual’s personal toolbox. It is beyond the scope of this study to conduct an in-depth review of all possible methods that help students to learn and internalize 21st century work skills; however, a number of them will be presented as potential options.

A comprehensive approach to employability at the college level should have skill development occurring fluidly across curricular and co-curricular applications. Career centers should be playing a vital role in college students’ development. Within the classroom, lecture can be a very effective method for introducing to students what employers’ expectations are in relation to 21st century skills (Hassan & Maharoff, 2014). Once students are made aware of employer expectations, additional teaching strategies can be utilized to develop those skills.
Audu et al. (2014) found the teaching methods that influence the acquisition of practical skills in students at the technical college level are demonstration, work-based learning, simulation, fieldtrip, context-based learning, discussion, and problem-based learning. Career centers directly influence career relevant employability skills development helping to make connections between secondary education, higher education, and the workforce.

**Career centers.** Career management is a process that should begin early in the educational process and continues once graduates enter the workforce; however, college career centers need to be playing a more active role in the development of employability and self-management skills that students need to remain competitive throughout their careers (Bridgestock, 2009). Dey and Cruzvergara (2014) called for transformation within career centers that require the acquisition of additional resources, elevating the leadership of career centers to higher levels of influence, designing new and creative organizational structures, and establishing stronger coordinated campus partnerships as well as the ability to convene internal and external stakeholders to assist students in leveraging networks. (p. 34)

College career centers can play a vital role in student’s preparation for the work-force (Rae, 2007). Students must be aware of the 21st century work skills that employers desire workers to possess (Cox & King, 2006). Students must then be able to develop and exhibit the skills necessary to achieve employability. The services provided by career center staff at colleges that facilitate the introduction and understanding of 21st century work skills are career counseling, resumé preparation, mock interviews, campus visits by employers, career fairs, and workshops (Andrews & Russell, 2012). However, it is imperative that career centers move beyond the transactional services to creating a centralized career education model that convenes
a larger group of stakeholders and creates connections that begin prior to admission and continue long past graduation (Dey & Cruzvergara, 2014). Bridgestock (2009) presented a conceptual model of graduate attributes for employability that includes career management skills. The model, (see Figure 1) calls for a reflective process whereby both discipline-specific skills and the development of self-management skills work in tandem to create a model for career management and long-term career success (Bridgestock, 2009).

**Figure 1.** Conceptual model of graduate attributes for employability including career management skills (Bridgestock, 2009).

For higher education to successfully integrate the learning of 21st century work skills into the educational experience, it will require a more comprehensive approach than just mapping
skills into existing curricula (Bridgestock, 2009). Queensland University of Technology created an award-winning, online, student-centered program designed to orient students to the university, to aid students’ planning for and taking advantage of real-world workplace learning experiences during their studies and to assist them in preparing for their professional careers (Thomson, 2010). The flexible program consists of 30 unique online interactive modules that “maximize student engagement throughout all the stages of a student’s higher education and life experiences” (p. 6). The following paragraphs examine a variety of other educational experiences and teaching methods that can be utilized in this type of comprehensive approach.

**Work-based learning.** Work-based learning is defined as any learning that takes place in the workplace with the majority not being accredited but with the possibility that it could be (Lester & Costley, 2010). Work experience provides more than just the opportunity to learn about a particular context. Work, like formal education, is a context through which students can learn and develop (Guile & Griffiths, 2001). The term work-based learning (WBL) can encompass cooperative education (co-op), internships, apprenticeships, and experiential learning and can be paid or unpaid. WBL is beneficial for students because it allows them to put into practice the skills they are learning in the classroom, making learning more relevant and meaningful (Brennan, 2005).

The three types of learning that students need to engage in are: learning on the fly, learning by collaborating, and learning by observing. According to students, the learning of these skills is better accomplished through work experiences than through traditional classroom experiences (Beach & Vyas, 1998; Rosenberg et al., 2012). Students working part-time as a part of their educational process, making crucial contributions to modernization and productivity across all industry sectors (Nixon, Smith, Stafford, & Camm, 2006). The contributions that
students make during WBL allow them to apply their knowledge and to witness first-hand the necessity of possessing 21st century work skills. WBL experiences provide for the type of high level learning that supports people as self-managing and self-directed learners (Lester & Costley, 2010). The work that takes place in real-world settings should be jointly assessed by employers and higher education institutions in order to create meaningful learning experiences for students (Bridgestock, 2009; Saunders & Machell, 2000). Moving to more directly curricular options, problem-based learning (PBL), new technology, and capstone courses are additional avenues for presenting and internalizing 21st century work skills.

**Problem-based learning.** PBL is another method that can be utilized in higher education to help students internalize 21st century work skills. PBL is defined as an instructional method in which students work in collaborative groups to identify what they need to learn through facilitated problem-solving (Mansor et al., 2015). Group work in the form of PBL, when facilitated effectively, has the potential to teach students the valuable transferable skills of teamwork, self-directed learning, communication skills, and prioritization (Hassan & Maharoff, 2014).

PBL helps students acquire the skills and knowledge of proficient problem-solving, lifelong learning, and team participation skills needed in the workplace, while practicing their content knowledge and workplace skills as they search for solutions and complete projects that are contextualized and authentic (Dunlap, 2005). Some competencies that PBL helps to develop that serve students throughout their professional life are: being adaptable to change, the ability to make reasoned decisions and deal with unfamiliar problems, creatively and critically reason through problems, approach problems holistically, collaborate in a team environment with empathy and an appreciativeness of others’ perspectives, and have the ability to identify one’s
own weaknesses and strengths (Engel, 1991). In addition to PBL, advances in technology offer new and relevant means of presenting 21st century work skills.

**Technology.** Utilizing the advances in technology to enhance learning is another powerful educational tool. The use of immersive collaborative media, such as that used by Millennial students, has the capacity to create real-world situations for students that allow for improving collaborative capacity though the use of avatars or “play” among groups of people from all over the world (Dede, 2007). Situated learning addresses the challenge of students being unable to apply classroom knowledge to real-world contexts. Learning in a well-designed digital context can lead to replication in the real world of the behaviors successfully learned in a simulated environment (Dede, 2010). By accessing a virtual learning environment, instructors can create interactions and experiences for students to enhance 21st century skill development that may not be possible otherwise due to time, distance, and financial constraints. While PBL and evolving technologies provide “cutting edge” opportunities to engage students in 21st century skills, the tried and true capstone course is also a viable forum.

**Capstone courses.** Capstone courses often utilize problem-based learning as a method to bring together different elements within a course of study for a final project. In preparation for entering one’s career, capstone classes give students an opportunity to integrate knowledge from across the curriculum, apply and connect the theory of the subject matter knowledge they have learned, allowing for less on-the-job training. Case analysis, computer simulations, role-play, living cases, and games are methods that are frequently used in capstone courses and that the goals of capstone projects are best achieved when the issues of self-direction, facilitation, and teamwork have been addressed by both students and teachers throughout the curriculum prior to the capstone experience (Fairchild & Taylor, 2000; Kerka, 2001).
Higher education has a variety of options available to facilitate student learning and internalization of 21st century work skills. The following section explores specific curricular and teaching trends that may lead to greater skill development.

**Teaching and Curriculum Trends**

Educational approaches should shift from an emphasis on teaching to learning (Grimson, 2002). In a teaching environment, learners play a largely passive role, and in a learning environment, when students are more active participants in the educational process it allows them to synthesize information in new ways, rather than just remembering facts (Bloom, 1994). Since graduates are expected to be cooperative problem-solvers with positive attitudes, higher education must play a larger role in shaping the personality of students through personally engaging methods that are likely to be more successful than traditional instructional methods (Bridgestock, 2009; Teichler & Kehm, 1995).

There are many current trends in teaching 21st century work skills. Balster (2009) advocated for an increased emphasis on career counseling and appropriate career choice through an employability course that combines personality assessments with job search skills that translate into greater job satisfaction post-graduation. Often, students want to know what type of job can be expected with a particular major. Allowing time for self-reflection during the academic process can be a key first step in developing the confidence in one’s personal abilities that can result in greater control over job search, performance, and career longevity (Balster, 2009).

Creating a greater connectedness between services in higher education is another method to better teach 21st century work skills. Faculty members are ultimately responsible for what goes on in the classroom in curricular design and often operate separately from support services, such
as career counseling services, through which students receive individual help for career preparedness. Rae (2007) advocated for enterprise education to be embedded into curriculum as a way to better connect services among the college, academia, students, and employers. He argued that colleges may offer a wide variety of activities, such as work-based learning, individual career counseling, project-based assignments, capstone classes, and employability courses, but that students see these activities as unconnected; therefore, employability activities should be at the core of the academic experience.

Teaching and integrating 21st century work skills into the curriculum should be done authentically with the opportunity for students to collaborate and communicate in both online and offline environments (Larson & Miller, 2011). Evenson (1999) indicated over 25 years ago that soft skills can be included into the curriculum by spreading the content throughout the semester and utilizing the following steps to soft skill inclusion into curriculum and this still holds true today:

1. Introduce students to basic people skills so they understand how to get along with others.
2. Segue to teaching essential customer service skills.
3. Foster student understanding by facilitating a problem-solving discussion based on real-life situations.
4. Have students demonstrate the people skills they have learned using role-play exercises in a mock business setting. (p. 29)

However, just mapping generic employability competencies into existing curricula is not enough. Partnerships need to exist between career services staff, faculty, and employers to facilitate the
development and implementation of career management concepts, competence, and self-management skills (Bridgestock, 2009).

Developing curricular frameworks that encourage students to make connections between work experience, subject matter knowledge, and its social, technological, and cultural context is an important step for colleges to take (Guile & Griffiths, 2001). One method for teaching 21\textsuperscript{st} century work skills is to develop specific learning objectives for both technical and interpersonal skills that function similarly to employee goals in the workplace (Bedwell, Fiore, & Salas, 2014). The learning objectives let students know what is expected of them, can allow for the selection of appropriate instructional activities and methods, and can result in the design of effective evaluations (Bedwell et al., 2014). The use of reflection learning experiences inside and outside of the classroom can be translated into the development of 21\textsuperscript{st} century work skills (Hassan & Maharoff, 2014). However, this translation does not usually occur until students understand the role soft skills play in their future career; that reflection is embedded in the learning objectives as formal evaluation occurs (Bennett et al., 2000). Teaching and curriculum trends are addressed in detail in two subgroups: delivery of instruction and assessment.

**Delivery of instruction.** Delivering instruction at the higher education level takes on many forms. Traditionally, direct instruction takes on the form of lecture. Content in a lecture format can be focused and compact and is an effective delivery method when instructors can illicit the interest of the class and are knowledgeable in their subject matter (Hassan & Maharoff, 2014). A foundation of knowledge about 21\textsuperscript{st} century work skills and the related objectives within a given course or program can be established readily through a lecture delivery method; however, lecture is probably best used for introduction purposes (Bedwell et al., 2014). In the
world of Generation X and Y, emerging technologies and facilitated learning create innovative teaching-learning opportunities.

**Use of technology.** Technology has had huge impacts on business and education. Students now have the capacity to interact with other students or businesses from all over the world at any time. The use of the internet provides students with a variety of communication, simulation, and visualization technologies that can deepen technical learning and provide an authentic framework for better understanding, appreciating other cultures, and creating the interpersonal connections that enhance learning (Lombardi, 2007). Students have the opportunity to utilize technology much the way business engages technology for global collaboration.

With the increase of technology in education and the workforce, video clips can be an effective method of demonstrating to students appropriate or inappropriate examples of 21st century work skills (Bedwell et al., 2014). The increase of online learning lends itself well to the use of video clips as an effective teaching method. In the development of a new course with employability as the focus, instructors created a three-layer concept of teaching the skills that employers indicated were important by constructing a set of modules consisting of theory, tools, and application, during years one, two and three, respectively (Cox & King, 2006). The implications of the Cox and King study show that with continued input from employers in course development, employability needs have a better chance of being met by higher education. While the use of emerging technology gives instructors new tools, facilitated learning creates a new instructional environment.

**Facilitated learning.** In recent years there has been a call for educators to become more facilitator than instructor, guiding students in the discovery process of their own learning, with some indicating that teachers and students share the responsibility for the knowledge production
that occurs in the classroom (Greenlaw, 2015; Ryan, 1999). This shift mimics what is happening in the business world, as supervisors become less involved in managing people and more focused on orchestrating projects and supporting the needs of their employees. Drucker (1992) proposed that each employee is a specialist in her or his own right and may not be subject to an immediate supervisor. Employees are expected to be more self-guided in directing their own work. This person-centered approach to learning (introduced by Rogers, 1945, 1979) indicates that the individual has within the ability to alter basic attitudes, self-concept, and to self-direct one’s behavior when there is a climate of acceptance, authenticity, and positive understanding.

Implementing the concept of facilitated learning is a huge shift for teachers and professors in K-12 and higher education, but it may be necessary in order to prepare students to be truly productive employees in today’s knowledge economy.

Incorporating active learning strategies into the higher education curriculum is one facilitated method to teach students 21st century work skills. Active learning is a learning theory that emphasizes participation and ownership by students about the subject matter and encourages reflection activities by individuals as part of the learning process (Hassan & Maharoff, 2014). To contribute to the learning activities, instructors should be able to help the learner make discoveries (Audu et al., 2014). The participants in the study conducted by Hassan and Maharoff indicated that their leadership communication skills and competencies improved through their participation in active learning strategies as did their ability to use new skills and information. This type of skill acquisition has direct carryover into the world of work.

Problem-based learning is another form of active learning by which students construct knowledge and engage in inquiry and problem-solving, typically in a collaborative framework (Edens, 2000). In this type of learning, the instructor acts as a facilitator, coaching, monitoring,
probing, and challenging students in this flexible approach to education (Edens, 2000). Informing the learners of the intended outcomes of their educational experience whether holistically or within a class is an important step in the process of imbedding 21st century skill learning in technical college students (Harvey, 2000). Group projects are an integral part of problem-based learning. Through these types of projects, students have the opportunity to develop teamwork and communication skills in addition to improving their creative and problem-solving ability (Grimson, 2002). Instructors value effective tools to improve learning; however, effectiveness should be supported by proper assessment.

**Assessment.** Assessment has always been a part of the educational process. In addition to the creation of learning objectives, higher education must develop strategies to assess whether students are indeed learning less tangible 21st century work skills. In their research in creating steps for assessing the soft skills in an MBA program, Ingols and Shapiro (2014) discussed the development of three assessment tools and processes that they believe can be used in assessing a wide range of soft skills. One of the diagnostic tools used is called CareerLeader and has a 360° component¹. The University of Luton, located in the United Kingdom, established an initiative to build employability skills into the curriculum to ensure that each of its students engages with the skills of retrieval and handling of information; communication and presentation; planning and problem-solving; and social development and interaction (Fallows & Steven, 2000).

Authentic assessment to gauge students’ understanding of the issues surrounding the problem must be developed (Edens, 2000). A series of achievement and knowledge benchmarks need to be instituted at several points and levels across the educational continuum; however, the

¹ and can be found at http://www.career leader.com/
assessment of soft skill attributes is often very subjective (Chamorro-Premuzic, Arteche, Bremner, Greven, & Furnham, 2010; Meier et al., 2000). A matrix of non-technical competencies needs to be created as a way to ensure that students leave the educational system with more than just the technical skills needed to be successful. The ABET Engineering 2000 Criteria as cited Owen, Scales, & Leonard (1999) recommend focusing on assessing student outcomes, such as analysis and interpretation of data, the ability to function in multi-disciplinary teams, an ability to communicate effectively, and interacting within the larger organization in ways that foster long-term career and institutional growth.

Conclusion

There is a lot of debate within the literature in regards to what type and level of embedment of employability skills within higher education curricula that result in the greatest outcomes for students. Some institutions have sought to embed the 21st century skills into existing curricula, while others have created stand-alone courses that are added onto the regular course of study, and still others use an approach that blends the stand-alone and the add-on method with the last approach being the most effective (Mason et al., 2009). The use of group work, oral presentations, real-world experience exercises and increased use of capstone projects were cited as ways of embedding the desired skills into the curriculum as well as making assessments more problem-based and placing a greater emphasis on numeric skills (Mason et al., 2009).

The development of 21st century work skills in a classroom setting may not be the most effective method; it may be through actual work experiences by which the greatest gains are realized (Cranmer, 2006). A holistic approach to employability seems to be the best course of action for institutions to fully develop current and future generations of learners (Quieng et al., 2009).
2015). For students to learn the 21st century work skills, they must be embedded throughout the curriculum in all programs and courses of study in addition to specialized courses or options on topics, such as career planning, simulations, resume preparation, and input from employers (Andrews & Russell, 2012). Including employers in course design and delivery, either formally through advisory committees or more informally through personal contacts between college faculty or staff and employers, results in greater gains for students and an increase in job placement post-graduation (Cranmer, 2006; Mason et al., 2009). There is a belief that by providing more explicit connections between what students learn in the classroom with what they will be doing on the job that there will be a much greater economic return on expenditure in higher education (Chamorro-Premuzic et al., 2010; Saunders & Machell, 2000).

The following section explores student attitudes toward learning 21st century work skills.

**Student Attitudes**

Developing the 21st century work skills that employers desire in new graduates is a complex task for higher education. Many programs struggle to teach all of the necessary skills in the content area during the time allotted to achieve a technical degree. Federal financial aid also places restrictions on the number of hours and courses a student can take in a given program. There is little debate on the importance of students gaining 21st century work skills; however, determining when and how to best teach and instill these skills, is an issue. Understanding students’ attitudes toward learning these all-important skills is necessary to creating meaningful educational experiences that facilitate 21st century skill development. Student attitudes vary considerably; however, common themes emerge. In this research, common themes emerged regarding the value of a degree and the perception of 21st century work skills.
A Degree is Not Enough

Some students indicate that attaining a postsecondary degree is necessary to improve their human capital in the labor market; yet, they also believe that a heavy emphasis must be placed on experiences and achievements, soft credentials that are developed in addition to their degree (M. Tomlinson, 2008). Yet, some students have not fully appreciated the importance of soft skills as evidenced by a mismatch between graduate skills and employer expectations (Makasiranondh et al., 2011). The following sections explore the perceptions of students concerning how they learn 21st century work skills as well as determining the skills that they find most important once they have entered the workforce. Most students recognize the need for skills beyond the acquisition of a technical degree. Perceptions of these skills form the basis of this research.

Student perceptions regarding 21st century skill development. Employability is viewed by students based on “what they are about as individuals as much as their technical know-how and cognitive skills” and that their ultimate success in the job market is more about “social fit between employers and graduates than their educational credentials” (M. Tomlinson, 2008 p. 58). A study conducted among graduates at several southern land-grant universities found that despite increases in technology, graduates indicate that the skills they found most necessary for career improvement were: oral and written communication, public speaking, motivating and managing others, and effective group leadership (Zekeri, 2004). Graduating dentistry students completing a self-assessment regarding their 21st century-based soft skills indicate that they believe they demonstrate to a moderate extent the skills of communication, relationships and collaboration, critical thinking and decision-making, and initiative and self-direction; yet, they believe that relationships and collaboration skills are the most important
Quieng et al. (2015) indicated that, due to the technical nature of dentistry programs, 21st century skills have not been fully integrated into the curriculum, thus allowing for continued innovations in the implementation of soft skills into the teaching and learning activities that will have a greater impact on the learning outcomes of students.

A 21st Century Skills Survey completed at Schoolcraft College, a community college in Michigan, found that students overwhelmingly indicate that they learn best by “doing” (Sigworth, Hawkins, & Daiek, 2003, p. 42). The students in the study also indicated a clear preference for demonstrating their skills through capstone projects. Within the focus groups interviewed for the study, the skills that students indicated as most important are communication skills, problem-solving, and critical thinking (Sigworth et al., 2003). Students participating in an apprenticeship program indicated that their goal in participating was to gain “hands-on experience and get a headstart to employment” in addition to developing a wider knowledge and increased options for employment (Velde & Cooper, 2000, p. 83). In a study focused on student opinions regarding their development of non-technical skills in IT education, it was found that students who participate in workplace experiences have a greater appreciation of the role that soft skills play in the workplace (Makasiranondh et al., 2011). Makasiranondh et al. determined that team-based project units are vital for teaching soft skills and that students must be made aware of the importance of soft skills within the workplace as part of their studies. Similarly, another study that examined graduate perceptions of work-placed learning found that effective learning occurred most frequently through teamwork, collaboration, and being given responsibility (Crebert, Bates, Bell, Patrick, & Cragnolini, 2004).

In a study conducted by M. Tomlinson (2008), students indicated that the use of a curriculum vitae was a viable way to highlight and document an individual’s skill, competence,
and potential and distinguishes their accomplishments from other graduates competing for employment opportunities. Critical reflection is another powerful strategy that students indicate gives them a sense of self-direction and initiative as well as the motivation to move forward toward their goals (Quieng et al., 2015). According to graduates, communication skills, both oral and written, are considered to be critically important to success in the job market, and they indicated that the speaking and listening skills should be practiced across courses and that writing should occur across the curriculum (Zereki, 2004).

**Conclusion**

Students indicate a preference for learning 21st century work skills though hands-on activities, such as work-based learning, team projects, or capstone projects. However, regardless of the field of study, 21st century skills must be taught explicitly (Makasiranondh et al., 2011). Learning outcomes for students in the classroom and work-placements need to be specifically focused on 21st century skill acquisition. Those in higher education are often slow or reluctant to change teaching methods and incorporate new skills within the curriculum. Colleges and universities cannot guarantee graduates will possess 21st century work skills, but they can provide opportunities to learn, practice, and develop the skills during their educational process (Crebert et al., 2014). There are still gaps in the literature regarding student perceptions of the needed 21st century work skills and how best to facilitate their learning in a comprehensible, sustainable way.

**Summary**

The literature review revealed that there is a plethora of information about 21st century work skills and soft skills. A big issue is the lack of consistent verbiage in the literature when referring to 21st century work skills, soft skills, employability skills, and enterprising skills. The
terms all refer to similar characteristics desired by employers in new graduates, but a lack of consistency makes it very difficult to have a focused discourse. Although there is incredible overlap in employer’s desired skill sets, there is also wide disparity in the way literature defines 21st century work skills, soft skills, and employability. A focused, well-defined term would be a positive step in the process of higher education’s teaching and college students’ learning the skills necessary for employment.

Expanded research should be conducted at colleges that have instituted a comprehensive plan to educate students about 21st century work skills to provide data as to the extent that an institutional focus on employability results in increased job placement, job security, and continued career development for graduates. Because of their flexibility and focus on workforce development, the community and technical colleges have an opportunity to lead the way in piloting changes in advising, counseling, support services, curriculum, work-based learning, and job placement that can lead to comprehensive 21st skills attainment for students as they enter the workforce.

For students to truly learn, internalize, and epitomize the 21st century work skills, higher education must create a comprehensive approach to intentionally embedding the desired skills into curricula and make the concept of employability pervasive in the educational experience. According to Bennett et al. (2000), students do not fully accept the importance of personal and professional skills for their future careers until the curricular and co-curricular learning are brought together through critical reflection and the desired skills become part of the learning objectives that are formally assessed. If students understand that the college has as its goal for students to become employable and that the educational process, with all of its many parts are
working together toward that end, then students will be able to learn, internalize, and put into practice 21st century works skills.

Globalization, advances in technology, and increasing diversity in the workplace is altering the kinds of competencies and skills that colleges are being required to deliver (Zekeri, 2004). Educators have argued that the purpose of education is more than just preparing students for work, while industry has bemoaned what it perceives as the skill deficit of young people entering the workforce (McWilliam & Haukka, 2008). Traditional curricula have failed to address the necessary knowledge, attitudes, and skills required to create knowledge workers capable of understanding the nature of the organization and their contribution to its performance (Meier et al., 2000). Recent college graduates identified the key skills they believed were needed to improve their careers as oral and written communication, problem-solving techniques, motivating and managing others, and setting personal and organizational goals (Zekeri, 2004). To ensure that graduates are work ready, colleges, especially technical and community colleges, must address the 21st century skills gap comprehensively.

Career counseling before the selection of a major or during the educational journey, when needed, is an important first step. Colleges must link all academic and non-academic services so that students witness the interconnectedness of the different roles that varying departments play in the process. Curricula must be developed that have the desired 21st century work skills embedded into the classes across the program of study, in which intentionality and reflection are part of the teaching process and meaningful assessment is part of the learning process (Cranmer, 2006). Learning must take advantage of the concept of transferability. Transferability is defined as the ability to take knowledge learned in one situation and to apply it to another situation and is
demonstrated if instruction on a learning task leads to improved performance on a transfer task (Dede, 2010).

Colleges must develop opportunities for students to participate in work-based learning because it is through such work experiences that students increase their motivation and professionalism (Lester & Costley, 2010). Utilizing situated learning is another method available to educators to increase real-world application. Using technology simulates problem-based learning that utilizes active learning strategies, and both are effective and necessary components in the development of a curriculum that teaches students 21st century work skills in ways that students can learn and exhibit them (Brennan, 2005).

The use of capstone courses is another strategy that the review of the literature indicates is an important way that students learn 21st century work skills (Fairchild & Taylor, 2000). A holistic educational approach is outlined in five steps that advocates for personal development, applied learning, skill development, work-based learning, and career management within the educational process (Matlay & Rae, 2007). By utilizing the framework outlined by Matlay and Rae, colleges can create a comprehensive educational plan that includes the methods, strategies, and situations that guide students to learn, internalize, and epitomize the 21st century work skills employers are looking for in new graduates.

The following research will seek to add information to the body of knowledge about how to best prepare technicians with the 21st century work skills needed for successful employment in industry in the Upstate of South Carolina, while seeking their two-year degree at TriCounty Technical College. It will focus on the attitudes of traditional-aged Industrial Electronics and Mechatronics Technology students toward learning 21st century work skills and how they feel they best learn these skills. The research attempts to ascertain self-reported preparedness of the
students in regards to 21st century skill development workforce readiness. The literature is replete with information about the need for higher education to develop 21st century work skills in students; yet, there is limited information about student attitudes and the importance they place on learning 21st century work skills as well as how higher education can help to achieve that goal.
CHAPTER THREE: RESEARCH DESIGN

The study sought to answer the following question: What is the attitude of traditional-aged, technical college students majoring in manufacturing related degrees, toward the necessity of attaining 21st century work skills? This study utilized an Interpretative Phenomenological Analysis (IPA) format. An IPA approach allowed the researcher to interpret the experiences of the students interviewed to ascertain their attitudes toward learning 21st century work skills and their interpretation of the ways that they learn those skills. The straightforward approach of IPA enabled the researcher to use composite themes that emerged through data analysis rather than look at the data on an individual level. Jirwe (2011) indicated that IPA seeks to uncover meaning while making sense of research participants’ lived experiences and perceptions, making it an appropriate methodology for the current research.

Philosophical Underpinnings and Overview

The nature of the human condition is qualitative and through measurement, one can distinguish and clarify the qualities that are sought to be understood (Alexander, 2006). In defining a paradigm, Filsstead stated that it is a “set of interrelated assumptions about the social world which provides a philosophical and conceptual framework for the organized study of that world” (cited in Pontorotto, 2005, p. 34). Approaching the current research study from the constructivism-interpretivism framework has as its goal to search for truth and meaning (Butin, 2010). Research from this perspective is subjective, contextualized, and value-dependent and sets out to prove that something is happening. According to Pontorotto (2005), the research participant cannot be separated from the research. In constructivism-interpretivism, the researcher and participant “co-construct or jointly creates the findings from their interactive dialogue and interpretation” (p. 129). Since the researcher is both a participant and is in search of
meaning making, constructivism-interpretivism research is always qualitative in nature. It is often used as a framework to conduct research in the natural sciences and education fields. The follow paragraphs describe the specific strategy of inquiry selected for this particular research study.

**Interpretative Phenomenological Analysis**

IPA is a research method used in psychology that has its theoretical underpinnings in both phenomenology and hermeneutics with an idiographic perspective (Shinebourne, 2011). IPA has as its goal making sense of the research participants’ lived experiences (Smith & Osborne, 2007). The active role of the researcher is considered necessary to the research in the analysis process by gaining an insider’s perspective, but this cannot be done directly or completely (Drummond, Hendry, & Dip, 2011). The researcher’s own conceptions and biases are required to make sense of the research data (Jirwe, 2011). This interpretative process consists of two stages, or a double hermeneutic, “where participants are trying to make sense of their world and the researcher is trying to make sense of the participants trying to make sense of their world” (Smith, 2007, p. 53).

According to Larkin, Eatough, and Osborn (2011), “IPA offers an established, systematic, and phenomenologically focused approach, which is committed to understanding the first-person perspective from the third-person position, so far as is possible, through intersubjective inquiry and analysis” (p. 321). IPA is provided a rich source of ideas from phenomenological philosophy.

Phenomenology had its beginnings as a philosophy in Germany before World War I and has held a prominent place in modern philosophy since that time (Dowling & Cooney, 2012). Most of the types of phenomenology draw from the work of Edmond Husserl, a German mathematician and his student Martin Heidegger (Gill, 2014). Phenomenology emerged as naturalistic paradigm that was in protest to the positivist paradigm because of the belief that
knowledge was achieved through the interactions between participants and researchers (Reiners, 2012).

Husserl presented ideas about how to comprehend and examine lived experiences (Shinebourne, 2011). Husserl’s work advocated getting at the truth of the matter or phenomena and that the investigation should be free of prior bias and assumptions (Larkin et al., 2011). He developed descriptive phenomenology, where preconceived opinions were set aside or bracketed when describing everyday conscious experiences (Reiners, 2012). Furthermore, he proposed a phenomenological attitude from which he developed the methodical steps involved in reduction, which redirects thought toward how an object appears to consciousness, and away from unreflective or unexamined world experience (Shinebourne, 2011).

Martin Heidegger diverged from the theory of knowledge known as epistemology and developed interpretative phenomenology, which expanded on hermeneutics and interpretative philosophies (Reiners, 2012). It was his belief that the culture and traditions of an individual influence his or her understanding of an experience (Gill, 2014). Because of his belief that personal awareness was intrinsic to phenomenological research, Reiners wrote, “Heideggers’s interpretative approach to studying existence denies the possibility of fully detached reflection and thereby disputes Husserl’s idea of bracketing presuppositions to articulate an essence” (Gill, 2014, p. 7).

IPA was created by Jonathan Smith in 1996. IPA is philosophically aligned with Heidegger’s ideas about the interpretative process (Smith, Flowers, & Larkin, 2009). IPA is separated from other phenomenological methodologies because of its idiographic nature in seeking to understand deeply and be able to convey a particular person’s experience (Gill, 2014).
According to Shinebourne (2011), “the researcher’s point of access to participant’s experience is through their accounts and through the researcher’s own fore-conception” (p. 20).

Smith (2004) has advocated for single case studies or homogeneous groups, making the understanding of contexts a vital part of IPA. According to Shinebourne (2011), IPA is differentiated from other phenomenological approaches due to its “hermeneutic approaches which provide opportunities for interpretative analysis, contextualizing participants’ accounts in reflections and relevant theoretical material, thus making it possible to link the findings to the psychological literature” (p. 24).

There are researchers who do not believe that IPA meets generally accepted scientific criteria. Giorgi (2011) criticizes Smith’s (2010) presentation of IPA as a method that does not create a deliberate articulation of steps that meets scientific criteria that helps the potential researcher of the method. The following three key points are raised about Smith’s writings about IPA: (1) confusion surrounding the term “bracketing,” (2) identifying the act of reflection with the assumption of the phenomenological attitude; and (3) failure to mention reduction which is critical for phenomenological psychology (Giorgi, 2011). Giorgi further argued that IPA theorists want an eclectic phenomenology and that they give “minimalist and superficial definitions” on content but not how the content should be approached phenomenologically (p. 204).

For this research study IPA was an appropriate framework because the study was conducted in a higher education setting on a homogeneous group of students. The study sought to understand participants’ lived experiences and their attitudes toward learning 21st century work skills. The IPA format guided the interview question development by developing questions that sought information that produced meaning-making regarding the study participants’ thoughts and experiences. The data were collected through semi-structured interviews and analyzed using
an interpretative process allowing common themes to emerge. The following sections discuss in
detail the participants, procedures, and ethical considerations related to the current study.

Participants

The target population for this study was traditional-aged technical college students
attending TriCounty Technical College that pursued manufacturing-related degrees in the majors
of Industrial Electronics Technology or Mechatronics Technology. The students ranged in age
from 18-22 years old and were selected to provide a homogeneously aged sample. Polkinghorne
(1989) indicated that in a phenomenology studies, interviews should be conducted with 5-25
people who have experienced a phenomenon and thus form a criterion sample. The sample size
consisted of eight students chosen based on purposive sampling methods since qualitative
samples tend to be purposive rather than random (Miles, Huberman, & Saldana, 2013). Students
for the study were selected based on the homogeneous factors of age and degree pursuit. An
effort to include both males and females as well as different races was made in order to capture
outliers and determine if common patterns still hold (Miles et al., 2014).

The setting for the study was a technical college located in the upstate of South Carolina
where there is a large economic base of automotive and aerospace manufacturing and a huge
investment in energy production and distribution. Students seeking Associate of Applied Science
Degrees in Industrial Electronics Technology and Mechatronics Technology were the subjects of
this study. The data collection method included semi-structured interviews conducted on-campus
at a time that was conducive for the students. The interviews were recorded using audio and were
then transcribed.
Procedures

The research began with seeking Institutional Review Board (IRB) approval. Permission to study the intended human subjects at the technical college chosen was sought. According to Creswell (2013), most qualitative studies that are conducted on subjects older than age 18 are considered low risk and not often subjected to lengthy review board procedures. Due to the semi-structured nature of the intended interviews as well as the type of questions to be asked, the researcher did not foresee any problems receiving permission to study the proposed participants at the intended college.

IPA has an idiographic nature that lends data collection to purposeful sampling from homogeneous groups (Loo, 2012). The typical data collection method is through semi-structured interviews in which the researcher has an idea related to the area of interest and has developed questions that allow the interviewer to enter into the social and psychological world of the subject (Smith, 2007). This approach to data collection allows the participants’ freedom in telling their story since they are viewed as the experiential expert on the subject being discussed (Smith, 2007).

The construction of the interview questions allows flexibility and takes into account the iterative nature of this type of research. Smith (2007) suggested structuring the interview questions by utilizing the technique of funneling, which encourages responses that start with a respondent’s general views and progresses to more specific details. The role of the interviewer is that of a guide or facilitator, always allowing for the unintentional discoveries that may occur (Smith, 2007). The interviews should be recorded. If the participant prefers not to be taped, then extensive notes will need to be taken. Once the interviews are complete, a verbatim transcription of the session was conducted (Smith, 2007).
Analytic Methods (Data Analysis)

The analytical methods used in IPA research stem from the work of Heidegger and interpretative hermeneutics in which the analysis is circular, in that the researcher is continually reviewing and analyzing the text in parts and as a whole (Reiners, 2012). Reiners related that the researcher is not removed from the meanings extracted from the text; therefore, the researcher is considered to be part of the phenomenon. Since the researcher is part of the process, the phenomenological analysis that is produced is always an interpretation of the research participant’s experience (Loo, 2012). The analysis process focuses on convergence and divergence rather than just concentrating on commonalities (Drummond et al., 2011).

Smith and Osborne (2007) provided a methodology for analyzing data in an IPA study that is meant to be adaptable, not prescriptive. Qualitative analysis is a personal process and that the data analysis is an interpretative work completed at each stage in the process. The use of computer software for data analysis in IPA seems to be a choice for the individual researcher (Drummond et al., 2011). The process of data analysis for use in this study is presented by Smith and Osborne (2007) consists of the following steps:

1. Reading the transcript several times in the first stage of analysis. Writing comments in the left-hand margin about the text, to include summarizing or paraphrasing, noting connections, use of language, gaining a sense of the person and similarities, as well as discerning differences and contradictions in what a person is saying should all be noted in the first several readings of the transcript.

2. The second phase in the process encourages the researcher to read the transcripts again noting emerging theme titles in the right hand margin. Smith and Osborne (2007) indicated that it
is important during this phase to transform initial notes into higher levels of abstraction invoking more psychological terminology.

3. The next step in the process involves connecting the themes. After listing the themes that emerged from evaluating the transcripts, they are listed in the order they appeared. The researcher then looks for connections between the themes and tries to cluster some of them together, continuing the iterative process of checking the themes with what was actually said in the text.

4. In the next stage, a coherently, ordered table is produced of the identified theme clusters. The clusters are named and represent the superordinate themes. To aid in finding the original source for the analysis process, an identifier is added to the table.

5. Other transcripts can be handled the same way or the researcher can use the themes from the first case to orient the analysis from the subsequent cases.

Once a transcription of the interview was created by the researcher, it was then analyzed using the simple inductive method of primary and secondary coding to identify themes in the data. The researcher intended to use descriptive coding, described by Miles et al. (2013) as a word or phrase that provides an inventory of topics for indexing and categorizing. Similarities in the data were identified then grouped together within the overarching themes. The researcher then combined themes with similar content into categories.

**Ethical Considerations**

To maintain the ethical standards of the study, each participant was provided a number in place of their name to maintain confidentiality. Once the recordings were transcribed, they were held in a password protected, secure environment and destroyed once the study was complete. Participants were provided a copy of their transcribed interview to check the accuracy of the data.
(Smith, 2007). The transcripts are maintained in a secure location and the documentation containing the names and codes associated with the selected participants are kept in a separate secure location.

**Trustworthiness**

The current study sought to provide valid and reliable data through utilizing recordings of the interviews and having the transcripts checked by the participant for accuracy of content. Any corrections were attached to the transcript and utilized during analysis of the texts. Smith (2007) indicated that validity in IPA should not be compared with that of quantitative research. Smith points to Yardley (2000) for the identification of the characteristics of good qualitative research which are shown in the table below:

Table 1

<table>
<thead>
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<th>Characteristics of Good Qualitative Research</th>
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<tr>
<td><strong>Essential qualities</strong></td>
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<tr>
<td><strong>Sensitivity to context</strong></td>
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<tr>
<td><strong>Commitment and rigor</strong></td>
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<tr>
<td><strong>Transparency and coherence</strong></td>
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<td><strong>Impact and importance</strong></td>
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Peer review was utilized to ensure validity through all stages of the study process. Researcher knowledge of the subject matter formulated from a review of relevant literature as well as knowledge gained through specific work with students, faculty members, and employers provided a foundation for the qualitative research study to have the “rigour that might be demonstrated by the effective use of prolonged contemplative and empathic exploration of the topic together with sophisticated theorizing, in order to transcend superficial, commonsense understandings” (Yardley, 2000, p. 222).

**Potential Research Bias**

According to Merriam (1991), questions arise from our worldview and guide us to question what can be done about it. The researcher’s current position as the employability programs coordinator at TriCounty Technical College has precipitated an acute awareness of the needs of local business and industry and the deficits that many students have in regards to soft skills or 21st century work skills. The disconnect between what companies are looking for in employees and college graduates’ lack of preparedness has led the researcher to want to know how higher education can help bridge this divide. In the following paragraphs, the positionality of the researcher is discussed as it relates to the study. According to Parsons (2008), “positionality is a concept that acknowledges the complex and relational roles of race, class, gender and other socially constructed identifiers” (p. 1129).

**Personal Background and Biases**

The researcher’s personal background was one of a white, middle-class upbringing, with parents who were working professionals. As a trained educator, the researcher approached this problem with some significant bias. “One always brings one’s history, experiences, and categories to bear when trying to understand new situations” (Briscoe, 2005, p. 25). First, this
researcher believed that students have the ability to learn and that educators should teach them, or at the very least, facilitate their learning. Understanding that each student has a different definition of success and that at the technical college level, faculty, and staff attempt to meet them where they are and help them get to where they want to go. In the case of what employers are looking for in their employees, it was the belief of this researcher that many students are unaware of the level of skill development expected from them once they enter the workforce. Ignorance begs for education. This deficit may be a problem of student achievement (Jupp & Slattery, 2006). If students are instructed as to the expectations and then given the tools to help them reach those goals, then significant growth toward a desired outcome can be achieved. This utopian view of education is potentially colored by the educator mentality of the researcher.

**Relation to Others**

Through multiple experiences as a career counselor, the researcher witnessed the lack of understanding on the students’ part about what the world of work expects from them. I taught classes and workshops across our campus to a wide variety of students in different majors. I completed hundreds of mock interviews for students, some as part of a class assignment and others in preparation for work-based learning or full-time positions. I was privy to survey results from local business and industry as to what they value in employees as well as held discussions with numerous human resources personnel, trainers, technicians, managers, and others as to what characteristics were most desirable in employees. This first-hand knowledge regarding the desired 21st century work skills, was part of what made me passionate about this problem and created the desire to discover possible solutions. However, as a researcher attempting to understand my own bias, I prepared for the personal and professional consequences of turning my gaze within (Fennell & Arnot, 2008).
According to the Institutional Research Department at TriCounty Technical College about 25% of the students are first-generation college students, minorities make up 19% of the college population, 36% of the students do not work, and 47% work part-time. All of these groups may have had limited guidance in regards to education and work. Even though I am from a different socioeconomic class from some of the students I will study, according to Briscoe (2005), “a scholars’ social group should not determine which social group they should or should not study and represent in scholarly discourse” (p. 24). It will be important to remain neutral with the students during the research process, especially within the context of my current position at the college.

Being the consummate optimist, I believe that the right type of education can inspire students to become more than they dreamed possible. I have witnessed and been part of the life-changing results that occur when students are successful in their chosen major, mentored throughout the educational process, and ultimately attain their desired employment. It is indeed life-changing, not just for that particular student but also for his or her family and for future generations. The effect of education and job attainment is like a pebble dropped in a pond, a far-reaching ripple effect. Through my research I hoped to discover ways that higher education could prepare technical college students for the workforce, instilling 21st century work skills and thus continuing the American dream for this generation and generations to come.

**Limitations**

While this research project intended to provide insight into the attitudes of traditional-aged Industrial Electronics and Mechatronics Technology students’ motivations toward learning 21st century work skills, there were some limitations that need to be addressed. Due to the qualitative nature of the research study, the sample size was limited, which has the capacity to
impact the variety of responses. The location of the research was a technical college campus in the southeastern United States where there was not substantial racial diversity. Another potentially limiting factor was that very few females were majoring in the two targeted degree programs. Both of the previously mentioned factors limited the pool of candidates and consequently limited the transferability of the outcomes to other technical or community colleges in other geographical regions. The researcher worked with the students at the institution where the research took place. There was the potential for the subjects to be influenced by a current or prior relationship with the researcher (Briscoe, 2005). Every effort was made to keep these limitations in mind and to complete a study that informed the problem of practice and has potential transferability to other institution.
CHAPTER FOUR: FINDINGS AND ANALYSIS

This study examines the attitudes of technical college students majoring in manufacturing related careers, toward the learning of 21st century work skills. Participants in this study each provided detailed accounts of their experiences with 21st century work skills, where and how they learned the skills, and the significance that they place on these skills. Three superordinate themes and eight subthemes emerged. These themes capture student understanding of 21st century work skills and the influences that contribute to their attitudes toward learning these skills. The superordinate and subthemes are: 1) Skills Necessary for Employment, including a) soft skills and b) technical skills; 2) Factors Influencing Skill Development, including a) people, b) experiences, and c) education; 3) Self-Assessment of Skills, including a) student strengths, b) student weaknesses, and c) student desires for additional knowledge and skill development.

Research Site

The study was conducted at a Technical College in the Upstate of South Carolina. The area has a large automotive and aerospace manufacturing base and a huge investment in energy generation and distribution. The technical college has a long history of supplying industry with multi-skilled technicians responsible for maintenance and repair of equipment, programming of controls systems, and set-up of new or existing production systems. Students involved in this study major in one of two degree programs that educate and develop these multi-skilled technicians: Industrial Electronics Technology and Mechatronics Technology. The programs have identical coursework for the first two semesters as well as common general education requirements. Fall 2017 enrollment for Mechatronics was 239 students, and for Industrial Electronics it was 123.
During the fall of 2016, responding to industry requests that graduates have more developed soft skills, a new course was introduced into the first year of these programs. The class is a four-hour Employability Skills Development course (IDS 106). IDS 106 seeks to better prepare technicians for the professional expectations of industry. Typically, the course is a spring offering during the second semester of a five-semester degree program. Each participant in this study has successfully completed the IDS course.

The college has a robust work-based learning program in which students can self-select to participate. The college, in conjunction with numerous business and industry partners in the local area, creates opportunities for full-time students to work part-time and gain hands-on experience in their particular field of study. Students are paid for the time they work on-site and some companies provide tuition assistance or reimbursement. These experiences often lead to full-time positions for the students upon their graduation. Industrial Electronics or Mechatronics Technology students do not typically receive course credit for the work experience. These programs are referred to as co-ops, internships, apprenticeships, and scholar programs, but for the purposes of this thesis, the term work-based learning (WBL) will be used as an umbrella term. Several of the participants in this study are WBL students.

Participants

Data were collected through individual interviews at a time and location of the participants’ choosing. Participants self-selected joining the study. Eight students aged 19-21 were interviewed during an 11-week period spanning summer break and the beginning of fall term. Participants were all male, six Caucasian and two African American. This sample is fairly representative of the student population in these two programs. All have completed at least three
semesters of coursework in Industrial Electronics or Mechatronics Technology. In reflecting on the data, it is important to understand the individual student’s backgrounds and experiences.

#1- Jacob is a 19-year-old Mechatronics student and a WBL participant at a local automotive manufacturer. His parents work for a local energy company and expect that he will do his best and be successful. Jacob held several jobs in service industries prior to accepting his WBL opportunity. He has participated in mission trips with his church and is a talkative, determined, outgoing, young man.

#2- Sam is a 19-year-old Industrial Electronics student who accepted a WBL opportunity with a local energy company in 2017. Sam played high school football and took electronics classes at his school district’s career center. Prior to WBL, he worked on a farm, landscaped, and worked at a local grocery store. He was raised primarily by his mother because his father spent time in prison. Sam’s grandparents took custody of him when his mother’s life choices made her unfit to keep him. His grandmother works at a local medical device manufacturer and his grandfather is a career technician. They expect that Sam will work hard. He has incredibly high expectations of himself. Sam is highly motivated and cares deeply about his education and his employer.

#3- Peter is a 20-year-old Mechatronics student in his fourth semester of coursework. He holds a WBL position at a local tire manufacturer. Peter’s career goal is to remain there in a secure job. He began working at age 15 in a grocery store and subsequently held several food service positions. His mother works as an administrative assistant, and his father was a salesman and branch manager in industry prior to his death. They want him to do his best and support his choices. Peter is well-spoken and observant of others’ behavior and the impact behavior has in the workforce.
#4 Derek is a 21-year-old student in his fourth semester completing both Industrial Electronics and Mechatronics. He is not currently employed, but he did start his own landscaping company at age 15. He grew the company during high school and had multiple employees. Derek sold the business and uses the revenue to pay his education and living expenses. He desires to work for a large, local well-established industry. Both parents are teachers and expect him to graduate and go out on his own. He played soccer in high school and served as team captain. Derek is a matter-of-fact type of person who does not say much but is thoughtful and has a strong work ethic.

#5- Andrew is a 21-year-old Mechatronics student in his third semester. He works at a local pizza restaurant. Past jobs include another restaurant job and work as an electrician’s helper at an industrial contracting company. He states his career goal as “get a good job and make money.” His mother works in a hospital in the billing department, and his father is a forklift driver at a local automotive supplier. Both parents expect him to support himself. Andrew played football and basketball in high school. He seems to be checking the boxes and wants to work, but not too hard.

#6- AJ is a 19-year-old fourth semester Industrial Electronics student. He currently works at an industrial equipment supply and rental company. He previously held jobs on farms, at grocery stores, and as a metal fabrication operator during a paid high school internship. He currently seeks a job related to his degree. His father is a retired agricultural education teacher, and his mother is a teacher in an adult education program. He feels that they taught him right from wrong, and he works hard to meet their high expectations. He is talkative, funny, full of life and likable.
Michael is a 21-year-old Industrial Electronics student in his fifth semester of coursework. He works in a local textile manufacturing facility part-time as an operator and hopes to be offered a technician position there or at another facility. His previous job was in a fast-food restaurant as a cook. His parents expect him to finish college, work to support himself and have pushed him to be better. Michael’s mother graduated from college with a degree in Biology and worked until she became disabled due to cancer. His father is a welding graduate of TriCounty Technical College currently working as a contractor at a large local tire manufacturer. Michael is a very nice young man who is often quiet but wants very much to improve himself. He is developing a good work ethic and challenging himself to overcome his limitations.

Luke is a 19-year-old Industrial Electronics student in his fourth semester. His career goal is to graduate from TriCounty Technical College and go to work at a company. He has never held a job nor did he play sports in high school. His mother works at a body shop, and his father is a technician at a facility that builds turbines. Luke seems not to take his education and future seriously and has yet to develop any noticeable work-related skills.

This study utilized an Interpretive Phenomenological Analysis (IPA) format to interpret student experiences and attitudes toward 21st century work skills (Jirwe, 2011). The data will be presented in an organizational structure describing each subordinate theme and then developing the sub-themes for the reader, utilizing data from the eight student interviews.

**Superordinate Theme One: Skills Necessary for Employment**

All of the students interviewed express a desire to become employed in their field; full-time upon graduation and/or part-time in a WBL opportunity while still in college. The students indicated that becoming successfully employed as a technician required that they possess and demonstrate certain skills. The researcher observed that the students have varying degrees of
understanding about the expectations of employers regarding the skills they will need, but there is consensus that they must each possess some degree of both soft skills and technical skills. These skill sets are the two subthemes of the employment superordinate theme.

**Sub-theme One: Soft Skills**

This research study uses the phrases, soft skills and 21st century work skills, interchangeably. Many of the students interviewed were unfamiliar with the term 21st century work skills and often related it to technical skills. However, once the researcher used the term soft skills, the participants had a much better understanding of what that term meant and its relationship to employability. Within the sub-theme of soft skills, the students identified five different skill set categories that they feel are important for employability: interview and ability to present self well, good attitude and strong work ethic, communication, teamwork, and problem-solving.

Sam said, “I believe that soft skills are one of the most important things that employers look for nowadays. I feel like soft skills are really what will set you apart in the long run.” Andrew indicated, “That technical skills are not all you gotta have,” and AJ feels that “technical skills will get you in the door, but soft skills will get you a long way.”

**Interview and the ability to present self well.** Jacob, Sam, and Michael focused on the importance of interviewing and presenting oneself well. Jacob discussed self-branding:

You are your brand, so promote your brand. Whatever you do is gonna reflect upon you. So always make sure you show everyone the best that you can be. And even though you may be lacking in some areas, make sure to brush up on and improve those areas.
Sam believes that it is all about making a good first impression:

They [soft skills] could make you or break you in getting a good job because you could have all the experience in the world, but if when it comes down to when you have that interview day and you don't impress the interviewer because you just don't have the soft skills to really make an impression and sell yourself, then I think that could make or break you from landing that good job or getting the promotion.

Michael also expressed the importance of documents, such as a resumé and cover letter in making a good first impression:

You only got one chance to make your impression on a future boss person. You gotta sell yourself good, and then once you sell yourself good in the talking interview…. you gotta show that you can back it up with your work skills. If you're gonna give somebody something about you, you make sure that it's neat and professional when it's going in there ‘cause you only have one chance to impress. If you take the time to make sure everything is neat and everything is organized, then they know that you're serious about the job.

These research participants clearly understood the importance of creating a professional image, paying attention to detail and appropriate self-promotion. Other participants expressed opinions about the importance of a good attitude and strong work ethic. The following section details those opinions.

Work ethic and attitude. All of the research participants identified a strong work ethic and a good attitude as 21st century work skills important for employment. Jacob said:
It is important to not be soft, but be firm and assertive and also be able to work hard at what you do. ‘Cause not everything is just handed to you. You actually have to work for what you are trying to achieve.

AJ believes employers are looking for someone hardworking and trustworthy. He said, “You need to be a hard worker, have a good work ethic, and you just got to... that's just what needs to be. You have got to get out there and show employers that you want this job.” Michael learned the importance of a good attitude during an interview:

It definitely humbled me a little bit. I was going in there just, "Hey yeah, you got a job opening? Here it is. I'm an IET student. I hear you got a job opening? Here it is." It set me back that I have to take my time. You can't just throw something, “Here I am,” on people. You have to explain why you're the good fit for the job.

Luke expressed that it is important to be motivated, and go into work each day with a positive attitude. Andrew noted that punctuality, being respectful, and attentiveness are all important. He went on to say, “You gotta be able to take criticism I would say, and then learn from your mistakes. Troubleshootin', problem-solving, stuff like that. Being able to assess stuff and then making adjustments on the job to fix it.” Peter feels that displaying emotional intelligence on the job is imperative. He stated:

You gotta be able to read a situation. As far as if you walk up and you walk into a situation, you gotta be able to look around and pick up on some clues that would guide you to assisting.

As the questioning continued, the research participants also offered their insights into the importance of effective oral and written communication.
**Communication.** Communicating efficiently and effectively is a skill that many of the students feel is very important to being an effective employee. The students involved in WBL spent a greater amount of time in their interview talking about communication and its importance on the job. From Peter’s WBL experience he provided this insight:

Definitely from what I've seen in the field, is that there is communication all the time, between managers and technicians, between technicians and production workers, between everybody. There is a problem going on now, where the technicians aren't communicating enough about what they did to solve the problem. You gotta know how to talk to people. A lot of the other students that I'm with, that I'm in class with, they kinda suck at communication. They don't know necessarily what to say, how to say, and all that. Also, confidence. How you say, and what you say, can be taken very differently from what it's meant. It's very important to learn skills on how to communicate, how to make yourself not sound like an idiot.

Sam believes his communication and presentation skills resulted in offers of two different WBL opportunities. Sam stated, “I can talk to just about anybody. I enjoy it. I try my best not to get nervous, it happens to everybody, but I always make a good first impression.” Jacob also believes that he possesses good presentation skills and communicates well with others. He gave the following example of something that happened during his WBL job:

I was actually able to communicate with him [a German employee] pretty well 'cause he had a good understanding of English. He was able to speak well about what was happening, what I saw what was happening, and he basically... For two days, I sat there and just kind of like, watched it and was able to... Before they could come down and fix the machine that was having the issue, I was the one in charge of making sure that they...
were all put in correctly. So I felt like that was a step up, 'cause I was able to present myself well to him, and he saw that I had potential in trying to do something like that. Derek, although not involved in WBL has previously owned his own business and felt that his experience strengthened his communication skills:

Knowing how to communicate with the people and knowing that you don't always get your way and that they have a opinion and you have to respect that and there's a push and pull that you have to come to agree on. Letting people know how and what you're going to be doing and getting their response, and figuring out how to find a middle ground to go with if they disagree.

The previous paragraphs revealed highly developed thinking from the research participants regarding the importance of effective communication in the workplace. The participants next shared experiences and insights regarding teamwork.

**Teamwork.** All of the students interviewed indicated that employers seek candidates with the ability to work well with others. The students felt that employers especially value this 21st century skill in potential employees. Derek said:

I know they're gonna want a team player who knows how to talk, communicate, let them know what's happening, being honest with them and being able to humbly go to them and tell them, "Oh, I don't understand this," so they can get someone that will help you along the way, so not lying to them and trying to just fake it ‘til you make it.

AJ articulated a similar perspective. He stated, “Employers definitely want somebody that can work with a bunch of people. People skills…. But people skills I would say would be the main thing.” Michael explains it in the following way:
I've learned to make sure to take your time and make sure to get everybody involved, not just one person, you have to get along with everybody even if somebody has a bad attitude toward you or something like that, you gotta deal with it or you have to pull them to the side like, "Hey, I know you've got a problem with me. We've both got a problem with each other, but we're gonna get this job done so we can go home and go on about our business. We can't let what we have affect the whole group." I've learned that you have to work with all types of people. Even at my job at the textile plant, there’s people I don't like, I usually just try to stay to myself or not go around them, but if there is a time I have to work with them, I just put it to the side and make sure I get that job done.

Sam expresses how he learned about teamwork and the importance of getting along with people through multiple experiences:

Even working at the grocery store, I deal with people every day. I'll have people that I don't even know that I have to encounter every day, help them, learn to build a patience to deal with sometimes pushy people that really do not deserve the patience. You learn to interact with other people to get a single job done…. It's made me realize that you're in there to get this job done. This is your job, but to also make the best relationships that you can. 'Cause I feel like strong relationships within a team, especially if you're playing football, strong relationships within a team will help the team succeed in the long run, so... I would put my money on it that that guy [the one with the soft skills] would get the job because this guy can get along with the crew. He can be taught by the crew, trade skills, stuff like that.

Sam expressed similar sentiments about what he learned in working at a grocery store, “You learn real quick what you can and can't say. Both from customers straight telling you to the face.
‘You can't say that. You shouldn't say that,’ and with managers telling you, ‘Maybe don't say that,’ or, ‘Maybe just keep that to yourself.’”

Four of the students indicated that respect is a key component to getting along well with others. Luke stated, “You have to be respectful.” AJ said, “Soft skills means treat people with respect.” Andrew went into more detail, “I guess paying attention would be another one, and then being respectful, and then being attentive, I guess, in our program to the things going on around you as far as when you're working.” Peter addressed respect in social awareness by saying:

Like, understanding when you're making a situation worse versus making it better. And also just social awareness; when is an appropriate time to crack a joke and when is it not an appropriate time, and if that joke itself is appropriate or not.

Sam expressed a belief that a good attitude and a desire to get along well with others may be more impactful than experience:

Somebody with lower experience that has great soft skills, can work with other people....You gotta think in the mind of the employer. You got this guy with really good experience here that you're trying to hire, but you also got a guy on your crew already that's got the same amount of experience, if not more. You just want a little bit more experience on your crew 'cause you got some young guys. You take both of these guys, the guy that's already hired that can teach other people already what he knows. This guy that you wanna hire that's got all the same experience, but he has no soft skills, he argues with everybody. He just doesn't get along. Then you take a guy with a little bit of less experience, great soft skills, gets along with people. I could put my money on it that that guy would get the job because this guy can get along with the crew, he can be taught by
the crew, trade skills, stuff like that. Whereas this other guy would, in theory, would cause problems, human-resources-wise I guess. It can cause more problems than it can good.

The research participants shared their thoughts and experiences involving teamwork that led to a discussion of the importance of problem-solving in the workplace. As part of this conversation, the students discussed the significance of troubleshooting, a specifically technical form of problem-solving.

**Problem-solving.** The students identified problem-solving as a skill that the students feel employers want. Jacob feels empowered to think in his WBL job but previously, his input was unwelcome.

It actually has changed, especially beforehand with my first original jobs, they were basically just looking for someone who could take orders, who could actually just, I guess, what's the right word... Be a puppet. They weren't looking for someone who could actually think forward and try to better something or make it more efficient. A lot of my other jobs, I was saying, "Hey, we could do this and be more efficient in what we do, save this amount of money, and be able to still abide by standards," but a lot of them were so set in their ways, and so set in the ways that the company gave them, so they were saying, "No, we can't do that," or "No, we can do this," even though above all, it would actually save them a lot of money in the long run, make them more money, and make their service more efficient. I've realized that they're not looking for people who can think for themselves or think to better the company or better the business, or better present them towards their higher up employers. While I'm doing this now, they actually expect me to do that. They don't expect me to just be someone who can take orders. They expect me to
be able to solve problems, to think through things, to actually help them become better 'cause it reflects good on your employers and your supervisors.

Andrew also indicated that one must be able to, “learn from your mistakes, troubleshootin', problem solving, stuff like that. Being able to assess stuff and then making adjustments on the job to fix it.”

The data presented within Sub-theme One highlighted the high importance placed upon soft skills by many of the study participants. Sub-theme Two captures the participants’ attitudes toward and experiences involving technical skills.

**Sub-theme Two: Technical Skills**

The students interviewed provided information they felt was important for employment as a technician. Although technical or “hard” skills were not included in the definition provided for 21st century work skills for this particular study, the researcher felt it important to capture the participants’ input regarding all of the skills they deem necessary for employment. The data gathered regarding technical skills are presented in two categories: technical knowledge and a willingness to learn.

**Technical knowledge.** Most of the students interviewed commented that they believe employers expect a certain level of technical skill. Jacob stated, “They basically just want to know if you have a concept of what you're about to do.” Sam agreed by saying, “They [the employers] are still looking for somebody that’s very technically sound.” Andrew views the need in this way:

I guess you have to be able to work with technology good and stuff like that. ‘Cause a lot of stuff is on computer now, so you gotta be able to handle technology good. I guess they would want somebody to know what they're doing.
Peter referenced the importance of understanding when he said, “Definitely, the hands-on stuff and knowing how the things work and not just knowing that you had to plug something in one position, knowing the background on why it works.” Luke believes that “knowing how to troubleshoot to find the problem” is essential to employment. Michael was more specific about the skills that he believes employers expect:

You gotta know the technical side to it too. You gotta have your multi-meter. You gotta have your tools. You gotta know which tool fits in what area. If you're gonna take something apart, you gotta know these things. That's essential for what you're gonna have to do. After I took that test, I know that you have to know what you're talking about, because they only take the best people. So studying on the technical part is real heavy, especially in the IET field, so they want the best people for the job.

While Michael stressed the importance of specific technical skills, Jacob connected technical skills to job performance. Jacob believes:

Performance is a key issue they have, such as, I've always heard this term whenever people get fired or just kind of like, I guess, wrote up is, “failure to perform.” Make sure that you can perform what you're doing and to the best of your ability.

Peter reflected on the realization he experienced when he was hired for WBL:

"Well, what do you already know?" And so, I wasn't exactly sure of what I knew. It was a big jump getting into industry. But... definitely, I didn't know that you had to come prepared for skills for a job. And teachers all the time are telling about, "You gotta know what the slip joint bearing is and how it works 'cause they might bring in parts and just be like, ‘Alright. Tell me about this bearing’ or whatever." I didn't think that actually happened, and it does apparently. So there's that.
The research participants understood not only the importance of entry-level technical skills but the importance of a willingness to continuously develop these skills and acquire new skills as technology changes.

**Willingness to learn.** Willingness to learn, especially in these technical fields is viewed as very important. Jacob expressed:

And of course, even though you may know something, always be learning.... Especially if you're in some sort of technological field, technology is always advancing. Make sure you're always learning, always keeping up with technology and current events and happenings that are not only in your area, like field of study, but also in the plant you're working at.

Sam was very specific in how he views what companies expect of employees and why:

Companies nowadays are more focused on the future than they have been in a while, whereas the dollar was basically a lot of people's motivation, I would say, especially in the past couple decades, focusing more on what they can make now with what they have now. Yes, advancing technology, but using as much as they can. Companies nowadays are more focused environmentally on the future and need employees that are as well.

Derek presented his thoughts about continuous learning:

I would say trial and error because you don't know it until you mess up at it, and then you only.... You can choose to improve yourself if you seek to, but you don't just wake up one day and just have all the knowledge about it.

**Conclusion**

The students interviewed strongly believe that employers are looking for technicians with technical skills but that the soft skills or 21st century work skills are the most important skills to
possess. The students that have worked in the field through WBL seem to have the greatest understanding that employers are seeking to hire technicians that have both the technical foundation needed to learn the specifics of a given position, as well as the soft skills or 21st century work skills that enable a person to communicate and work effectively with others. Students with the least amount of work experience are more limited in their understanding of the importance of possessing and developing 21st century work skills and seem to believe that their education will allow them to secure and maintain employment. The research revealed that many of the student participants held strong, well-articulated opinions involving the soft and technical skills necessary for employability and career progression. To situate this data within a context, the research explored the factors that influenced the participants’ development of these skills.

Superordinate Theme Two: Factors Influencing Skill Development

The second superordinate theme to emerge in this research study is factors that students believe influence their 21st century skill development. Interviews with students revealed that a variety of people and experiences have influenced their skills. The three sub-themes of people, experiences, and education will be presented.

Sub-theme One: People

Within the category of people, students discussed that family was the first influence on their 21st century skill development.

Family. All eight of the students referenced family as influencing their soft skill development. Jacob expressed:

My parents had a big part in trying to help me be successful and teaching life lessons. Not to be soft but be firm and assertive and also be able to work hard at what you do. ‘Cause
not everything was just handed to you. You actually had to work for what you were trying to achieve.

Sam indicated that his grandparents have high expectations and serve in a parental role. He continued to say, “My parents never did the best and, like I said, they're great people but made bad decisions. It really helped me learn that one bad decision can impact the rest of your life.” In the same vein, Peter felt that his mom tried to “raise him right” and that “an example [of hard work] was set and then definitely expected to be met.” Like Sam and Peter, Luke said his parents expected him “to be disciplined and to follow the rules.” Similarly, AJ indicated what his parents taught him:

My parents taught me. And I pick up on it real quick. Like what I need to be like... ’Cause I get kinda hyper sometimes, but I pick up real quick when I need to be. I mean going to church and all that. That's why I learned a lot of it. Speaking to older people, they love it when you respect them, so I always do... But my parents taught me a lot, just raising me right. That's basically how I learned most of it. You learn when to talk, when not to talk, “Yes ma'am, no ma'am, yes sir, no sir.” I was always expected to talk like that, and always respected people, but it's just the way that I was raised. It kinda comes natural when to talk and when not to, basically. And how to respect people.

Derek’s parents encouraged him to own and run his own business while still in high school. “They [my parents] were strongly for it. They enjoyed what I was doing or they liked that I was wanting to work.”

In speaking about their parents, several of the students discussed the expectation that they finish college and get a job. Michael relayed:
They expect me to at least finish college somewhere. When I finished high school, they already had me looking for colleges. And I didn't really want to at first, but my mama told me, she was like, "You can't sit and play the game all day. You gonna have to get out and get you job 'cause the world is not gonna be waiting for you." Ever since then, I had that work ethic going on with me, and my parents pushing me to do better.

Parental expectation also influenced Andrew. He stated, “Their goals for me is just to get a degree from college anywhere and I guess work. You gotta provide for yourself. You gotta have a job. You gotta work. Nothing's gonna be handed to you.” Luke’s parents expect him to “graduate and then go to be a maintenance technician.” Sam expressed sentiments similar to Luke and Andrew about wanting to please family when he stated:

I want them to have some kind of a feeling of accomplishment for their raising me, I guess. It's not really my sole driving force just to please them, 'cause it's my own life, but it definitely is a factor. It's something that I definitely want to do.... It drives me, and I think about it a lot. Definitely would like to make them proud.

People in the participants’ lives, particularly people in parental roles, shaped the students’ development of soft skills. Experiences played a similarly vital role in how the students developed and valued critical employment skills.

**Sub-theme Two: Experiences**

Students expressed that much of what they know about soft skills they learned through a variety of life experiences. This includes experiences in current or prior employment, WBL, high school, college career centers, sports, and church.

**Current or prior work experience.** Seven of the eight students interviewed have some work experience. Many of them have worked several different jobs. Sam reported:
I feel like from what I've gained in my past jobs, and just through learning at home, I know what to say and what not to say. If I think a joke doesn't sound appropriate in my head, I probably shouldn't say that outside 'cause it won't be welcomed there either. I do feel that the customer service mentality has helped a lot.

Peter discussed the importance of how one communicates:

When I got my first job at the grocery store, you learn real quick what you can and can't say. Both from customers straight telling you to your face. "You can't say that. You shouldn't say that," and with managers telling you, "Maybe don't say that," or, "Maybe just keep that to yourself," or something like that. There was a lot of skills learned in a small time frame, from getting the first job to coming here to college. I'd say I gained a lot of skills.

Derek expressed how he learned about communication through owning his own business:

With owning a business, talking to the customers, scheduling weeks in advance for bigger jobs, so you had to be prepared and let them know what was gonna happen. So you don't just show up at their house one day and them not expect it and working around their schedules and being flexible for them.

Interacting with people and having a good understanding of what employers look for is something that Andrew feels he has learned. He stated, “I'm working with people, interacting with different people, 'cause people have different issues or something. You gotta be able to take the problem and not blow up at 'em no matter what they do to you.” From working at the grocery store, Andrew believes that an employer “would want somebody to know what they're doing. I feel like I've always had a good understanding of what employers would want out of an
employee.” AJ expressed that jobs have taught him about what is important and about having a strong work ethic:

I've learned to not back talk a lot. Some is necessary, because sometimes you gotta get your point across. But learn to know what battles to pick. That's one of the constant things I see with people. They don't know what battles to pick. And just hard work. And it's hard to find good work these days. You can go talk to any farmer out here. It's hard to find somebody that will be on the job when you need them to be there, do what you need to be done, and have it done when it needs to be done. And it's not the air-conditioning jobs that I feel like that helped me. It's always the get out there in the dirt, sweating all day, back-breaking labor. That's what I always feel like grows me every time, and I love doing it…. I feel like those are the ones that teach me the most.

Michael explained that a lack of communication among workers made his fast-food job difficult. He also believes reliability and work ethic are paramount to employers:

If you show up every single day on time then I think somebody will take notice of that, that your work ethic is good and that'll definitely help you get promotions and stuff like that and plus that they know that you're reliable. They'll call you in if something goes wrong where you're working. You'll be the first one they call because they know that you're reliable, and I think most companies like that in people.

As detailed in the previous sections, people in the participants’ lives and the participants’ experiences created the framework for identifying, understanding, and developing 21st century skills. Several of the research candidates also cited WBL as a major influence on their skills development.
**Work-based learning.** For this research study, WBL is defined as part-time work affiliated with the college and is in the student’s field of study. Four of the research participants currently hold WBL positions in local industry. These students attend school full-time in addition to working part-time. Jacob is a technical scholar at an automotive manufacturer. He spoke at length about all that he has learned during his WBL experience:

It's helped me in the fact that it gave me an insight of what the job field is like, and it gives me, I guess, a chance to be able to gain experience in that type of field, 'cause overall, if they don't offer me the job, it looks good on applications seeing that... Other companies see it, "Oh wow, you worked for “xyz” for two years, and you got all these different types of training and certifications." Right now, I've actually got forklift lessons, so I'm actually certified to drive a forklift. Or I'm certified to rig up stuff for cranes. What else? I've taken PLC [programmable logic controllers] classes.

Jacob also discussed the company’s desire for him to “problem solve and think forward and try to better something or make it more efficient.” He went on to say, “So, the thing is, you're always gonna be learning no matter what. And you're always gonna be doing presentations 'cause I get supervisors coming around me, constantly asking, ‘Okay, why is this down?’” Peter echoed Jacob’s sentiments stating, “I definitely learned to try more things before I just say I can't do it. I was told once that they'd rather see you try and fail than stop and say, ‘I'm gonna fail.’ That they'd rather fix a mistake than they would walk you through it or whatever.”

Michael discussed working with people and learning how to get along with others on the job:

I've learned to make sure you take your time and make sure to get everybody involved, not just one person. You have to get along with everybody even if somebody has a bad
attitude toward you or something like that, you gotta deal with it or you have to pull them to the side like, "Hey, I know you've got a problem with me, we've both got a problem with each other but we're gonna get this job done so we can go home and go on about our business. We can't let what we have affect the whole group." I've learned that you have to work with all types of people. Even at my job, at my current job, there are people I don't like. I usually just try to stay to myself or not go around them, but if it's a time I have to work with them, I just put it to the side and make sure I get that job done.

Peter referenced a situation at his company, “Sometimes the boss would walk in when they'd be talking about something and he'd just be like, ‘Guys, can't be talking about this.’”

Peter summed up the hands-on learning that he has gained through WBL:

I've been able to see where things are, how to fix motors versus just seeing a picture of one and saying, "Oh this is a burnt coil on a motor." I can't grasp a picture, but I can grasp it if I can look at it and smell the burning, or see the flames coming out of it or whatnot. I'm not saying that's happened. It's not. But it definitely has helped to be able to visualize and to work on stuff that actually will have an impact on something else.

Similarly, Sam believes he has a better understanding of what skills and abilities employers want as a result of his WBL experience. While WBL had a powerful influence on several of the students in the study, research participants also cited the impact of high school and college experiences on their acquisition of employability skills.

**High school, co-curricular, and extra-curricular.** Half of the students interviewed for this research study referenced high school and college experiences as helping them to improve their understanding of 21st century work skills. Jacob shared:
I developed that a lot in high school. I took a lot of advanced English classes that helped me develop both my writing skills and my presentation skills 'cause we were always writing papers, giving presentations. And beyond that, I believe that going to... I went to the career center, and if I would have just applied myself a little bit more for the labs and such, I would actually be able to get college credit. But overall, I felt more enjoyment of being the fix-it guy for the class. I would work with the computers, fixing them, and trying to clear out bugs and stuff like that, fixing the printers and the equipment they had. And that's what gave me the idea, like I probably shouldn't be doing Bio-med, I need to be doing something with my hands, so I can actually get down to grit and try to solve a problem.

Michael believes that college helped him learn about opportunities. He expressed:

The college is definitely a good place especially for the people who try to help you get a job, like you [name] trying to reach out to these companies, I didn't know these companies exist. I think that a place like TriCounty Technical College helps you put yourself out there to these different companies that have technician jobs for us, but we don't really know about, and I love that at TriCounty Technical College, I swear. You have the bulletin boards and then you have the career center, the career fair, that all the career people come here looking for employees and that really helps out a lot because me not knowing the names of these plants, or the jobs that we go to, I'd be narrowed down to a few companies that I know. There's a whole bunch of other companies that have jobs out there.

Andrew echoed the sentiments of Michael when he commented, “The career fair they have here is a good opportunity to go around talking to people.” According to Peter:
TriCounty Technical College is really doing a lot already. The resources are out there with the mock interviews and the resumé building and all that stuff. It's just a lot of these students don't care enough. At the moment they're just like, "Oh, I'm here to get a degree. I don't need to know about mock interviews."

Michael secured an interview following the career fair last year. During that interview, he learned the importance of having a well written resumé and cover letter:

I know when I was doing my resumé and cover letter for, let me see, I think it was Top Electric, and I had given it to them, and we had talked through the interview and all that stuff, and he said, "Do you have a resumé? And do you know a little bit about Top Electric? Do you know where we started from and all that stuff"? And I'm like, "Not really, I didn't do any research." He was like, "Okay, well, let me see your cover letter." And I showed him my cover letter. This before Mrs. Jones [from the career center] had helped me fix it all and get all the mistakes right. He looked at it, and he was like, "Okay, I'm gonna put this right here." He put it to the side, and he told me that he'd call me back. They would keep in contact with me. He told me that the interview was over at that time, so I guess at that time he must've looked at my resumé and thrown it in the drawer 13.

In addition to curricular educational experiences, students in the study discussed the impact of involvement in sports on the growth of their soft skills.

**Sports.** When it came to experiences outside of school or home, several of the research participants referenced sports as influencing their soft skill development. Sam stated:

I've learned most of my hard work skills from football, playing organized sports, being a part of a team, learning that it's not about you. And it's more... It's a better decision to reach for a goal with a team of people that you can trust and that you can depend on,
rather than trying solely to do it yourself. You know, you against the world. It's a good idea that sounds good in theory but, in the end, it's good to have that good support group and dependable team to depend on.

Andrew also discussed how sports influenced his understanding of teamwork:

Teamwork, chemistry. You gotta be able to get along with people, even if you don't get along with them. You still gotta get along with them for the time being to get the job done. So I felt that's probably the most important thing sports probably taught me.

Derek felt he developed communication skills though participation in sports. “In high school I played soccer and ended up being team captain so I had to communicate with the team to get them, I guess excited, or ready for a game.” While sports influenced three of the student participants, others described the impact of church on their soft skills.

Church. Two of the students mentioned church experiences as influencing soft skill understanding. Jacob indicated that going on mission trips with his church was educational, as did AJ. He said, “I mean going to church and all that, that's why I learned a lot of it. Speaking to older people, they love it when you respect them, so I always, always do.”

Having explored various influences, such as people, experiences, WBL, sports, and church, upon the research participants’ understanding and acquisition of soft skills, the study examined the impact of collegiate experiences.

Sub-Theme Three: Collegiate Experiences

The students participating in this research study provided insight to their college educational experience, specifically, how the programs, a required employability skills class, and the instructors have all impacted their attitudes toward 21st century skill development. The participants also provided some insights into how they feel the programs could be improved.
Programs. The students interviewed are enrolled in one of two degree programs that develop technicians for industry. Industrial Electronics Technology (IET) and Mechatronics Technology share common required coursework for the first two semesters of a five-semester associate degree program. The following data analysis shares the students’ thoughts about the programs’ both soft and hard skill development as well as the perceived strengths and weaknesses of the programs. Jacob stated:

I feel like Tri-County is kind of ahead of the game…. I feel this is a good way to... If you have these skills beforehand, brush up on them and refine them, if not, it's a good way to get them. And also, especially with Tri-County Tech being a two-year college and focusing more on these trade skills or these associate's degrees, like I said before, that you can basically back up what you've learned with hands-on experience.

AJ spoke about the course selection in the IET degree program:

Just the classes I'm taking in general. They're gonna help me. Just y'all being organized and knowing what I should take. I'm really going off y'all's judgment on what classes I should take. That helps a lot because if not, I would be like, "Oh, I wanna take this class," and well, little did I know it has nothing to do with anything. The classes I'm taking, that's really what's gonna help you get your skills better.

Michael believes that the IET program has helped him communicate better:

I definitely got better at speaking. When I would speak to a person at home it's just like, "Hey, go get that. I told you to go get something like that." Or, "Say what?" But now, I slow down and comprehend what people are saying to me. I sell myself better when it comes to interviews.
Sam also feels that his written and oral communication skills as well as his problem-solving skills improved:

The presentation we had to give, the projects of trying to create documents, trying to create portfolios, and Excel documents on top of papers that we had to research and present for Reliability Centered Maintenance. And for troubleshooting-wise, we were presented with a problem, and we were required to fix the problem with, basically almost no information given, say, for instance, was it Power and Transmission class that I took, that's like, they gave us documentation, and what we're expected to do in the workforce is, just from that documentation, have a box of parts and make it work.

Many of the students referenced how the programs built their technical knowledge. Sam stated, “The technical aspect, especially of the Industrial Electronics degree, it is definitely a very well put together program.” Jacob provided an overview of the Mechatronics classes that he feels have helped him grow:

In considering TriCounty Technical College, what has helped me improve my 21st century work skills would be the Reliability Centered Maintenance class, the IDS class, and as and when it comes to showing and performance of what I can do and apply, all my other classes I've taken with the robotics, the motor controls, troubleshooting, especially troubleshooting, 'cause they gave me the basis behind the systematic approach of solving a problem that is what these companies are looking for.

Another student found circuits and trouble-shooting classes particularly helpful. Michael believes:

Circuits having been really beneficial. That EEM117 and especially troubleshooting, 'cause troubleshooting is what I see all the time when machines break down at the textile
finishing plant. I know that right there is definitely what you need. That, the circuits, and being safe.

The technical courses in the programs have a hands-on lab component. Andrew shared his thoughts on the labs:

I think the labs, they do a pretty good job in the labs. As far as you seeing what you're going to see when you go to work. And, I don't know, I feel like the flow of the program is... I guess they set it up how they figured it would be best for you to learn each semester. So I think that helps people.

Derek discussed how he is learning to work with others in his robotics class and lab:

With the robotics class I'm in right now, it's teaching you more the hands on so you're working with a partner. And if you see them doing something or they see you doing something that might not be correct, you definitely talk about it before you just continue to wire it up or program the machines. So you're talking to people about why you think it's one way and why they think it's the other way and then coming to a conclusion on what it actually is.

In addition to their direct experiences, related outside influences formed students’ opinions about the college curriculum. Michael took a test on campus for a company that was looking to hire technicians and gained the following insight about the curriculum:

I took the company’s test, and what was on it was definitely is what TriCounty Technical College teaches, like the circuits, parallels series, trying to get the voltage, trying to get the current, trying to get the power wattage and all that stuff, that's all on there. The test, like some of the questions on there, try to test you, like if you know stuff beyond what TriCounty Technical College is like, what they teach.
Luke feels that TriCounty Technical College is filling in some of the gaps that he has due to his lack of work experience. He stated, “Well, since I didn't have no work experience, then it’s helped me a lot knowing how to wire, program, and all those sorts of things I didn't have no clue what to do.”

Two of the students who have WBL experience feel that the programs could do a bit more to facilitate the learning of technical skills. Jacob wishes that the hands-on experiences were more challenging:

Kinda like more hands-on kinda things. For instance, like just one of my recent classes was Electronic Theory. I know we were able to work with Arduinos and overall, it was a good class, but I feel like we had the ability to do more than what we did with them.

Sam expressed similar feelings about wanting more projects that require the use of multiple skills:

Take all of this, everything that we've learned, and PLCs, all the different courses we've taken, classes we've taken, take those, combine them into one unit basically. And design different, have different projects for the students to, through the course of the semester to complete.

Study participants provided valuable data that explained the perceived impact of specific technical courses on employability. The students also offered insights into the relationship of specific curricular topics, safety and teamwork, to the development of employability skills.

**Safety.** Learning the importance of safety is an integral and critical part of becoming an effective technician. Two of the students commented directly about what they learned in their college courses have helped them understand the importance of safety in the maintenance field. Michael stated, “Being safe is definitely the number one thing that they teach you, 'cause this
field right here is pretty dangerous, and they put that first before anything, safety.” AJ was a bit more descriptive:

Don't horseplay 'cause you can get messed up. You learn a lot of safety, and that's key in a workplace, because if something does go wrong, it's their fault. It's the company's fault, and that's not... They don't want that. So safety is key, but you always learn if it's a hostile environment you should learn how to cope with it and how to get it back down to normal. I've done that before.

Sam indicated that he wished the college taught more about safety. He said, “Learning about lockout-tagout a little bit more, 'cause that's something that is very stressed in the industry that doesn't... It's brushed over when you go through the class.” Like safety, teamwork evoked strong reactions from several of the research participants.

**Teamwork.** Peter and Derek discussed how their classes helped them learn about teamwork. Peter bluntly stated:

I've learned just to kinda let some people fail. Even if you're part of the failing group, you're not gonna get the blame. You know 'cause if someone steps up and wants to... And they're very loud about wanting to do it their way, and you know their way is the wrong way, you kinda gotta step back and let them fail, and just be like, "I tried to tell them." So patience, I guess, would be a skill that I learned.

Sam referenced a general education class and a technical class that was instrumental in helping him work with others more effectively:

I'm in a psych class right now, and yeah, it's teaching you to do more of a team-based learning program or working in groups, so that is... It's the stuff I've done before, so I'm a little more familiar with it than just the one-on-one work, but learning how to work with
people and not just going off on your own and doing everything. The robotics lab I'm in right now, it's more of a team-based thing, all the other ones have usually just been go off on your own, and wire it up or get it done. This one you're having to work with partners, so you get the aspect of one person does one thing, and you do the other thing and making sure you know what the other person is doing and checking up on them and having them check up on you.

Following the discussion of collegiate and curricular experiences, students in the study were asked about a required course contained within both the IET and Mechatronics curricula, Employability Skills Development.

**Employability Skills Class (IDS).** Two years ago in response to industry requests that students have better employability skills or soft skill development, IET and Mechatronics developed and implemented a new course. It is a required course and all of the students interviewed for this research study have completed the course. Because of the size of the programs, there are multiple sections offered and multiple instructors. Based on student comments about their learning experiences, substantial differences exist in delivery of IDS. However, seven of the eight students indicate that the class had a profound impact on their attitudes toward learning 21st century work skills as well as the development of those skills. Jacob expressed his opinions about the class:

> I feel like my IDS class that I took, that one that helped me... It kinda gave me a refresher on what kind of skills I need to do interviews, presentations, for, when it comes to industry, and especially because of the job I work right now, it was able to let me brush up on Excel. We use basically nothing but Excel. Even when we're doing documentation, like writing stuff out, we use Excel documents, just so we have sections for signatures
and dates and stuff like that. So I feel like TriCounty Technical College is preparing me actually a lot better than probably any other college would at this time.

Sam shared similarly strong opinions about the IDS class. He stated, “The IDS course is very well taught, especially with Mr. Harris teaching it.” Sam continued:

That the IDS class really helped me with interview skills more than anything. It helped me really kind of open my eyes a little bit more to what an employer is looking for when they're giving an interview. Which I had a pretty good understanding of it beforehand, but that class really helped open my eyes to a little bit more of a broad array of interviewers, not just people that I'm used to.

Andrew provides similar information:

I feel like the employment skills class was probably the biggest development in that program. I feel that's probably good. If you could find a way to build off of that onto, I don't know, other areas. Preparing you for interviews, and jobs, and stuff like that. I learned some stuff out of there as far as interviews, how you should act, how you should dress, all that. I feel like that was a pretty good class that was introduced to some stuff, like talking to different employers. What you need to say, what you don't. And how you should be prepared, setting up a resumé, and all that stuff.

Luke provided similar information about what he learned about interviewing:

How to do an interview. That was one big thing I learned and, let's see. That was long ago. I can't remember. How to send emails, that's one thing I learned to be a professional person. How to... interview, how to do Excel, how to make spreadsheets and all that.
AJ expressed that he developed a better understanding of people's differences:

Mr. Harris’s class, IDS 106. It helped me a lot. Just realizing where everybody's coming from, 'cause everybody's coming from different backgrounds. Just like, "Okay, I have to realize you come from there. I realize you come from there. Well, let's work together."

So... I mean it's really about teamwork, but I've been strengthening my soft skills through all that, just opportunities and all that. Mock interviews and all, just stuff like that, just really strengthens them. And you get that... I don't know. Not courage. Well, I guess you could say confidence.

Other student comments regarding the IDS class stressed the importance of required presentations, exercises in communication and the role played by presentations and communication in building the students’ confidence.

*Presentations, communication, and confidence.* As part of the course, students are required to do a variety of presentations. Often the instructors invite industry professionals to come to campus to talk with students and provide insight into industry expectations as well as feedback on their presentations. Jacob expressed the following:

A lot of times we were doing presentations, we had to do the research behind the presentations, which I really enjoyed doing. I felt like that was a good thing to have.

Mr. Forest was actually able to get managers and supervisors from other different plants, all these major companies. They would come in and actually sit during the presentation and give us feedback on how to present, like do the presentation, the material we cover, and how we actually... And how they would improve on what we did. For instance, highlight the key points. Don't just rattle off every single bullet point.
In discussing the IDS class, Luke stated that he learned “how to stand up and talk to people and do all those kinda things.” AJ felt that the class helped to improve his confidence:

Confidence, there we go. To... "Yeah, I can see where I come from. And I see where I'm at." I definitely feel like I'm a better soft skills interview person than I was, 'cause I've learned what to do and what not to do. That class helped me out a lot. So, now when I go into an interview, I'm like, "Okay, keep calm. Chill out. I got it."

In his IDS class, Andrew gained a greater understanding of the importance of life-long or continuous learning:

We had a guy from an automotive supplier come in, talk to us, and tell us what they expected in the plant as far as when you get the job, you gotta advance every so often, or they'll let you go, 'cause you can't just get there and be stagnant in the job. So, it shows you gotta continue to learn the whole time you're working.

In preparation for the Annual Career Fair, Mr. Harris had students create an “I” speech. Students presented the speech to the class, were recorded giving the speech, and put the speech to real-world use at the career fair. The following provides the students’ perceptions about this assignment and its impact. Sam expressed:

We learned about when we created our "I" speech in the IDS class. And Mr. Harris really iterated on that, kinda made us develop our "I" speech, and 45 seconds to set the hook really. Work on that when you're out in public, you meet somebody, you introduce yourself, and it's in that first 15 to 20 seconds where you make an impression.

Peter really felt his communication skills improved as a result of the assignment:

I took that class, that employment skills class. There was a whole thing about a 45 second speech, or something like that. We had to tell about ourselves in 45 seconds. And we had
to cover a lot [of] stuff because after that no one really listens. So I learned that. I also learned that... Like, how to communicate as a group and how to be most effective with our communication.

The “I” Speech assignment really helped Michael overcome his intense fear of speaking in front of others and being recorded:

I was afraid to talk on a recording or sit in front of a bunch of people. I would just freeze up. I wouldn't really know what to say, 'cause it'd be three or four eyes on me, and I would just freeze up. But after doing that in front of my class, 'cause in a classroom you have 20 people looking at you, and I really got froze. I really froze up then. But after I kept on doing it, it got better, and I started learning to make sure you pay attention to everybody at the table.

Michael stated, “I definitely got better at speaking.” The visits from industry representatives helped AJ better understand industry and how to get your foot in the door:

The industry representatives are saying what they like about it [the job], and then what needs to be done. And they're also saying how to get into that position...But there's a guy from the energy company who really helped me, 'cause he come in and did a mock interview with us and asked us technical questions, showed us what it actually was gonna be like, what an actual interview would be like with them...It was very helpful.

Students in the study not only discussed courses and course content, they also talked at length about the instructors teaching these courses.

**Instructors.** Throughout the educational process, instructors can have incredible influence over students’ learning and success. This section in the sub-theme of education
addresses the students’ insights into their instructors and the impact they had on the students in regards to their attitude and employability skill development. Jacob states:

I feel that they are preparing me for a career, especially because the instructors are phenomenal. I love the instructors I've had so far, except for maybe like one or two, but that's... I don't think it's their fault 'cause a lot of times it was like pushed on them to teach a class or something that they really didn't want to teach.

Sam had very positive things to say about the impact of Mr. Harris:

That is one of the best teachers, no I'll say the best teacher I've ever had, in all seriousness. Because he really cares for his students. It was first semester, he knew my first and last name. First-name basis. He definitely is somebody that cares for his students. And he makes sure... He will take time out of his schedule. He will go way out of his way to help you and make sure you understand these things. And when it comes to teaching the employability skills, he made sure everybody got involved. In a cowboy up kinda way, he made sure everybody... He was slick about it, but he made sure everybody got involved.

Michael felt that Mr. Harris’s real-world approach to teaching had a huge impact on his understanding of what to expect:

I was in Mr. Harris’s class where he actually tried, he actually tried to make it uncomfortable for you so you'll get the real feeling out of it when you go to a real interview. He had everybody sitting quiet and all the chairs pointed toward you, people not saying anything and like a real mock interview. He told people to whisper something or turn their head, write stuff down, and it kinda makes you, you got that real feeling.
Building upon the theme at the core of Jacob’s, Sam’s and Michael’s comments, Derek expressed:

The teachers are very helpful, so if you have any questions, they'll help you out. I feel like we're getting a lot of hands-on experience with the labs that we do, and every single class has a lab that goes with it, so it's not like you're missing out on anything that I see.

AJ feels strongly that the instructors are preparing him for the workforce and appreciates that the instructors know him personally:

I feel like they're bettering me by getting me ready so that I don't jump in blind, not know what's going on. And I feel like they're just trying to do what's best for me, and I really like that. I'd rather go somewhere where the professors know my name than be in a crowd of a hundred people and nobody knows who I am. But that's how I feel.

Peter believes that instructors facilitate a learning process not just a feeding of information. He states, “Definitely when they just teach you about it and then throw you to the wolves, 'Cause that way it's not necessarily the teacher teaching you; it's the teacher helping you teach yourself.”

Two students commented on the impact and limitations of experience that instructors bring from their past personal employment. Peter said:

As far as like if the teachers know what they're talking about from experience versus just being taught themselves, most of the teachers here have some background in working in the field, which helps, but also it does put a damper on things because if they... So like, if one of my teachers was a manager for years and then became a teacher, he knows what’s going on for those years, not what's going on now. I do feel that I am prepared though.
AJ had the following to say about one of his instructors, “Mr. Harris was in the position I'm going to interview for, but he did it 10 years ago. And he told me, ‘Hey, this is what you're gonna go through.’ That means like, ‘Okay, alright, thank you, I appreciate it.’”

While student discussion yielded a wealth of data regarding courses, instructors, and related experiences, the students also offered ideas for improving the IET and Mechatronics experience at TriCounty Technical College.

**Student observations and suggestions.** The students had observations and suggestions on ways to improve the programs. Sam expressed his thoughts this way:

I believe that there's more focus on the theory aspect of the program than there is going into the workforce. I feel like the way that they have the theory being taught right now, I totally agree with it. It is very effective. But I feel like there is some different ways that we can deter the program or kinda change its course a little bit to kind of focus more on how to use these skills in the workforce. They're teaching us about these skills, and on paper we're perfect, but when it comes to actually doing the work, the hands-on stuff, is when it really could affect some people later on, especially people that come into the program with little to no experience at all working with their hands. So you can have some projects you would have to troubleshoot, and it would be a mixture of electrical components, motors, different kinds of valves, stuff like that.

Jacob discussed a time when the class was asked to share something. The experience frustrated him:

"Write something down on this test that you wish you can do in this class as a big project." Well, everyone wrote their stuff down. I was expecting we were actually able to do a big project, but as it came toward the end, we never actually did something like that.
I felt a little bit disappointed doing something like that because it was, in my Robotics II class and my troubleshooting class, we did big projects.

Peter feels that there are limitations to what can be taught in a classroom:

You can only teach so much in a classroom. There is so many more skills that have to be learned outside, either through hard experience or through parental guidance. Like being nice and letting people try things. You can't teach niceness or you can't teach attitudes in a classroom. That's something you have to develop through parents and just your environment around there.

Conclusion

Superordinate theme two: factors influencing skill development, is supported by three sub-themes: a) people, b) experiences, and c) education. The students have varied opinions regarding superordinate theme two and those opinions are widely influenced by their personal beliefs and lived experiences. Despite their differences, there is substantial commonality among the data gathered from the students. Family is the first and most powerful influencer of students’ initial understanding of 21st century work skills, even though it is learned in the form of treating others with respect, positive communications, and a strong work ethic. Part-time jobs and especially WBL are experiences that have the strongest influence on the attitudes of students’ understanding 21st century work skills. Those students with experience in the field had far more to say regarding their understanding and perceptions of what employers look for in a technician as well as expected work skills. As for the education the students are receiving at TriCounty Technical College, technically, they feel fairly well prepared through the IET and Mechatronics curriculum. Almost all of the students do acknowledge that they still have much to learn. The Employability Skills Class has had a measurable influence on their attitudes toward learning 21st
century work skills. The following statement by Peter sums up what should be one of the goals of education. He stated, “Maybe I should focus a little more on learning instead of just remembering.”

Superordinate Themes One and Two cataloged data formed around participants’ perceptions of skills necessary for employment and factors influencing the development of those skills. Superordinate Theme Three represents data describing the study participants’ self-assessment of these employability skills.

**Superordinate Theme Three: Self-assessment of Skills**

The third superordinate theme that emerged in this research study was students’ self-assessment of skills regarding their current and future 21st century skill development. The participants discussed their perceived individual strengths and weaknesses as well as their desire for continued growth and development. The following section presents three sub-themes of student strengths, student weaknesses, and student desires.

**Sub-theme One: Student Strengths**

The interviews revealed that the students believe they possess skills in communication and a strong work ethic.

**Communication and teamwork.** All of the students involved in the study indicated that they see communication as one of their strengths. Jacob stated, “I feel like I can actually perform well when it comes to presentations.” Sam said the following, “I feel like I've developed some pretty good soft skills, talking to people and kinda promoting myself. Derek, Andrew, and Luke all indicated that they believe communication is their strength. Peter declared:
I'm definitely a better communicator than most. I'm not afraid to get up and talk in front of people. I'm not afraid to talk to bigwigs of the company. I definitely would say I'm a better communicator, and I have better people skills than others.

AJ expressed his positive communication style in the following way:

I can get along with anybody, basically. I'm a people person, that's my strength. I can talk to anybody. I've never met a stranger. I can work with anybody, really. I can do... I mean, from farming to mechanical to... I can do a lot. I've just had a lot of experience, and that's what's really helped.

Michael also indicated an ability to get along well with others:

I can get along with mostly anybody. It's gonna be people that don't like you who's gonna have attitude. But I think that my attitude and the way I put myself out to people is mostly friendly, is bright. I think I can get along and work with anybody.

**Hard work.** Three of the students feel that they have a strong work ethic. Jacob stated, “I'm able to perform well in what I do. Even though I may be lacking in some areas, but I always know I can improve.” AJ presented several characteristics that make him a good worker:

I can be on time, definitely. Yeah, I feel like I'm a trustworthy person. I feel like a lot of people trust me with different things just from over the years of what I've done. Like I worked for a grocery store, and I got tired of it, really didn't like it. They wouldn't let me move around. They only put me in one spot. I was a cashier. So I wrote them a two weeks’ notice like letter, put it in an envelope, gave it to him. He's like, "You're the first person to actually give me a letter and say you're giving me a two weeks’ notice.

Andrew expressed the following about himself, “I’m a good learner. Quick. Fast learner. If you can show me, point me in the direction of a problem, I can figure it out. Hard worker. And I’m
good at technology 'cause I've grown up with that.” Related to the discussion of strengths, student participants also discussed their weaknesses.

**Sub-theme Two: Student Weaknesses**

The research participants were forthcoming about their perceived weaknesses in regards to 21st century skill development. Interestingly, all eight students cited communication as a strength, yet, half of the students also claim certain aspects of communication as a weakness. The four categories identified by the research participants as weaknesses are: communication, teamwork, personality traits, and technical skills.

**Communication.** Jacob had the following insight about communication:

One of my weaknesses I feel is, even though I can do well in presentations, for instance, right now, I'm thinking that I'm saying "like." I'm saying, "Um," and that's not good when you're presenting. You wanna be clear, and you want to be concise and properly speaking. I try to communicate with some people, but a lot of times I feel like I'm talking too much because I'm not giving them a chance to speak. You have to not only be able to speak but also be able to listen. That's another thing you need to be able to do. Even though I can listen well, sometimes I talk too much to be able to listen.

Like Jacob, AJ struggles with listening, “Sometimes I don't really listen. I like to do my own thing sometimes.” Andrew described his challenge with communication in the following way, “I guess one of my weaknesses would be going out of my way to talk to somebody 'cause I won't actually go out of my way to talk to somebody... But if I need to, I guess I can.” Luke initially stated, “I really don't have no weaknesses really, come to think of it” but as the interview continued he indicated, “I don’t think I am a good written communicator.” In addition to communication, two student participants identified teamwork as a weakness.
Teamwork. Students often have to work in pairs or groups, especially during the lab portions of class. Derek had the following insight into his weakness regarding teamwork:

My weaknesses is being able to go the extra mile to meet somebody in what they're thinking 'cause if I think it's right this way and they think it's right that way, it can be difficult sometimes to meet in the middle. I'm gonna have to be more open to it because there are going to be right ways and wrong ways and going into it I'm not gonna necessarily know everything that's right, so I'm gonna having to be willing to accept that people will know more than me, and I have to listen to them.

In relation to teamwork, Luke stated his weakness as, “Me trying to do all the work sometimes, or me contributing more than I should.” Students also saw particular personality traits as weaknesses or potential weaknesses in the workplace.

Personality traits. A couple of the students identified personality traits as weaknesses. AJ was very honest about something he believes is a weakness:

I'm a procrastinator. So obviously, if I'm procrastinating, I'm a little lazy. I'll say that. I'll always try and do it the easiest way possible, always. But if it comes to it, I will do it the right way, if necessary. But if I can figure out a way to do it easier and still get the same result, and it be okay... I'm gonna do that, definitely, all day.

Whereas AJ battles procrastination, Sam struggles with overthinking. He stated, “I think the overthinking aspect I could really work on. That, in my opinion, is my greatest weakness, I think. I'll overthink about things, something that it could be as simple as it is, I'll overthink it.” Students discussed soft skill weaknesses, such as communication and personality traits. They also described weaknesses in technical skills.
Technical or hard skills. Four of the students interviewed discussed their lack of technical skill as being a weakness. Jacob stated, “I want to learn more about what I do and be able to perfect my trade.” Peter feels his technical knowledge still needs to grow:

I do fail at my technical knowledge, because you know, I’ve been in customer service all my life. I'm not really... If something breaks it's not our job to fix it. It's always just, “Call someone else to fix it.” So it's been a lot of like, “What's the difference between... How can I look at a bolt and see that it's a 5 ml bolt versus a 6 ml bolt?” It's just stuff that I've picked up, but my technical knowledge is where I lack.

Similarly, Michael indicated a desire to do some re-learning:

It's just that some of the, I think, some of the technical part I still have to brush up on, and I'm going to do that. I'll make sure I re-learn everything I know from the beginning of when I started TriCounty Technical College to where I'm at now. I think I need to make sure I have all my stuff together, like all my technical part, my math, my English. I have to make sure I know all that. Definitely math. I don't really like math too much, but I know math is in industrial technology, and I know I'm gonna have to know that, just like simple math and stuff like that, stuff you can do without a calculator.

Luke thinks he needs to become a better troubleshooter. He stated, “Maybe my weakness might be troubleshooting ’cause sometimes I can't find the problem, I need to get my partner to help me out sometimes, and that's good in a group.” Research identifying strengths and weaknesses set the groundwork for a discussion of student desires.

Sub-theme Three: Student Desires

During the interview process, students were asked what 21st century work skills they would like to improve on as well as how they felt the college might be able to better facilitate
21st century skill development. This final section provides insight into the students’ desire to have continued education and develop their interpersonal communication skills. This section also shares student recommendations for the college.

**Continued education.** Five of the eight students interviewed developed plans for continued education and personal growth. Jacob indicates that he will seek two additional degrees at TriCounty Technical College:

My steps I plan to take is, of course, learning more about my field. And like I said before, even though that I'm required to go to school for two years, I'm actually going to fully enjoy it and take advantage of coming here and actually learning Industrial Electronics Technology (IET) and learning Industrial Management.

AJ wants to pursue a Business Management degree when he finishes IET. Michael plans to use interviews as a way to grow his confidence in speaking with others:

I'm gonna have to get better at not stuttering and just being confident in myself. I know that I'm gonna have to keep applying for jobs because at the job I have now, it's just not where I wanna be. It stops at a certain point, and it doesn't really get into my field so I'm gonna continue going to go to interviews, and the feedback I get from them is gonna be real life experience. I take an interview and I do poorly in it, then I know I have to change something around or I won't be getting a job. It's gonna be real life. You get this job or you won't be making any money to support yourself.

Peter indicated that he has already done some research about skills he would like to develop:

I've already started looking at skills to learn, certificates I can gain online or something like that. Just something to add to help buffer the resumé. I also wanna learn Spanish and French. French because the company I work for is a French company, and a lot of the
drawings are French. And Spanish because a lot of the workforce... A lot, a big part of people we work with are going to be Hispanic or of some Latin origin where they speak Spanish. So I'm definitely gonna wanna learn other languages. But I've also thought about coming back as getting another degree 'cause Mechatronics and IET are so close, it's like two semester difference or something. So I thought about coming back getting a second degree.

Andrew feels that work experience will be his best teacher. He stated, “I feel like a lot of the stuff that I feel like I'm not strong in, I'll get strong in eventually from work experience. I want to try and get an internship before I graduate.” Students went on to describe additional, more specific continuing education goals.

**Interpersonal communication skills.** Three study participants provided specific examples of how they would like to develop their interpersonal communication skills. Jacob had this to say about communication:

> When it comes to skills, such as communication, I work for a German company, and I see a lot [of] times these people coming in from Germany ordering from us and a lot of the supervisors that actually are over the whole company, like our vice president is German, and there's some of these supervisors that are in the scholarship program that are German. I feel that if I were to learn or be able to learn German or find a way to communicate better with them, I feel like I could get ahead, as in be one of the people they go to.

Jacob discussed a specific learning goal, while Luke shared the following:

> I said I was a good communicator, but sometimes I'm not. 'Cause I don't like meeting new people, but I will. I'll talk to anybody, but some people I just can't get to know that good. Working with somebody that I know is not contributing more than I am. I can't stand that.
Luke’s frustration with certain work relationships is balanced by Derek’s understanding that soft skills continuously develop. Derek expressed, “I'm always going to be working on interpersonal skills, 'cause you can never really master those skills. There's always going to be something else to learn. And then my technical knowledge is always gonna be improving.” As the research interviews closed, participants offered suggestions for improving the student experience.

**Student suggestions.** Several of the students provided suggestions to make the educational experience more impactful and comprehensive. Jacob proposed that the college offer language classes beyond Spanish and French. He said, “TriCounty Technical College should actually offer language classes on how to learn Spanish, French, German, Russian, stuff like that. A lot of these companies would have more faith in some of the employee.” Many of the companies in the TriCounty Technical College service area are foreign-based, and he feels students and employers would benefit from future employees knowing the company’s native language.

Peter would like to have had the opportunity to visit industry:

I'd love to see a plant tours. Because it's very difficult to conceptualize seeing a trainer that we have over here, being like, "Alright, where am I gonna see that in the real world?" In the real workforce how is that gonna look? 'Cause I had no experience going in. And so now I'm actually looking around, I'm seeing hydraulic pumps with engines attached to it and seeing these giant relays connected. I'd love to see where all this stuff they're talking about actually is.

Peter also commented on the college bringing in more industry professionals:

You could bring industry people in and sure, that would help, but I don't know if that would be the one-stop solution. It would definitely help to see a manager come in and be
like... Give them an actual interview with actual interview questions, and then be like, "No. I wouldn't hire you because you can't form a complete sentence and you don't know the ratio of these two gears to each other," and make it more important on just how much this will affect them.

To improve technical development, Derek suggested that the college provide:

More hands-on earlier in the curriculum. I would say yes because this is the fourth semester, and we're just now getting into this type of work, and then the previous three were more just by yourself. There was some [hands-on], but now I'm seeing it more in the later semester.

Jacob suggested that the IDS class be offered to other degree programs. Michael and Luke also feel that other classes in the curriculum should incorporate IDS style instructional techniques. In the IDS class Michael stated, “Either you conquer this whatever, you gonna finish it or I guess you just won't pass the course. You're gonna have to make sure that you get it. It was kinda crazy, but I got over though.”

Conclusion

The students interviewed in this research study desire to continue learning. Based on responses regarding continued education, several of the students would like to learn another language. Interestingly, TriCounty Technical College only teaches Spanish and French, yet many local companies are German-based. None of the technical programs have a foreign language requirement in the curriculum. The students do seem to have embraced the idea of becoming a continuous learner whether through additional formal education or on the job training and certifications. A few of the students have an awareness that their communication and interpersonal skills will need refinement, and they expressed willingness to pursue further
development in that area. In terms of students’ perceptions about what the college could do better, they want more hands-on learning in the technical curriculum and greater contextualization of how and where their skills will be applied.

Summary

This chapter analyzed the findings from eight semi-structured interviews with technical college students who had completed at least two semesters of a five-semester associate’s degree program in either Industrial Electronics or Mechatronics Technology. The theoretical framework of connectivism (Siemens, 2004) situated this research. Siemens built the theory of connectivism from the foundation of behaviorism, cognitivism, and constructivism, which are broadly utilized in the development of educational environments; however, they fail to take into account technology and the impact technology has on learning, communication, and how lives are lived. The students interviewed are digital natives, growing up with technology at their fingertips. Furthermore, they are entering a field driven by advancing technologies and automation. They must be prepared for the realities of a constantly evolving, ever-expanding global workplace. A restatement of the primary research question and sub-questions follows this conclusion.

Primary Question

What are the attitudes of technical college students who are entering manufacturing-related careers toward learning 21st century work skills?

Sub-questions.

- What skills do students view as necessary to become employable?
- Where and how do students feel that they have learned these skills?
• What experiences as a college student contributed to learning and being able to exhibit 21st century work skills?
• What role should the college play in developing these skills?
• What 21st century work skills do students feel need greater development prior to their completing college?
• What is the college’s responsibility in facilitating the development of 21st century work skills?

A summary of research findings follows the restatement of the research questions.

Findings

This study offered the students the opportunity to reflect on their knowledge and understanding of 21st century work skills, their past and future development of those skills, and what skills they believe employers seek in future technicians. Three superordinate themes and eight sub-themes that depict technical college student’s attitudes toward learning 21st century work skills emerged as a result of IPA analysis (Smith & Osborne, 2007). They are: 1) skills necessary for employment, 2) factors influencing skill development, and 3) self-assessment of skills.

This research study indicates that these students entering manufacturing or energy production-related careers believe they must possess a combination of soft skills and technical skills. The results undergirding the findings of the factors the students believe influence skill development are people, experiences, and education. The analysis of the student’s self-assessment of skills provides insight into their perceived strengths, weaknesses, and desire for 21st century skill development.
The findings indicate that the students understand that they must possess both a strong technical foundation and soft skills or 21st century work skills to become and remain successfully employed as a technician. The research participants identified that they need to present themselves well, to have a strong work ethic, to communicate effectively though both oral and written means, to work well with others, and to problem-solve. For both the technical and soft skills, the students believe that they must have a mindset of continuous learning.

The factors influencing skill development according to the research analysis are three-fold. Family, mainly parents, have the first and greatest impact on the student’s development of skills. The students’ upbringing and parental expectations play a guiding role in the initial understanding of soft skills. Students’ individual experiences led to various understandings of 21st century work skills and greatly impacted the student’s attitude toward learning 21st century work skills. IET and Mechatronics students who have WBL experience exhibit the most well-developed concept of the skills they need for employment and are the most motivated to grow and continue developing their employability skills. Other work experience, as well as involvement in organized sports also play a substantial role in 21st century work skill advancement. Formal education potentially has a powerful impact on students’ development of soft skills. The Employability Skills Class (IDS), when delivered successfully, provides a framework for students to understand and develop 21st century work skills in a safe yet challenging environment. The research analysis leaves no doubt that this employability course has unbelievable potential to prepare students for the 21st century workforce.

The self-assessment of skills by the students revealed both strengths and weaknesses. Effective communication was at the forefront of these skills. Several of the interviewees cited communication as a strength, while a few know that it is a weakness. In reading and evaluating
the transcripts, the researcher found that all of the students have substantial room for growth in both verbal and written communication skills. Teamwork, work ethic, technology, and technical skills were strengths for some of the students and weaknesses for others. The final sub-theme of student desires exposed that students have a strong desire to continue to improve their 21st century skills knowledge and abilities as well as to develop their technical foundation. Several of the students wish to learn a foreign language as a way to increase their value to their employer. Students suggested that the college can improve student soft and technical skill development by having more opportunities for hands-on learning, contextualizing the learning in a more real-world environment and focusing more on deep learning and understanding versus just the teaching and learning of facts.

**Validity and Trustworthiness**

The research participants self-selected to be a part of this study. The semi-structured interviews were conducted with eight participants who are traditional-aged college students from the same institution. They had completed similar coursework and yet have had a variety of personal and work-related experiences.

The participating students were provided a brief overview of 21st century work skills prior to the interview. The students were interviewed at a time and location of their choosing. Establishing integrity in data collection and analysis required that each interview was recorded with permission and then transcribed verbatim using a reputable and secure transcription service. The participants were provided the opportunity to review and edit the transcripts for authenticity and validity. Field notes were taken during and after the interviews to document the researcher’s observations. Furthermore, credibility was achieved as this research study utilized an established idiographic methodology, Interpretive Phenomenological Analysis, and a detailed description of
the researcher’s positionality for understanding the double hermeneutic sense-making. The following chapter provides a summary of the importance of the research study findings, how the theoretical framework and extant literature correlate to the current data, and implications for future practice.
CHAPTER FIVE: DISCUSSION AND IMPLICATIONS FOR PRACTICE

Organizationally, this chapter begins with the purpose statement of this current study, an overview of the qualitative approach used for analysis, followed by the identification of theoretical framework in which this research study was positioned. A summary of the study design along with a review of the research questions and findings are presented. Findings are detailed utilizing the lens of the literature review and the theoretical framework. Recommendations for practice and future research are identified in the conclusion of this chapter.

The purpose of this study was to determine technical college students’ attitudes toward learning 21st century work skills. This study employed an interpretive phenomenological analysis (IPA) to reveal the skills, people, and experiences that influence traditional-aged college student’s attitudes about learning and developing soft skills. Through an iterative, qualitative design, the researcher was able to uncover common themes from the analysis of the eight semi-structured interviews conducted with technical college students majoring in degree programs that educate individuals for technician roles in manufacturing and energy related industries.

Sieman’s (2004) theory of connectivism is the theoretical framework that situates this study. Connectivism has been presented as a learning theory for the digital age, with four key principles for learning: autonomy, connectedness, diversity, and openness (Tschofen & Mackness, 2012). Connectivism has its historical underpinnings in the educational theories of constructivism, behaviorism, and cognitivism. By researching how traditional-aged college students perceive the need for and development of 21st century work skills, college faculty and staff can gain insight into better educating the digital natives to meet the expectations of employers. Siemens (2008) has suggested that learning in the modern day occurs through network connections as individuals share their interests, knowledge, perspectives, opinions, and
expertise in online and virtual learning environments. While not all tenets of Siemens’ (2004) theory have been applied to this study, the concepts of connections, continual learning, and decision-making as it relates to learning 21st century work skills have been applied.

**Research Questions**

The study sought to answer the following research questions:

What are the attitudes of technical college students that are entering manufacturing related careers toward learning 21st century work skills?

**Sub-questions**

- What skills do students view as necessary to become employable?
- Where and how do students feel that they have learned these skills?
- What experiences as a college student contributed to learning and being able to exhibit 21st century work skills?
- What role should the college play in developing these skills?
- What 21st century work skills do students feel need greater development prior to their completing college?
- What is the college’s responsibility in facilitating the development of 21st century work skills?

The study consisted of eight semi-structured interviews with traditional-aged technical college students who are majoring in Industrial Electronics or Mechatronics Technology and have completed at least two semesters of a five-semester degree program. The students self-selected to participate in the study. Coding and analysis of the data presented in the interviews resulted in three emergent themes. The themes that emerged from the analysis of the data resulted in key findings that are described in detail in the next section.
The literature review proffered in Chapter Two details studies and data that corroborate the findings of the present study in regards to student attitudes toward skills perceived as necessary for employment, experiences that enhance learning 21st century work skills and assessment of their own skill development.

The organizational structure of the remainder of this chapter has been established to describe how each finding of this study is aligned with the literature and how it is situated in the theoretical framework. Any contradictions and clarifications of the current study findings with regard to the literature are discussed. The implications of the findings and recommendations for practice are presented and finally, future research is suggested.

**Presentation of Key Findings**

Three themes that contribute to the understanding of student attitudes toward development of 21st century work skills in technical college students entering technician positions in manufacturing and energy production industries emerged from this research: skills necessary for employment, factors influencing skill development, and self-assessment of skills. Skills necessary for employment sub-divides into themes of soft skills and technical skills. Student conversations separated factors influencing skill development into three subordinate areas of discussion: people, experiences, and education. Further, the self-assessment of skills neatly segregated into three subordinate conversations: student strengths, student weaknesses, and student desires.

The use of semi-structured interviews and an iterative data analysis process revealed the above themes and sub-themes and led to the key findings that follow.
Skills Necessary for Employment

In an effort to determine student attitudes toward learning 21st century work skills, it was important to ascertain what skills the students believe they must possess to become and remain employed in their chosen career field. As technical college students, there is a strong emphasis on subject specific knowledge that graduates must have as a foundation for becoming a technician. However, it has become increasingly important for students to exhibit soft skills as well. Employers have indicated a desire that new graduates have both technical and soft skills. The nature of work in industrial production has shifted to positions requiring the higher order skills of communication, problem-solving, and reasoning (Grubb & Lazerson, 2005).

The current research study found that students understand that they must have both well-developed soft skills and a solid technical foundation. This finding is supported in the literature. Even middle-skilled jobs, such as those in manufacturing, require both postsecondary education and the critical thinking and analytical skills that facilitate worker adaptability in an ever-changing workplace (Mellander, 2013). Often, those in academia perceive that employers want graduates with specialized academic skills when in reality employers maintain that their greatest need is for employees to have basic employability skills (Rosenberg et al., 2012).

Students in the current study identified categories of specific 21st century work skills that they believe they should exhibit. They should be able to interview and present themselves well to an employer, have a strong work ethic and a good attitude, be able to communicate effectively, get along well with others, and have well-developed problem-solving abilities. These discoveries are supported in the literature. Rosenbaum (2002) suggested that work habits are better predictors of job performance than academic skills. In recruiting new graduates, employers tend to place a high value on social skills, attitudes, and motivation (Saunders & Machell, 2000).
As students, the subjects in this study are focused on becoming employed and thus expressed a strong desire to interview well. The ability to present themselves to potential employers in a positive way is discussed heavily in the Employability Skills class that each student has taken. This particular finding was not supported specifically by the literature review but does nod to the concept of employability. A strong work ethic and good attitude, which was identified by all of the research participants as important, was supported in the literature as a priority for employers. Employers want new graduates able to work in teams, communicate effectively across all levels of an organization, participate in and facilitate conflict resolution and negotiation, display leadership qualities, build positive relationships, develop good decision-making skills, self-regulate, and display a positive attitude and work ethic (CEO Forum, 2001; Ingols & Shapiro, 2014; Robles, 2012).

The literature is replete with evidence that business and industry want employees that are effective communicators and have the ability to work well with others. The CEO Forum (2001) identified one of the 21st century skills that students need to be effective employees as, communication (teamwork/interpersonal/collaboration, personal/social responsibility, interactivity). In the current study, all of the students indicated that communication skills and collaboration are vitally important. The students referenced labs as the time when they have the opportunity to collaborate with other students, but often they feel they lack the skills or maturity to truly work well with others. Unfortunately, Leveson (2000) stipulated that oral communication skills, which are highly valued in industry, are rarely fostered or assessed on a collegiate level. This study’s findings bore this out. With few exceptions, within the curriculum, the students perceive that their opportunities to develop good communication skills are limited in the academic setting. The study participants did indicate that work experiences have helped them
improve their communication and collaboration skills. This is especially true for those students participating in WBL.

Within industry, technicians are expected to be good trouble-shooters to solve the technical problems faced on a daily basis. Two of the students referenced the importance of problem-solving or trouble-shooting in their interviews. A wonderful opportunity exists to help students develop problem solving skills through the facilitation of a guided reflective process in which they are able to fully appreciate the transferability of effectively solving daily, academic, and work problems. The literature indicates a need for this type of ability. There is a belief among politicians, educators, and business leaders that students need 21st century skills, such as critical thinking, problem-solving, information literacy, and global awareness to succeed in the changing world economy (Rotherham & Willingham, 2010).

Students expressed a strong willingness to continue learning and developing their technical and 21st century work skills well past their initial college experience. Their specific desires will be discussed later in this chapter. The attitude that students exhibit toward continuous learning is imperative to the concept of employability. According to Cox and King (2006), employability indicates that a person has the capacity to acquire the skills to do the work required, even if they are unable to perform the work immediately or without additional training.

The ability and desire to continuously learn is imperative in the theory of connectivism that situates this research study. The theory begins with the individual, while leaving space for human agency (Bell, 2011). The four key principles for learning in the theory of connectivism are autonomy, connectedness, diversity, and openness (Tschofen & Mackness, 2012). The skills necessary for employment identified in the current study and in the literature review, strongly reflect the following tenets of Siemens’ (2004) connectivist theory:
• Learning is a process of connecting specialized nodes or information sources.
• Capacity to know more is more critical than what is currently known.
• Nurturing and maintaining connections is needed to facilitate continual learning.
• Ability to see connections between fields, ideas, and concepts is a core skill. (p. 4)

Recognizing that the core interactive and personal attributes that employers are looking for include problem-solving, the ability to think critically, be innovative, and possess the interpersonal skills that allow for communication, collaboration, and teamwork can help students and colleges better focus their learning on the skills that are most important (Harvey, 2000; Hodge & Lear, 2011).

The following section gives an overview of the factors that students in this research study identified as contributing to their 21st century skill development and how those findings are situated in the current literature.

**Factors Influencing Skill Development**

The three categories of people, experiences, and education were identified as the factors students believe influenced their development of 21st century skills.

Family was seen by students as the first and most powerful influencer of their skills that are foundational to 21st century work skill development. Each of the students in the study expressed some degree of parental or guardian expectation of good behavior, a work ethic, and attaining education and gainful employment. The literature review in Chapter Two did not reference any studies related to parental influence or guidance in regards to 21st century skill development.

The second category of factors that influence skill development is experiences. Within this category students believe that work experiences and especially WBL have contributed
greatly to their 21st century skill development. Interactions with the College Career Center, participation in sports, and other extracurricular activities facilitated soft skill acquisition.

Work experience most enhanced the ability to communicate more effectively according to seven of the eight students in the study that have had some type of formal employment. Working students gain insight into a larger world of employment. Even if it was not in the field they want to ultimately work in, they are exposed to the demands and expectations of avocation.

The current study as well as the literature strongly supports that students involved in structured work-based learning experiences exhibit better developed work skills. WBL benefits students by allowing them to put into practice the skills they are learning in the classroom, thus making learning more relevant and meaningful (Brennan, 2005). Four of the eight students interviewed for this study participate in WBL. Their understanding of the need for technical and soft skills was much more developed than the non-WBL students. They expressed an ability to synthesize what they are learning in the classroom with what they are learning on the job and articulate where they see cohesion and gaps. The literature supports this finding. WBL experiences provide the type of high level learning that supports people as self-managing and self-directed learners (Lester & Costley, 2010).

Research participants indicated that experiences in high school and with the college Career Center allowed them to become better written and oral communicators. The literature strongly supports the role that career centers play in developing the employability skills of students. College career centers can play a vital role in student’s preparation for the work-force (Rae, 2007). Career counseling, resumé preparation, mock interviews, campus visits by employers, career fairs, and workshops are the services provided by career center staff at
colleges that facilitate the introduction and understanding of 21st century work skills (Andrews & Russell, 2012).

Participation in sports and church activities were identified by several students as important to their attitudes toward developing soft skills. Being a part of something larger than oneself helped research participants develop a strong work ethic and better communication skills. These activities fostered a respect for others. There was no mention of sports and church and in the literature review conducted for this study.

Based on the interview data, the students believe that TriCounty Technical College does a good job of technically preparing them for industry. Dede (2009) indicated that technical proficiency in addition to troubleshooting systems and applications is a key subskill for 21st century learners; yet, the typical higher education learning environment does not lend itself to problem-solving or troubleshooting. The research participants indicate that their understanding and development of 21st century work skills, especially teamwork and communication, have improved as a result of participation in labs as well as curricular expectation. The required employability skills class had a major influence on the students in this study.

Instructors have a huge capacity to influence 21st century skill development in students. According to the research participants, they feel that instructors are preparing them for a career. All of the faculty members in the Industrial Electronics and Mechatronics programs have industry experience and are therefore capable of sharing their firsthand knowledge of the students’ chosen career field. Mr. Harris was cited by the students that took his Employability Skills Class as someone that will take time outside of class to make sure students understand the material. Knowing student’s names and showing genuine concern for them and their development made a positive difference in their educational process. The literature review
advocates that faculty members become more facilitator than instructor, guiding students in the
discovery process of their own learning, with some indicating that teachers and students share
the responsibility for the knowledge production that occurs in the classroom (Greenlaw, 2015;
Ryan, 1999). Several of the instructors are adapting to a more facilitated and person-centered
learning environment and the gains noted in the research for this study demonstrate that students
do learn best in this type of setting. Carl Rogers (1945, 1979) indicated that the individual has
within themselves the ability to alter basic attitudes, self-concept and to self-direct behavior
when there is a climate of acceptance, authenticity and positive understanding.

Three of the research participants desire that the curriculum become even more realistic
and hands-on. The students feel that they learn best by doing. Active learning has direct carry-
over to the world of work. The participants in the study conducted by Hassan and Maharoff
(2014) indicated that leadership communication skills and competencies improved through
participation in active learning strategies as did students’ ability to use new skills and
information. Although TriCounty Technical College utilizes some problem-based learning,
especially in the capstone courses, the students in this study would like to have these types of
learning experiences earlier and more often. The literature supports problem-based learning as a
form of active learning where students construct knowledge and engage in inquiry and problem-
solving, typically in a collaborative framework (Edens, 2000). Harvey (2000) believes an
important step in the process of imbedding 21st century skill learning in technical college
students is to inform learners of the intended outcomes of their educational experience whether
holistically or within a class.
The theoretical framework of Connectivism supports the factors that the students identified as influencing their skill development. The following tenets of Siemens’ (2004) theory situate the findings from this section:

- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision. (p. 4)

The people, experiences, and education of the participants in this research study had a strong influence on the student’s attitudes and behaviors toward developing 21st century work skills. The literature review as well as the theory of connectivism support most of the findings from the data. The following section discusses the findings related to the self-assessment of students’ skills.

**Self-assessment of Skills**

The final section of findings in this research study discusses the self-assessment of student’s skills, which is broken down into the three sub-categories: student strengths, weaknesses, and desire for growth and development.

During the data collection, the students described their strengths as communication, work ethic, and technology. All of the participants believe they possess the ability to talk with others and communicate effectively in some regards. The need for strong communication skills is supported in the literature. The CEO Forum (2001) identified communication (teamwork/interpersonal/collaboration, personal/social responsibility, interactivity) as a 21st
century skill that students need to be effective employees. Some of the students indicated that the ability to work in teams or get along well with others is part of their communication strength. According to Robles (2012), the need for interpersonal skills ranks above the need for academics, technical skills, and hands-on training.

A few students cited a strong work ethic as a strength. In the interviews, this is supported by the fact that seven of the eight students are working in addition to attending school full-time. Work habits are better predictors of job performance than academic skills (Rosenbaum, 2002). Unfortunately, some of those in academia perceive that employers want graduates with specialized academic skills, when in reality employers maintain that their greatest need is for employees to have basic employability skills (Rosenberg et al., 2012).

One student shared that he is strong in technology. As the world of business becomes more networked and dependent on technology, the ability to adapt to changes and engage in continuous learning will be imperative. The theory of connectivism suggests that learning in the modern day occurs through network connections as individuals share their interests, knowledge, perspectives, opinions, and expertise in online and virtual learning environments (Siemens, 2008).

Students in this study identified their weaknesses as communication, teamwork, and technical skills. The researcher found it interesting that some of the students cited the same skills as weaknesses as they did strengths. Several students identified an unwillingness to go out of one’s way to talk to people and not listening effectively as weaknesses. According to two of the research subjects, the ability to work well in teams is compromised by not allowing others to share their opinion or trying to do too much work alone. The literature is clear that communication skills are lacking in employees. The National Association of Manufactures’
(2005) Skills Gap report determined that over 50% of the respondents indicated that employees lack basic employability skills with the lack of effective communication skills being the most prevalent. An ability to communicate effectively can be taught and learned in the higher education setting, but it must be done so intentionally. Hassan and Maharoff (2014) suggested that group work in the form of problem-based learning, when facilitated effectively, has the potential to teach students the valuable transferable skills of team-work, self-directed learning, communication skills, and prioritization.

Three of the research subjects expressed that their technical skills need more development. To mitigate this need, educational approaches should shift from an emphasis on teaching to learning (Grimson, 2002). Dede (2009) indicates that technical proficiency in addition to troubleshooting systems and applications is a key sub-skill for 21st century learners, yet, the typical higher education learning environment does not lend itself to problem-solving or troubleshooting.

The research captured students’ desires as they relate to 21st century skill development. The three areas that emerged are continued education, communication and interpersonal skills, and student recommendations. Several of the students want to pursue additional formal education to expand their knowledge and make themselves more marketable. The literature did not directly speak to the need for more formal education; however, there is indication that graduates must engage in continuous learning to remain relevant in today’s workforce. Jacob, Luke, and Derek expressed a desire to improve their communication and interpersonal skills. The literature supports the ideas that the research participants expressed. There seems to be broad consensus among practitioners that college graduates today need to possess strong interpersonal skills, be adaptable, driven, and able to conceptualize and readily use information (Eisner, 2010). In
recruiting new graduates, employers tend to place a high value on social skills, attitudes and motivation (Saunders & Machell, 2000).

The research participants expressed things that they would like the college to change, improve, or do more of. There are many foreign-owned companies in the area and a few of the students expressed a desire to learn a foreign language to better serve these employers. One student suggested that more industry site visits would help students understand how learning in the classroom is applied in the field. Similarly, one research participant proposed having more industry professionals visit class and engage students with knowledge of workforce expectations. A recommendation was made that the programs be more hands-on as well as incorporate techniques from the Employability Skills Course into other classes in the curriculum. The literature supports establishing and maintaining open and highly communicative relationships between higher education and business and industry if both are to be successful in reaching the goal of highly employable graduates. By developing programs that integrate academic and professional learning that connect classrooms to the workplace in mutually beneficial ways, it is possible to strengthen occupational preparation and academic learning (Grubb & Lazerson, 2005).

**Conclusion**

Findings indicate that students in the Industrial Electronics Technology and Mechatronics Technology Programs at TriCounty Technical College have a positive attitude toward learning 21st century work skills and view these skills as necessary and relevant to gaining and maintaining employment as technicians in manufacturing and energy related fields. The students believe that they must possess the hard, technical skills typically taught in the classroom as well as the soft skills or 21st century work skills of presenting themselves well to employers, having a
strong work ethic and good attitude, communicating effectively verbally and through the written word, capable of working collaboratively, and problem-solving. Students believe that a strong willingness to learn undergirds these skills.

The students feel that they have learned about 21st century work skills as a result of parental influence, experiences, which include jobs, work-based learning, interactions with career services, and participation in sports and church activities. Their experiences with formal education and the interactions they have with their instructors play a role in hard and soft skill development. The Employability Skills Class has been one of the most influential factors to help students understand and internalize 21st century work skills for those participating in this study.

The research participants believe they are good communicators, have the ability to get along with others, and are willing to work hard. Some of the students feel that their communication skills still need work, especially the ability to listen. True collaboration is a skill that the subjects indicate needs more development. Students also feel like their technical ability could be improved.

According to the research, students perceive that the college does a good job of preparing them for the workforce but that there is room for more facilitated learning of 21st century work skills. The opportunity to solve real-world problems, engage with more hands-on learning, visit industry, and have industry professionals visit campus, were all recommendations made by the students in this study.

Recommendations for Practice

The following recommendations for 21st century skill development that emerged from the current study are important, as they indicate that technical college students have some awareness
of the skills employer’s desire in new graduates. Higher education, in conjunction with business and industry has the opportunity to develop these necessary skills.

The findings in this study indicate the following:

- A comprehensive approach to employability in higher education may best facilitate the learning and internalization of 21st century skills. The focus on employability should permeate curricular and co-curricular offerings. Employability education should begin early in the educational process and be mapped into the programs through the collaborative efforts of career center or work-based learning staff, faculty, and business and industry partners.

- Students should engage in WBL whenever possible because students who do so have a more thorough understanding of 21st century work skills and the technical skills that are needed for employment. They seem to develop these skills at a faster pace than their non-WBL classmates. WBL allows students them to put into practice the skills they are learning in the classroom, making learning more relevant and meaningful.

- Within the college environment, 21st century skills must be taught explicitly. Setting and maintaining high expectations of student behavior has transferability to the work place. Facilitating the use of student reflection is a powerful strategy that students indicate gives them a sense of self-direction and initiative as well as the motivation to move forward toward their goals (Quieng et.al, 2015).

- Students who have work experience as well as those who have played sports or been involved with church-related activities understand the necessity of exhibiting 21st century work skills. Therefore, students should be encouraged to engage in
either WBL, part-time employment, volunteerism or extra-curricular activities during their college years.

- Students believe they learn best by doing. Colleges need to provide more opportunities for student to work hands-on by employing the following instructional methods: Problem-based learning which allows students to work in collaborative groups to identify what they need to learn through facilitated problem-solving (Mansor et al., 2015); Capstone courses that often bring together different elements within a program of study allowing for integration of knowledge across the curriculum; Facilitated learning is a method where instructors are more facilitator than “sage on the stage” guiding students towards knowledge acquisition; Meaningful work experiences, preferably in the student’s field of study.

- Colleges, business and industry should partner more intentionally to develop students into the employees of the future.

- Students expressed a desire to improve their written and oral communication skills, their ability to work collaboratively, and their technical skills. The required Employability Skills Course (IDS) appears to be an effective way to introduce 21st century skills as well as provide some opportunities for practice. TriCounty Technical College should continue to refine the IDS course as well as imbed opportunities in the technical curriculum which reinforce and assess 21st century work skills.

- Professional development must occur to teach faculty members about the importance of 21st century skill development in technical college students.
College personnel must be empowered and encouraged to exhibit 21st century skills as well as to embed strategies into existing curricular and co-curricular offerings that foster student’s soft skill growth.

The current research study may benefit educators at all levels but particularly those in higher education. Business and industry have been clear on their expectations of new graduates. Higher education, specifically technical colleges, have long focused on preparing students with the hard skills needed for the workforce. While technical skills are vital, 21st century work skill development is crucial. Graduates need these skills to acquire and maintain employment in their chosen field as well as to engage in long-term career management. It is imperative that academia embrace 21st century skill development as passionately as they do their discipline-specific material. Facilitating the learning of 21st century skills for students should be pervasive across the educational experience, beginning with application to the college and continuing past graduation. This holistic approach to employability requires a culture shift and buy-in from administration, faculty, staff, business and industry leaders, and students. While the above recommendations could benefit students, higher education, and business and industry constituents, there are limitations to this study, whereby this research could be expanded.

**Limitations**

Limitations of this study include how forthcoming the students were in their responses. Students may have limited or embellished their remarks as a result of self-consciousness about their experiences or knowledge. The small sample size also limits this study. The students who chose to participate were all male, six of whom are Caucasian and two are African Americans. The participants were all traditional-aged college students ranging in age from 19-21. Each of the programs host a wide variety of age groups, with many students having years of work
experience. The study focused on a technical college in South Carolina with a robust manufacturing and energy production base. Well-established WBL opportunities abound for students seeking these two technical degrees. This may not be the case in other areas of the state or country.

The data collected through semi-structured interviews with the students sought answers to questions that represent only a moment in time. Despite asking questions about the students’ past experiences, the responses called upon the students’ memories. The fact that the participants self-selected may indicate a greater willingness to engage with and have buy-in when it comes to their attitude toward 21st century work skills. The researcher is employed at the college where the study was completed. Student responses may have been colored by a pre-existing relationship or a desire to impress the researcher.

**Recommendations for Future Research**

Several suggestions for future research are recommended as a result of this study. Additional students from TriCounty Technical College enrolled in one of the two degree programs utilized in this study could be interviewed. A broader age range, greater ethnic diversity, and female participants could potentially provide a more comprehensive sample thus providing results more indicative of all students’ attitudes toward learning 21st century work skills. The study could be carried out at TriCounty with students majoring in other degree programs, thereby capturing data from students without access to the Employability Skills Class. Partner with other technical colleges in the state technical college system to expand the research across South Carolina in an effort to develop a more skilled workforce statewide. The research could be conducted at other technical colleges or four-year institutions locally or nationally.
A follow-up research study could be instituted with the original participants once they have been in the workforce for a period of time. This type of follow-up could provide even greater insight into the skills actually needed for employment, insight into the former students’ growth of and insight into any shift in attitude toward 21st century skill acquisition. Furthermore, the suggestions that the graduates provided regarding how the college can best facilitate 21st century skill acquisition would be grounded in first-hand knowledge of employer expectations and their lived experiences.

Creating a pre- and post-survey for use with the students who complete the Employability Skills class each year could help discern to what extent the course impacts 21st century skill development and what discrepancies exist between the outcomes when different instructors are teaching the course. The data could also guide the college about potential 21st century work skills curricular development in all degree programs.

**Conclusions**

Employability for college graduates has become multifaceted and complex. The technical college has as its charge development of a workforce that is knowledgeable, capable of continuous learning, able to adapt quickly while being flexible and willing to shift jobs and careers in a high tech, globally driven economy (Dede, 2010). The shortage of highly skilled employees to fill the skills gap created by aging baby-boomers and a robust, domestic manufacturing environment must be addressed. Technical colleges must be about the business of creating and nurturing “purple squirrels.” Recruiters refer to candidates with the right combination of technical skills, soft skills, and experience as “purple squirrels.” By researching traditional-aged, technical student attitudes toward learning and exhibiting 21st century work skills, a small gap in the literature has been filled. With the right types of instruction and
guidance from parents, colleges, and industry, students can understand the expectations employers have as well as learn and refine 21st century work skills during their college experience. Developing curricular frameworks that encourage students to make connections between work experience, subject matter knowledge, and its social, technological, and cultural context is an important step for colleges to take (Guile & Griffiths, 2001). Facilitating the development of these non-tangible skills will require culture changes in academia, expanded partnerships with business and industry, and greater involvement of students in their own learning outcomes.
Interview Protocol Form

Institution: Tri-County Technical College

Interviewee: Student #

Interviewer: Cheryl Garrison

Research Question:

1. What is the attitude of traditional-aged, technical college students entering manufacturing-related careers toward the necessity of attaining 21st century work skills?

Part I: Introductory Session Objectives (5-7 minutes): Build rapport, describe the study, answer any questions, and get the informed consent form signed.

Introductory Protocol

Thank you for agreeing to participate in this research study about 21st century work skills. This research project focuses on the attitudes of traditional-aged technical college students surrounding the learning of 21st century work skills and student perceptions about the ways that those skills are learned.

Because your responses are important and I want to make sure to capture everything you say, I would like to audio record our conversation today. Do I have your permission to record this interview? [if yes, then I will thank the participant, let them know that I may ask the question again as I start the recording, and then I will turn on the recording equipment]. I will also be taking written notes. I can assure you that all responses will be confidential and only a number identifier will be used when quoting from the transcripts. I will be the only person privy to the audio file, which will be destroyed after it is transcribed. To meet our requirements regarding human subjects at the university, you must sign the form I have with me [provide the form]. Essentially, this document states that: (1) all information will be held confidential, (2) your participation is voluntary, and you may stop at any time if you feel uncomfortable, and (3) we do not intend to inflict any harm. Do you have any questions about the interview process or how your data will be used?

This interview should last about 45-60 minutes. During this time, I have several questions that I would like to cover. If time begins to run short, it may be necessary to interrupt you in order to push ahead and complete this line of questioning. Do you have any questions at this time?

Part II: Interviewee Background (5-10 minutes)
Objective: To establish rapport and obtain the story of the participants’ general understanding of this research topic. This section will be brief as it is not the focus of the study.

A. Interviewee Background

1) Please tell me a little bit about yourself: your major, semester term, career goals.

2) Tell me about your family. What your parents do, their expectations of you now and for the future.

3) Tell me about your work experience.

Part III: (remainder of time)

I am interested in learning about how prepared you feel to enter the workforce and your attitude toward learning 21st century work skills. I would like to hear about your perspective of what types of expectations industry has for new graduates and your own personal development of those skills. I also want to understand how Tri-County Technical College can help with that skill development. I am going to ask you some questions about your experiences regarding school and work. If you mention other people, please do not use names. Say that you are giving the person a pseudonym.

Interview Questions:

1. Please explain whether you feel that Tri-County is preparing you for a career?

2. How do you feel this is happening?

3. What skills do you view as necessary to become successfully employed?

4. Share with me your understanding of 21st Century Work Skills or soft skills.

5. What were your experiences with 21st century work skills before you entered Tri-County Technical College? (possible prompt: high school, home, work, sports, music, or clubs)

6. What have been your experiences with 21st century work skills while at TCTC?

7. Tell me about experiences that have increased your understanding of the 21st century work skills desired by business and industry today? Has this knowledge affected your attitude toward learning 21st century work skills?
8. Has your impression/understandings of what employers are looking for in an employee changed? If so, how has it changed?

9. Have any particular experiences improved or increased your personal development of 21st century work skills?

10. What methods or activities did you find most effective in the learning of these skills?

11. What do you feel are your strengths or weaknesses when it comes to 21st century work skills?

12. What types of skills do you feel need additional development before you enter the workforce?

13. How do you feel that TCTC can help develop those skills and/or improve your preparedness for the workforce?

14. What steps do you plan to take to continue developing your 21st century work skills prior to graduation?

15. Is there anything else that you would like to share with me?

Ask participant if they have any questions and thank them for their participation.
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