HOW CAN CLARION UNIVERSITY OF PENNSYLVANIA SUPPORT THE REGION, EMPLOYERS, AND STUDENTS IN ORDER TO MEET EMERGING AND CHANGING WORKFORCE NEEDS IN THE PETROCHEMICAL AND PLASTICS INDUSTRIES

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Submitted to the Graduate Faculty of

the School of Education in partial fulfillment

of the requirements for the degree of

Doctor of Education

University of Pittsburgh

2018

UNIVERSITY OF PITTSBURGH

SCHOOLOF EDUCATION

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University of Pittsburgh, 2018

The manufacturing industry is faced with a growing challenge in recruiting and retaining a skilled labor force with the education and skills needed to perform high-demand jobs. The plastic and petrochemical industries are a facing these same challenges but are experiencing an additional hardship in finding applicants and potential employees with skill specific training to meet their unique needs as it relates to the process and production utilizing plastic and petrochemical resources and materials.

The purpose of this Action Research study was to identify general and specific education and training skills as defined by Polymer Molding Inc., Komatsu Limited, Onex Corporation, Franklin Manufacturing and Powder Coat Company, GeorgeKo Industries, Specialty Fabrication and Powder Coating, Electralloy Division, Schaal Glass, Essentra, and Hamill Manufacturing to assist in the development and delivery of competency-based programs.

In addition, inquiry questions were designed to determine current initiatives within industry, economic and workforce development, and higher education, to offer recommendations for program development and further collaboration amongst all stakeholders.

Findings identified three comprehensive categories in addressing the education and training needs of the future labor force. The categories include: “community workforce and economic development”, “skills training”, and “labor force characteristics”. As a result of the findings collaborative efforts are in effect to develop training programs that meet employers’ needs.

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PREFACE

I would like to thank the following individuals for their continuous support and encouragement as I fulfilled the goal of obtaining my doctorate; a goal I set 6 years prior to beginning this process: Dr. Tony Johns, Hope Lineman, and Deb McNerney Eckleberger, for their letters of recommendation for admission into the program. Dr. Colleen McAleer for taking the time to read through and offer guidance in writing Chapter 2 - the Literature Review. Dr. Pamela Gent for serving on my dissertation committee and for her support of implementing my research into practice. Dr. Stewart Sutin, for his direction and guidance as I began my research, and Dr. Jean Ferketish for the confidence she encouraged in me throughout the entire process. Nicholas Hess for volunteering his time to review my final paper.

I would like to thank my friends and family for cheering me on and the many times they said, "you can do this.": Brandy Dulaney, Alexis Hyslop, Casey McVay, Matthew Beightol, Tanya Wood, and Shelly Baker. My parents, Jim and Peg Dulaney for letting me know, every day, how proud you are of me.

Almost finally, I would like to thank my girls, Elizabeth and Olivia Beach for their love, patience, encouragement, and belief in me.

Finally, Dr. Emily Aubele, my partner in life. I don't know if this would have been possible without you…Thank you.

1.0 INTRODUCTION TO THE PROBLEM OF PRACTICE

The environment and expectations for providing workforce development training at the post-secondary level is evolving to focus on the retraining of workers, preparing individuals to enter the workforce, and meeting the demands of employers. The change comes at a time when employers' needs for employees with some post-secondary training are in demand. As such is the need for a skilled labor force in the petrochemical and plastics industry in Northwestern Pennsylvania. There is an increased need in the state of Pennsylvania for education that links training to performance in the workplace (Pennsylvania Center for Workforce Information and Analysis, 2016), however, understanding training needs from the employer's perspective can be cumbersome. Specifically, how can higher education and Clarion University of Pennsylvania meet employers' education and training needs for their future workforce? Workforce training programs are recognized for their important role in meeting ever-changing demands and providing skills training in a way that is responsive to economic needs (Boggs & McKenney, 2004; Van Noy, Jacobs, Korey, Bailey, & Hughes, 2008).

The broader context surrounding this issue involves state and federal funding for higher education, state and regional workforce initiatives, and institutional policies and practices. The new and changing environment requires the state of Pennsylvania, higher education, and departments responsible for recruiting and training the workforce to play an important role in

supporting and promoting the delivery of workforce training programs for students in higher education. According to the Pennsylvania Department of Community and Economic Development, natural gas and natural gas liquids used for the production of plastics forecasts an abundance of Marcellus and Utica Shale and the production of these resources will increase to 40% of U.S. production over the next few years (Pennsylvania Department of Community and Economic Development). This increased production increases the need for specialized workforce training in petrochemicals and plastics.

1.1 PROBLEM AREA

Collaborative workforce and educational initiatives can assist in opening the door for student access to programming by identifying higher education's role in developing and offering education and training to meet employers' needs that fill labor gaps (Academic Senate for California Community Colleges [ASCCC], 2009). As such, there is a need to build a stronger workforce pipeline by increasing the number of people interested in pursuing careers in the petrochemical and plastics industries, as well as improve the region's training capacity to prepare workers with in-demand skills. There is a gap in the availability of middle-skill workers with the right qualifications to be successful in the petrochemicals and plastics industry. This study focused on understanding the importance of the industry as a whole and identifying skills gaps. Once the needs were clearly identified, Clarion University began to develop and expand training programs to address those gaps. In addition to improving the quality of training in the region, there is a need to attract more students and jobseekers to manufacturing industries. This involves

promoting the industries as well as introducing careers at middle and high school levels, teaching basic work-readiness skills, and exposing students to careers in petrochemicals and plastics. Specifically, how can Clarion University of Pennsylvania support the region, employers, and students in order to meet emerging and changing workforce needs in the petrochemical and plastics industries?

I serve as the Interim Director of Workforce Development for Clarion University of Pennsylvania. I obtained a Bachelor of Science in Business Administration with a concentration in economics and a Master of Business Administration. My areas of research, service, and interest include education and economic and workforce development along with civic and community engagement.

According to the Georgetown Center on Education and the Workforce (2015), by 2025, 65% of all U.S. jobs will require some form of post-secondary degree or credential, however "the current rate at which colleges and universities are awarding them will fall short" (ASCCC, 2009). More and more, businesses and policymakers are turning to higher education to help fill these workforce gaps (International Labour Office [ILO], 2010; NCLS, 2014). Research strongly suggests that workforce training could serve as a "bridging mechanism" to assist students in making a transition from higher education to the labor force (ASCCC, 2009; Grubb, et al., 2003; Jacobs & Hawley, 2008; Walker et al., 2014). The Pennsylvania Department of Community and Economic Development states,

> Pennsylvania's abundant natural gas and natural gas liquids (NGL) resources are creating opportunities for growth in the plastics industry throughout the state. Ethane and propane – two important NGL feedstocks for petrochemical processing – are highly cost

competitive compared to other global production centers, including the U.S. Gulf Coast, Western and Eastern Canada, and the Middle East.

With the construction of the Shell cracker plant underway in Monaca, PA, Butler County and the opportunity for additional plants to be built in Pennsylvania, there is an immediate need to educate and train a labor force prepared for the competitive advantage of petrochemical and plastics companies in Pennsylvania. According to the North East Petrochemical Construction – Opportunities & Challenges (2018) more than 70% of North American polyethylene customers are within a 700-mile radius of Pittsburgh. The Pennsylvania Department of Community and Economic Development (2018) Industry Factsheet reported a 10.5% job growth in plastics in PA with a 50% greater employment concentration than the U.S. overall. In addition to the anticipated growth, as of April 30, 2018, Pennsylvania's current unemployment rate was at a low 4.7%. Down from 6.5% in January of 2014. See figure 1.

Figure 1. Pennsylvania unemployment rate Jan. 2014 – Jan. 2018

In addition to my role as Interim Director of Workforce development at Clarion University of Pennsylvania, I serve as a volunteer member of the Northwest PA Oil and Gas HUB. The HUB focuses on fourteen counties including Cameron, Clearfield, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, Mercer, McKean, Potter, Venango, and Warren. In 2009, Keystone Community Education Council, along with the Oil Region Alliance, brought leaders of education, economic development, industry, and local government together to form the Northwest PA Oil and Gas HUB (nwpaoilandgashub.com). The mission of the NWPA Oil & Gas HUB exists to promote regional expansion and development of the petrochemical industry for the economic revitalization of Northwest PA. The HUB fosters partnerships that educate, prepare, promote, and connect business, industry, and education on local, regional, and state levels (nwpaoilandgashub.com).

Through this committee, we identified specific targets of awareness, partnerships, industry, education, funding and other miscellaneous needs to accomplish goals within the communities of the Northwest PA region. The broad goals of the NWPA Oil & Gas HUB include: (nwpaoilandgashub.com).

1. Provide information and programs needed to educate the community about the industry
2. Provide local businesses with information on how to do business with oil and gas companies
3. Present information on natural gas vehicles and the effects of CNG and LNG on the transportation industry
4. Facilitate programs regarding the petrochemical industry/cracker plant and what it will mean to manufacturing in PA
5. Schedule informational seminars to inform business and the public about how energy can be produced economically by natural gas.

1.2 INQUIRY SETTING

The inquiry setting for this study encompassed the workforce and economic region of Northwestern Pennsylvania including Clarion University of Pennsylvania. Clarion University of Pennsylvania is a public university within the Pennsylvania State System of Higher Education (PASSHE) located in rural, northwestern, Pennsylvania. It is one of fourteen universities within the state system. State system schools are located throughout the state, each of which resides in a workforce investment region or area that could focus on varied initiatives for workforce development and addressing industry needs. Pennsylvania counties in the NWPA workforce investment region include Erie, Crawford, Clarion, Forest, Warren, and Venango. Clarion University resides in the Northwest PA workforce investment region.

I serve as the Interim Director of Workforce Development responsible for noncredit and certificate training as well as providing professional and workforce development training in support of Northwest PA workforce initiatives (NWPA Workforce Investment Area, 2016). In addition, I also serve as an administrator to the Applied Technology program, responsible for partnership relations. The Applied Technology program offers associate and bachelor degrees in Administrative Technology and Industrial Technology, both of which focus on skills specific training in several high-demand occupations.

Clarion University has excelled over the years in meeting workforce demands by partnering with industry and educational institutions in order to train the future workforce. In

fall 2005, Clarion University's Venango Campus partnered with FirstEnergy Corporation to offer an associate degree in Applied Technology. The area of concentration was electric utility technology, training students for careers as electric utility lineman. This came at the request of FirstEnergy's need to fill a labor gap and educate and train future electricity utility workers. Clarion University now partners with Global Powerline Academy for the delivery of the electric utility program. In addition, the Applied Technology program utilizes a creative partnership approach designed to train the future workforce in many high-demand careers. Students complete 33 credit hours of specified general education coursework and up to 36 hours of administrative technology or industrial technology field training with one of the training partners depending on student's area of interest. Partnerships include: Precision Manufacturing Institute located in Meadville, Pennsylvania, Erie Institute of Technology located in Erie, PA, Triangle Tech, with locations in both Dubois, PA and the Pittsburgh area, and Ravotti Air, located in Franklin, PA.

Furthermore, in July 2017, Clarion University, in response to the growing opioid epidemic in Pennsylvania, developed an opioid treatment specialist certificate (www.clarion.edu). Governor Tom Wolf stated,

> Fighting the ongoing battle against heroin and opioid abuse in the state is a top priority of my administration, I'm proud to announce this new curriculum with Clarion University because education is a powerful force in this fight and it is my sincere hope that people take advantage of this opportunity to learn more about opioid addiction and what part we can each play in this effort.

The opioid certificate presented yet another opportunity for Clarion University to respond to a training need in Pennsylvania.

Summer of 2018, the Office of Continuing Education met with administrators from Venango Training and Development Center (VTDC) to discuss a training need for their employees. VTDC provides a multitude of rehabilitative, vocational, and employment focused programs with the Mental Health and Intellectual Disabilities Administrations in much of Northwestern Pennsylvania. The Association of People Supporting Employment First (APSE) developed the first national credential for professionals serving individuals with disabilities, the Certified Employment Support Professional (CESP™) certification. VTDC identified a need for certification preparation for the CESP™ exam. The office of Continuing Education worked with faculty from Special Education and disability Policy Studies to offer courses that will prepare professionals for the CESP™ exam. The first course began October 22, 2018.

As a final example of how Clarion University has responded to workforce training needs in Pennsylvania, in May 2016, the University's Office of Continuing Education in collaboration with community members and healthcare agencies identified the need for Emergency Medical Technicians in the region. The Office of Continuing Education partnered with Clarion Hospital, EMMCO WEST, and the local Venango Technology Center to develop and launch the training program. The program began September 2017 with 20 participants. At the successful completion of the program, participants were eligible to sit for the National EMT Registry exam. A second class began September 6, 2018 with 19 participants being trained.

There is now an identified need for training in the petrochemical and plastics industries. Beginning summer 2016, Shell Chemical Appalachia began building a multibillion-dollar ethane cracker plant in Monaca, PA. It is estimated, once completed, the cracker plant will provide 600 jobs (Litvak, 2016). Economic growth in other industries, specifically plastics, is also expected to increase as a result of the cracker plant. The intent of this research was to identify the

education and training needs of the future petrochemical and plastics workforce in Pennsylvania. And more specifically, to answer, how is Clarion University serving employers in the petrochemical and plastics industries?

1.3 STAKEHOLDERS

Stakeholders in the workforce development and training of Pennsylvania's labor force create an infrastructure necessary to provide opportunities for quality education and training. Stakeholders include: regional and community workforce and economic development agencies, students/employees pursuing education and training, educational institutions, and lastly, employers. While each stakeholder presents a significant role in building the structure for education and training, each group views workforce development from a different perspective.

Workforce and economic developers approach workforce development from a view which benefits the sustainable economic growth of a community or region. Workforce and economic development partnerships provide funding opportunities to develop programs and funding opportunities for individuals (Spaulding & Martin-Caughey, 2015). Their focus is to assist job seekers in obtaining and retaining skills to secure living-wages and long-term employment. Pennsylvania's workforce development initiatives fall under the Pennsylvania Department of Labor & Industry (L&I). PA L&I states,

> "Pennsylvania's workforce development system enables businesses and workers to compete in the worldwide, knowledge-based economy. The workforce system enhances employer competitiveness and innovation while preparing Pennsylvanians for jobs that

pay in an economy that grows, supports families and businesses and is effectively improving the quality of life for our most valuable resource - our people" (pa.gov)

Students/employees approach workforce development from an individual and personal outlook. Specifically, what is their personal growth in education, training, and future employment opportunities. Individuals enrolled in workforce training programs are often quite diverse. Typically, these individuals represent a broader range of ages, encompassing both traditional students and nontraditional students as understood within higher education. They may be employed, unemployed, or underemployed; some may be more likely to have taken previous college courses. Additionally, workforce training programs often serve targeted populations such as low-income individuals seeking full-time gainful employment offering a sustainable wage in a high occupation demand career, one that may require job specific skills.

Educational institutions approach workforce development and training programs from the standpoint of the sustainable economic security of the student, by providing education and training in order to secure gainful employment. Educational institutions provide skills training in a variety of forms and modalities to assist individuals in gaining the knowledge and skills needed to secure employment or advance in an existing career. Educational institutions can also provide employers with the resources and means to deliver needed training to incumbent workers.

Employers approach workforce development from an organizational perspective, concentrating on industry specific skills needed to remain competitive in the global marketplace (Haralson, 2010). Identifying training needs and program development; employers' goals include finding qualified job applicants, reducing training and recruitment costs, addressing

training and/or service needs they may not have the ability to offer, and meeting diversity goals and social responsibility objectives (Spaulding & Martin-Caughey, 2015).

1.4 PROBLEM OF PRACTICE

Navigating and understanding workforce development education and training opportunities for individuals in the Commonwealth can be quite cumbersome. For employers and individuals seeking information on training programs and funding opportunities, limited data exists to assist in making well-informed decisions for training, career, and education pathways. It is important for Clarion University to determine the value of workforce development training and understand the collaborative efforts between commonwealth employers, state legislation, workforce development agencies, and the university. Qualitative data is needed to assist policymakers, constituents, employers, and higher education administrators in making sound informed decisions related to workforce training program relevance, development, funding, and pedagogy.

The purpose of this study was to examine employers' needs in educating and training the petrochemical and plastics labor force in Pennsylvania, specifically within the northwest region in order to develop academic and non-credit programs that meet those needs. This qualitative study was designed to identify and comprehend the relationship between state and federal legislation, workforce development agencies, Clarion University of Pennsylvania, and Commonwealth employers in providing quality education and training. The intent was to determine if these stakeholders are working collaboratively to (1) identify the needs of Commonwealth employers and (2) support the educational and training needs of the labor force

and Clarion University students. This study was intended to explore qualitative data to determine if mutual and concerted investments in academic and non-credit programming are aligned and furthermore, to develop workforce training programs that meet the needs of regional plastic, petrochemical, and manufacturing employers within the commonwealth while simultaneously supporting Clarion University students. While the perspectives of stakeholders in workforce development initiatives might vary, Commonwealth, industry, and personal economic growth are fundamental objectives (Haralson, 2010). The intent of this research was to explore relationships and their place in the wider context of partnerships with other key stakeholders in order to develop workforce training programs that provide students with the education and training needed to fulfill job duties in these industries.

2.0 REVIEW OF SUPPORTING SCHOLARSHIP

With an increasing need for a skilled workforce possessing credentials for employment, workforce development training programs both credit and noncredit are well positioned to assist unemployed, dislocated workers, returning adult, and underprepared students with entering the labor force. There is an opportunity then to prepare students to become lifelong learners. It is certainly possible that the idea of entering post-secondary education could seem overwhelming and costly to the student. However, while programs are typically less expensive, but not necessarily more affordable, workforce development training programs often allow for an opportunity to enter post-secondary education with a skills specific goal in place. (Grubb, Badway, & Bell, 2003; Ozmun, 2012). Ozmun (2012) explored student's experiences in an educational environment to determine the academic worth of programs by attempting to understand the students' perceptions, expectations, and experiences in an educational setting. Ozmun (2012) found students had positive views about education and their own achievement, which encouraged them to pursue further education beyond skills specific training.

Workforce development focuses largely on training that concentrates on practical skills attainment or skill improvement, and industry or regionally defined certifications in sector-specific areas. Workforce training programs are typically designed "to empower individuals in transition to participate fully in planning and achieving their career, educational, and personal

goals" and to provide students with a basic course of studies designed to increase their likelihood of success in academic and skill attainment and also to provide a foundation in educational and skill credential achievement (Walker et al., 2014).

Many students are interested in building skills and gaining certifications, such as those related to specific fields (i.e. manufacturing, technology, or healthcare), in order to transition to a new career or to advance within an existing one (AACC, 2016; Walker, & U.S. Department of Labor [DOL], 2014). A primary motivation of many students is to obtain job specific skills and/or certifications that will help with career goals and advancement (Walker et al., 2014; Van Noy et. al., 2008).

2.1 WORKFORCE DEVELOPMENT TRAINING IN PENNSYLVANIA

Workforce development lays a foundation for economic growth and attempts to boost a region's economic stability by focusing on individuals rather than businesses and industry. Such development incorporates a human-resources strategy, by investing in the individual. Workforce development and human resource strategy are processes that identify the current and future needs of the individual in professional development in conjunction with anticipated employer needs. Workforce initiatives have progressed from a problem-focused approach, addressing issues such as skill attainment and industry specific employer needs, to a holistic approach which considers participants' barriers to accessible education and the overall labor force needs of the region.

Workforce development can be further defined as a critical human capital system concerned with identifying future workforce and labor market needs, developing a productive

workforce, identifying and examining the competencies and skill levels of employees, and determining both proficiency and skill gap levels. This development is responsible for helping to cultivate an environment that initiates and encourages the attainment of current and future agency goals through the use of transformational strategies in career development, education, and training (ILO, 2010). In short, workforce development is about learning, enhancing, and changing one's skill sets to meet the labor force needs of a community.

The phrase, *workforce development* has evolved to describe any one of a moderately wide range of government policies and programs related to learning and training for work (Sykes, 2012). For example, many experts involved in the administration of subbaccalaureate programs and regional economic development initiatives use workforce development to describe the nature of the services (Jacobs et al., 2008; Sykes, 2012). Furthermore, many higher education institutions, from community colleges to four-year public and private institutions, have departments explicitly dedicated to community and workforce initiatives expanding to include academic departments in applied technology programs, noncredit training, and certificate programs.

Workforce training programs support the economic needs of the region and state by supplying a skilled labor force to business and industry. The common objective of workforce development programming is to provide training resources and opportunities to participants to improve their industry knowledge and skills and thus aid participants in securing or advancing in gainful employment (ILO, 2010). Workforce development training recognizes a completion of coursework typically focused on a specific field such as healthcare or manufacturing.

Research conducted by Carnevale, Rose, and Cheah (2011) from the Georgetown University Center on Education and the Workforce found, "a college degree is key to economic

opportunity, conferring substantially higher earnings on those with credentials than those without" (p. 1). Their study found, "Having some postsecondary education, even without earning a degree, adds nearly one quarter of a million dollars to lifetime earnings." (Carnevale, et al., 2011, p. 4). As such, workforce development training programs deserve recognition and increased support from their institutions as well as state and federal policymakers.

By 2025, 63 percent of jobs in Pennsylvania will require at least some education or training beyond high school (Carnevale et al., 2015). The Pennsylvania Department of Labor & Industry (L&I), established in 1913, originally inspected the working conditions in factories around the state (www.dli.pa.gov). Over time, the department's responsibilities expanded to include the administration of benefits to unemployed individuals, overseeing the administration of workers' compensation benefits to individuals with job related injuries, and providing vocational rehabilitation to individuals with disabilities (www.dli.pa.gov). The department prepares job seekers for the workforce through employment and job training services for adult, youth, older workers, and dislocated workers (www.dli.pa.gov).

L&I also promotes economic development and an enriched professional environment through a variety of initiatives and programs to help Pennsylvania's workforce remain competitive in the global market. The Pennsylvania Department of Labor and Industry on workforce development states,

> Pennsylvania's workforce development system enables businesses and workers to compete in the worldwide, knowledge-based economy. The workforce system enhances employer competitiveness and innovation while preparing Pennsylvanians for jobs that pay in an economy that grows, supports families and businesses and is effectively

improving the quality of life for our most valuable resource - our people (www.dli.pa.gov).

Universities and colleges across the state of Pennsylvania assist in administering numerous workforce training programs, including state and federally-funded job training incentive programs, such as Workforce Investment Opportunity Act programs (WIOA), Trade Readjustment Allowances (TRA), the free training program for employers (WEDnetPA), as well as, industry sector and regional workforce initiative programs (www.dli.pa.gov). The primary model for workforce development funding is to establish career pathways for skill, credential, and degree attainment and provide all Pennsylvanians an opportunity to obtain gainful employment that provides adequate income (www.dil.pa.gov; Walker et al., 2014). The common element among these various training programs is to provide education and skills training to a diverse population; from incumbent or employed workers, to displaced and dislocated workers, to those seeking career changes, to specific targeted populations such as persons who are low-income and/or disadvantaged.

These funding sources are typically administered through governmental agencies such as the PA CareerLinks and/or regional economic development consortiums such as the Northwest PA Workforce Investment Board (NWPA WIB). They appear to function as inducements or incentives to encourage workforce development and are designed to be the investments in future benefits, anticipated with a capacity-building instrument. The capacity-building instrument is a conceptual approach to development that focuses on barriers that obstruct goal attainment. These funding sources and programs may not be completely meeting their intended purposes, therefore the evaluation of current or alternative policy mechanisms should be explored (McDonnell & Elmore, 1987).

The Workforce Innovation and Opportunity Act (WIOA) implemented a significant change on July 1, 2016, when it began requiring the reporting of performance measures. Institutions of higher education had previously been excluded from this requirement. Higher education institutions (HEIs) are now required to submit information on performance of past participants in order to be considered for inclusion on the current eligible training provider list (ETPL). As a result, individuals will have greater barriers and challenges accessing training, as fewer HEI's are submitting programs for approval. Oil Region CareerLink site Administrator, J. Gatesman stated that higher education institutions that award bachelor's and master's degrees had submitted programs for funding under TRA but had not yet submitted programs for approval under WIOA funding (J. Gatesman, personal conversation, November 28, 2016). This signifies a much larger issue than the impacts on student funding for workforce development programming. This presents a Pennsylvania statewide concern that eligible individuals under WIOA funding are not able to utilize Title I dollars for degree programs offered through institutions that prior to the July 1 reform had approved programs on the ETPL.

Although funding is restrictive with set guidelines for participants and training providers, Title I WIOA funding is to help individuals access employment, education, training, and support services in order to enter the labor force. Training funds may be approved only for programs that appear on the approved High Priority Occupation list (ETPL). Should institutions choose not to submit programs for approval under WIOA funding, they will likely see an enrollment decline is some programs both academic and non-credit. The impact will also expand to the region, with a decline in potential workforce labor trained in high priority jobs. There is a possibility with the increasing guidelines and requirements for program reporting, that the TRA program may reform policy as well to also require performance reporting in the future. The High Priority Occupations

list for 2017 highlights 8 occupations, that relate to petrochemical and plastics industries that are in demand by employers (High Priority occupations). The demand for these occupations is projecting a 17.5% increase from 2014 through 2024 (High Priority occupations).

2.2 THE ROLE OF HIGHER EDUCATION IN WORKFORCE DEVELOPMENT

Universities and colleges play an important role in assisting individuals with their transition into the workforce and/or post-secondary programs. Studies conducted by Arena (2013), Grubb et al., (2003), Ozmun (2012), and Simone & Cesena (2010) indicate that post-secondary institutions are in a prime position to make significant contributions to the economy, the workforce, and the student through specialized training programs. These programs are often vital to their institutions of higher education as well as the communities they serve (Milam, 2005). Workforce training and preparation is an integral component of education and training performed by universities and colleges (ASCCC, 2009; Barrineau, & Association for Continuing Higher, E, 2003; Deggs & Miller, 2011; Grubb, et al., 2002; Johnson, 2011).

Research conducted by Deggs et al., (2011) found employers are in need of a labor force comprised of individuals that have adequately developed critical thinking skills. Workforce development programs are intentionally designed to help to develop these skills. Employers see value in programs that offer their employees the opportunity to gain skill-specific training and educational credentials, increasing the value of their human capital. According to Deggs et al., (2011),

> Organizations that value education and employ an educated workforce can increase the informal interaction between the educated and uneducated, and help individuals begin to identify values in learning, diversity, and employment (p. 25).

Workforce focused training programs typically are very responsive to the regional workforce needs of businesses and industry (Barrineau, et al., 2003; Deggs et al., 2011; Grubb, et al., 2002; Johnson, 2011). In addition, training programs that easily articulate into degree programs could provide an opportunity to meet employers' needs, address unemployment levels, and assist those who have a need to rapidly change careers or enter the workforce as quickly as possible, while building a foundation to credential stacking and career pathways (Walker et al., 2014).

Milam's (2005) study encouraged further research on the importance of continuing education programs and their data collection processes for the purpose of gaining an understanding of the relationship between programming and higher education. Methods used in this study to collect data included, the review of historical data obtained from the U.S. Department of Education's National Center for Education Statistics (NCES), surveys, and interviews conducted with employees of various education associations and institutions. The results of the study found that continuing education programs are vital to the institutions as well as the community and need to be further promoted and supported by state agencies and institutions where they are housed. Workforce Development Initiatives and higher education appear to have a common goal to provide the education and training necessary to meet workforce demands. However, in some cases there is a disconnect in the communication, collaboration, and alignment efforts of these two enterprises to fulfill a similar goal.

2.3 PENNSYLVANIA COMMUNITY COLLEGES

To understand the role of higher education in workforce development, it is important to recognize the role community colleges assume. Community colleges play an important role in educating and training current and future workers and providing higher education to hundreds of thousands of Pennsylvanians every year. The Pennsylvania Commission for Community Colleges [PCCC], (2016) "advocates on behalf of the 14 community colleges and provides leadership and guidance for their collective interests". In addition to the main campuses, the colleges have a combined 12 branch campuses and 87 instructional sites and centers with locations in 44 out of 67 Pennsylvania counties (U.S. News and World Report, 2016).

The community college's mission is the foundation from which all of its activities are built. The American Association of Community Colleges states,

> "Most community college missions have basic commitments to serve all segments of society through an open-access admissions policy that offers equal and fair treatment to all students."

Providing comprehensive educational programs that serve communities through teaching and lifelong learning is at the center of community college missions.

Community colleges attract students from diverse backgrounds and educational levels with the primary goal of providing open access and affordability to those seeking a post-secondary credential. Students enroll at community colleges for a variety of reasons; however, the three primary reasons are to "earn a credential, transfer to a four-year university, or receive job training" (AACC, 2016). The accessibility and affordability associated with community

colleges has appealed to student populations characterized as low-income, first-generation, minority, or working adults (NCLS, 2014).

Students who complete an associate degree or certificate at a community college are much more likely to earn higher incomes than students who have taken little or no college courses and those who have not obtained an industry recognized credential (AACC, 2016; ASCCC, 2009). Subbaccalaureate certificates and technical and trade programs in certain fields, are the fastest growing credentials today, outpacing associates and master's degrees (NCLS, 2014; Sykes, 2012). While there is incredible potential for community colleges to assist in meeting workforce development needs, many challenges remain. One of the most significant is improving legislation on funding for workforce development and career pathway initiatives. Demand to continue one's education and training is increasing rapidly while funding has decreased and will likely continue to decline in the coming years. Dennis Jones, president of the National Center for Higher Education Management Systems stated,

> "This will have serious implications for the nation's competitiveness and future economic prosperity if we are not able to adequately educate tomorrow's workforce," (as cited in NCLS, 2014).

2.4 THE PENNSYLVANIA STATE SYSTEM OF HIGHER EDUCATION (PASSHE)

The Pennsylvania State System of Higher Education's (2016) mission reads, "The primary mission of the System is the provision of instruction for undergraduate and graduate students… in the liberal arts and sciences and in applied fields…" (PASSHE Strategic Plan 2020, 2016).

While workforce development is not explicitly declared in the mission for PASSHE, there are elements of its importance throughout PASSHE's strategic plan's vision, mission, and goals. Strategies listed to fulfil PASSHE's mission and vision include: responsiveness to regional, state, and national needs through its programs, service, scholarship, and research…aligning academic program offerings with future regional workforce needs to meet strategic interests of students, the Commonwealth, employers, and communities (PASSHE Strategic Plan 2020, 2016).

The State System universities are Bloomsburg, California, Cheyney, Clarion, East Stroudsburg, Edinboro, Indiana, Kutztown, Lock Haven, Mansfield, Millersville, Shippensburg, Slippery Rock and West Chester University of Pennsylvania. The universities also operate branch campuses in 4 locations, and offers classes and programs at several regional centers, including the Dixon University Center in Harrisburg and in Center City in Philadelphia.

PASSHE universities last year recorded more than 80,000 registrations in noncredit programs. Of the 14 PASSHE schools, 10 serve as WEDnetPA partners across the state, assisting businesses with workforce development training for their employees (PASSHE, 2016). Nearly 90 percent of all students who attend the State System universities are Pennsylvania residents; almost 80 percent of those remain in Pennsylvania after receiving their degrees to live, to work and to raise their families (PASSHE, 2016). Almost 520,000 State System university alumni live in Pennsylvania (PASSHE, 2016). They are part of a workforce that serves the communities and the Commonwealth. According to Marshall (2015), "Pennsylvania's State System of Higher Education generates more than $6.7 billion annually in economic activity, and, in addition to its own 12,000 employees, supports about 62,000 external jobs statewide, including many of the small businesses that thrive in and around the campus communities."

In the simplest terms, the State System produces a significant economic impact in the Commonwealth. This is only part of the story. Guido M. Pichini, chairman of the State System's Board of Governors from 2011 through July 2016 stated,

> The connection between the State System and Pennsylvania's economic vitality is unmistakable…. From the direct impact the universities have in their communities, where they are the economic engines that drive their local economies, to the ripple effect across the state, their impact on the state's economic climate is tremendous (as cited in Marshall, 2015).

In the U.S., by 2014, 22 states had implemented some type of career pathways system beginning at the noncredit level (Walker et al., 2014). Pennsylvania had participated in a career pathways initiative from 2010-2012 (Walker et al., 2014). As of April 2014, 16 states were involved in the implementation of up to three career pathways initiatives (Walker et al., 2014). The increase came at a time when employers' demands for employees with some post-secondary training also began increasing, which signifies the importance of understanding and supporting workforce development and skills specific training.

2.5 LEGISLATION

As the economy struggles to regain stability, legislators are turning to higher education to help meet the increasing demands for a skilled and educated workforce. One step policymakers can take is to initiate legislation to increase the support for students seeking workforce development

training. Legislators can provide incentives and hold institutions accountable for reaching that goal.

State budget difficulties make all this more challenging. Higher education relies on state appropriations to keep tuition and cost lower for student and families. As such, state institutions are profoundly impacted by cuts in state and local financial support; decisions made at the state level have implications. There is an immediate need for state legislatures to realize and support policies, procedures, and guidelines that can lead to equitable access and student achievements, in workforce training programs.

The Education Commission of the States (ECS) reviewed enacted legislation, from 2012-14, across the 50 U.S. states that addressed higher education and workforce development. The purpose of this brief was to assist in acquiring information about policies that can better align education programs and workforce needs. Advocates of higher education, say it is imperative that policymakers and educators continue to focus on access and success (ASCCC, 2009; Bidwell, 2014; ILO, 2010; Walker et al., 2014). The national emphasis on higher education to develop and deliver workforce and education initiatives will assist America in thriving and competing in the global market and strengthen workforce development during difficult economic time for states. As state institutions, the success is the responsibility of state governments and officials. Bidwell (2014) quoted House Majority Leader Eric Cantor as stating,

> For America to work, we need effective education and workforce development programs to strengthen the middle class…If we allow ourselves to continue down this dangerous path, we'll only see feeble economic growth for the foreseeable future.

An alliance is necessary to eliminate the bureaucracy that often complicates equitable access for those seeking training that provides jobs. Government, workforce development

agencies, and higher education have similar goals in providing opportunities for job training, often duplicating rather than aligning services that support one another. A 2011 report from the Government Accountability Office found more than 40 of the existing 47 programs authorized under the Workforce Investment Act duplicate services and programming initiatives in some form with another program (Bidwell, 2014).

Workforce development literature indicates state and federal government, economic development agencies, and higher education institutions including trade schools, community colleges, and four-year public and private institutions need to play an active role in adequately supporting the needs of employers and students in workforce development training and education opportunities. There is a need for the identified stakeholders above to collaborate on the development and delivery of initiatives and policies across the state of Pennsylvania to meet the needs of the employers and the needs of individuals seeking training a in order to enter or reenter the labor force.

The scope of this literature review is limited to the areas of focus: Workforce Development, Pennsylvania Community Colleges, The Pennsylvania State System of Higher Education, and Pennsylvania legislation related to education and workforce development. In addition to a lack of adequate information regarding the relationship between higher education, workforce development, and state and federal legislation from a strategic planning and implementation perspective specific to workforce development training programs, the literature is also insufficient in identifying noncredit/non-degree seeking student demographics. A limitation to this inquiry is research on individual wants and aspirations to seek training that will present opportunities for gainful employment.

3.0 METHODS

This study was action research designed to address an education and training need in the manufacturing and petrochemical and plastic industries in Northwestern Pennsylvania, in order to develop curriculum and programs with core competencies to meet employer's needs. In addition, this qualitative study helped to identify and comprehend the relationship between employers, state and federal legislation, workforce development agencies, and Clarion University of Pennsylvania in providing competency-based education geared towards workforce development training in the petrochemical, plastics and manufacturing industries.

Qualitative research is a useful tool for obtaining information regarding a complex issue (Yin, 2014). Analyses of the data assisted in discussing and determining the "who", "what", "where", "how many', and "how much" to investigate further the "why" and "how" involved in the broader context of understanding the industry as a whole, including state, regional, and employers' labor force needs (Yin, 2014). Interviews provided an understanding of the perspective, giving direction on how to address the education and training needs in the petrochemical and plastics industries.

Hernandez-March & Monica (2009) presented the results obtained from 40 in-depth interviews with individuals in charge of human resources and/or company directors, and from a questionnaire targeting 872 companies surveyed. The results of their study assisted in

understanding the larger context in relation to their research. While Hernandez-March & Monica's (2009) study incorporated a questionnaire in addition to interviews, their research focused on employers' education and training needs to identify competencies required of graduates. The research provided awareness to understanding the extent to which higher education can improve their education and training programs to meet employer needs. For this study, interviews designed to collect data from regional manufacturing, petrochemical, and plastics employers aided in presenting an understanding of their perspectives on the need and level of training for the future workforce in these industries. Conducting interviews with manufacturing employers provided insight into the current needs and collaborative efforts between workforce education and training and Clarion University.

10 professionals and industry experts from the plastics, petrochemical, and manufacturing industries were interviewed. Participants were asked questions in order to fully understand employers' perspectives on the growth in these industries and the impact that potential growth may have on their need for a skilled labor force. Furthermore, questions were designed to determine the general and specific education and training needs of the future labor force. Included in chapter three is the research design, participant recruitment and selection process, Institutional Review Board exemption, the data collection process, data analysis, and limitations to the study.

The ultimate product of this inquiry will be the continuous research and development of outcomes and competency-based curriculum under the Office of Continuing Education and/or an associate degree concentration within the Applied Technology at Clarion University of Pennsylvania.

3.1 RESEARCH QUESTIONS

In order to develop curriculum designed to meet the educational and training needs in the plastics, petrochemical, and manufacturing industries, there was a need for Clarion University to identify skills required in these industries as defined by employers. This study was action research designed to address education and training needs in the petrochemical and plastic industries, in order to develop a set of courses at the non-credit and/or associate degree level with core skills and proficiencies to meet employer's needs. Rather than developing a program internally that would then be marketed to employers, this research gathered the education and training needs from the employers' perspective. Identifying from their expertise, the required competencies for employment in the plastic, petrochemical, and manufacturing industries.

In addition, this qualitative study was designed to identify and comprehend how employers, state and federal legislation, workforce development agencies, and Clarion University of Pennsylvania currently work collaboratively to provide competency-based education geared towards workforce development training. The following fundamental questions guided this study.

1. What is the current need for specialized workforce training in petrochemical and plastics industries in Northwest Pennsylvania region?
2. What types of workforce development and skills training programs does Clarion University currently offer?
3. What is the current relationship between workforce development agencies and higher education institutions in meeting the workforce needs of employers in the region?

4. How can the Pennsylvania State System of Higher Education, Clarion University, and the Office of Continuing Education help to bridge the connection between Commonwealth employers, Pennsylvania residents, and education and training providers and opportunities?

Question one was designed to elicit responses in reference to skills and training needs as perceived by employers. While there is substantial literature on workforce training needs, there is a lack of information explicit to these industries and the skill specific training. The intent of the question is to determine the extent to which training is needed. Is the training on a small scale, less than 50 individuals trained within the Northwest PA region or on a larger scale, 50 or more individuals trained? In addition to determining the need for training, question 1, helped to determine the types of positions employers are seeking quality training applicant and employees for as well as the levels of training dependent on the position and job specific duties.

The second question identified current training programs offered through Clarion University of Pennsylvania that meet workforce training needs in the region. Question 2 initiated both an inward self-assessment of Clarion University's training opportunities at both non-credit certificate training levels and for-credit degree programs as well as an external assessment of employers' familiarity and understanding of programs offered through Clarion University. As a result of the findings related to this inquiry question, Clarion University is able to assess whether or not we are currently offering the training employers require and if employers know what we currently offer in addition to our flexibility in offering customized training.

The third inquiry question referenced the collaboration between workforce development initiatives and higher education institutions. Understanding the current relationship and culture in

workforce development and higher education will assist in identifying how the two areas can work together toward a common goal. Working collaboratively allows opportunities for stakeholders to be fully engaged and involved in identifying a need and creating structures in which to address the need, while eliminating duplication of services being provided and removing barriers for access to training.

The final inquiry question intended to determine how Clarion University's Office of Continuing Education can assist in meeting the skills training needs of Pennsylvania residents and the workforce by identifying training needs, assessing current program offerings, and working collaboratively with various stakeholders. The final question was designed to capture data and information that would pull the three previous inquiry questions into one question encompassing the broader context as it applies to the research, while gathering any information not specifically addressed or identified through the first three inquiry questions.

Each research question was used to develop a seven-part interview questionnaire that allowed participants opportunity to fully engage in open dialogue on their expertise, knowledge, and expectations for growth in the plastics, petrochemical, and manufacturing industries in Northwestern PA. The interview questions provided the means to gather the employers' defined educational and training needs for a skilled labor force and further to identify Clarion University's role in developing and delivering programming to meet those needs.

3.2 RESEARCH DESIGN

Chapter 1 and the action research process began with identifying a problem of practice within my scope of work which includes the responsibility for developing, coordinating, and delivering workforce training programs at the non-credit level as well as assisting with the coordination of the Applied Technology degree programs at Clarion University. The process then was to focus on a particular area within the identified problem of practice. Narrowing the focus to training needs that support manufacturing companies and more specifically the plastic and petrochemical industries, allowed for the research to be intentional and specific with defined outcomes. Selecting manufacturing as an area to research targeting the plastics and petrochemical industries was a result of continuous involvement in and exposure to the Northwestern Pennsylvania needs and assessment of economic impact as a result of the Cracker plant under construction in Monaca, PA. Identifying and clarifying the problem of practice led to the development and refinement of the research questions that guided this study, the review of literature, and all steps in the research, analysis, and reporting of findings.

Chapter 2 presents the supporting scholarship pertaining to workforce development education and training. The supporting scholarship focused on five areas; workforce development training in Pennsylvania, the role of higher education in workforce development, Pennsylvania community colleges, the Pennsylvania State System of Higher Education, and state legislations. Each piece provided insight and understanding into the current structure and policies in place that address workforce education training needs. The literature was revisited throughout the research process to assure alignment with the guiding inquiry questions.

Chapter 3 provides detail in the methods used for this study including the research design, participant recruitment and selection, Institutional Review Board process, data collection, and analysis. For this study, it was determined interviews with manufacturing companies that support and/or produce goods and services for the plastics and petrochemical industries would provide the best possible data to determine workforce education training needs for these industries. Ensuring the data collected justifies actions taken and recommendations for further action can be accomplished through action research utilizing data collected from interviews. The data collected represents and supports the actions and recommendations presented in the conclusions section. Lastly, before data are used to develop and deliver training programs, the data must align with Clarion University's current institutional capacity and ability to develop structures, organizational process, and financial models to support recommendations to develop and deliver programs. Because the data collected came from the responses of employers to determine their education and training needs, the relevance of the findings is assured.

The approach to this study was designed to provide an understanding of and insight to identifying employers' educational and training needs. To explore employers' education and training needs semi-structured interviews were conducted with professionals and experts within the manufacturing, petrochemical, and plastics industries. A seven-part questionnaire was designed to gather qualitative data that would address the fundamental inquiry questions leading this study.

By exploring manufacturing industry's experiences pertaining to the educational and skill specific training needs of the labor force in response to anticipated growth in plastic, petrochemical, and manufacturing, predominant needs were identified. It has been noted in the literature that qualitative research is a useful tool for obtaining clarifications and insights into a

complex issue. Additional literature supported the decision to explore this study from a qualitative perspective.

Once the data was collected, it was then coded and analyzed to identify and determine predominant and repetitive themes across employers' responses. By coding and analyzing the data, specifically employers' responses to a seven-item questionnaire (see Appendix C), I was able acquire a better understanding of the phenomenon under study and as a result provided grounded theory regarding recommendations to address the problem of practice.

The final steps were to report the findings in Chapter 4 and provide descriptions of informed action taken and recommendations for further action in Chapter 5's conclusion. In developing the study and recognizing the specific problem of practice as Clarion University's necessity to identify employers' training needs in the plastics, petrochemical, and manufacturing industries the research design structure was applied utilizing interview questions to gather specific educational and training needs. Simultaneously, the design and approach assisted in identifying how Clarion University can better understand and collaborate with various stakeholder initiatives in developing curriculum and programming that meets employer's training needs.

3.3 PARTICIPANT RECRUITMENT AND SELECTION

Plastics, petrochemical, and manufacturing employers in the Northwest Pennsylvania region were selected to participate in this qualitative study. The participants were experts in their fields, either human resource managers or company presidents and chief executive officers.

Participants were selected based on the size and structure of the company. For smaller companies consisting of less than 100 employees, participants were company executives. Large companies with employees over 100, participants held positions related to human resource management, talent management, and/or training specialists. The participants were able to speak to the education and training needs in the plastic, petrochemical, and manufacturing industries. Participants had an understanding of both industry needs as well as company specific needs in filling labor force shortages.

A total of 10 manufacturing companies participated in this qualitative study. The participants are experts in their fields, holding positions within human resource management and executive structures, therefore, able to speak on the education and training needs. Experts interviewed were from Polymer Molding Inc., a manufacturer of plastic protective caps, plugs, and custom moldings. Komatsu Limited, a Japanese multinational corporation that manufactures construction, mining, and military equipment (komatsuamerica.com). Onex Corporation, a refractory distributor of industrial built furnaces (onex.com). Franklin Manufacturing and Powder Coat Company, a job shop specializing in small parts and powder coating. GeorgeKo Industries, a custom plastic injection molder. Specialty Fabrication and Powder Coating, a machine shop specializing in computer-aided manufacturing; metal working, laser cut parts, fabrication, painting, and assembly. Electralloy Division, a producer of bar, billet, coil rod, master alloy pigs and ingot products as well as weld wire and weld consumables. Schaal Glass, a manufacturer of glass insulated units. Essentra, a manufacturing producer of plastic components. Hamill Manufacturing, a manufacturing of precision machined and fabricated products, specializing in precision machining, welding, and fabrication of complex components for a variety of industries including defense, power generation, glass, steel, semi-conductor,

aerospace, and transportation. The study collected data from various manufacturing companies in western PA in order to represent companies that manufacture plastic products or produce products for the plastics and petrochemical industry. Participants have been given fictitious name.

Table 1: Participants

NAME	POSITION	COMPANY	PRODUCT	#EMPLOYEES
Sam	Director of Accounting and Human Resources	Manufacturing Commercial Construction Design engineering and service and repair.	Aluminum Framing Aluminum Entrances Aluminum Curtain Wall Demountable Partitions Glass Switch Light Glass Composite Panels	<100
Allen	Chief Executive Office	Manufacturer of plastic protective caps, plugs, and custom moldings. These types of products are usually disposable and are commonly used to protect threaded fittings, tubing and valves	Tubing inserts Netting Cable Ties High Temp Masking Plastic Tubing and Vials Vinyl Products	101-250
Phillip	Chief Executive Office	Components Manufacturer and Powder Coating Company	Powder coat products as small as a nut or bolt to car frames to large pieces to bridges. Ovens are 21 ft. long and 7 ft. tall. Featuring standard colors or specialty colors.	<100
Jane	Human Resources Manager	Steel Manufacturing	North America's exclusive licensed producer of all NITRONIC® bar, billet, coil rod, master alloy pigs and ingot products as well as NITRONIC® weld wire and weld consumables.	101-250
Ann	Human Resources Manager	Components Manufacturing and Powder Coating	Machine Shop Specializing in Computer-Aided Manufacturing; Metal working, laser cut parts, fabrication, painting, and assembly design, manufacture, and delivery of specialty fabrication parts and powder coated products, taking raw metal and cut it to customer specification.	101-250
Kasey	President	Plastics Manufacturing	Custom injection molding facility molds parts serving a	<100

			broad range of industries including plastics, juvenile products, automotive, medical, consumer and construction. Specializing in the following areas: short production runs, mold/assemble/pack & ship products, tool transfers, insert molding, overmolding and reshoring of tools from overseas.	
Liz	President	Refractory Installation, Repairs, Maintenance & Products Company	Designing, manufacturing, and servicing high quality furnaces and equipment for heat intensive industries	<100
William	Process Engineer	Manufacturer of Component Parts in The Plastic Industry	International supplier of specialty plastic, fiber, foam and packaging products with four principal operating divisions: Component & Protection Solutions, Porous Technologies, Packaging & Securing Solutions and Filter Products.	101-250
Kelly	Human Resource Manager	Machine Component Manufacturing Company	Manufacturing of precision machined and fabricated products. Specializing in precision machining, welding, and fabrication of complex components. Industries including Defense, Power Generation, Glass, Steel, Semi-Conductor, Aerospace, and Transportation; provide engineering services such as drafting, tool design, structural analysis, non-destructive test disciplines, and metallurgical evaluation.	101-250
Matt	Global Talent Manager	Mining and Construction Equipment Manufacturer	Develop, manufacture, distribute & service underground mining machinery. Manufactures and markets original equipment and aftermarket parts and services for the mining industries used extensively for the mining mineral resources.	>500

3.4 INSTITUTIONAL REVIEW BOARD

Institutional Review Board inquiry request was submitted on September 22, 2017. According to the Research Review Analyst from the University of Pittsburgh, the University of Pittsburgh IRB reviews all projects that meet two criteria: (1) The project must be "research," and (2) the project must include "human subjects." The federal regulations provide definitions for each of these terms, and those are the definitions that we use.

> Research is defined as "…a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge" (45 CFR 46.102.d). Thus, a case report on a single individual would not meet the definition because one could not generalize from that single case. A completely unstructured discussion with several people ('tell me what it was like to be a feminist in Berkeley in the 1960s') would not meet the definition because the investigation is not 'systematic.' On the other hand, an open-ended interview that includes a number of probing questions to ensure that all interviewees address the same topics would be considered to be systematic and would meet the definition of research – so long as sufficient people were interviewed to provide some assurance that the resulting information was generalizable.
>
> A Human Subject is defined as "…a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information" (45 CFR 46.102.f). Thus, individuals are considered to be a human subject if the researcher interviews them or asks them to complete an experiment, or if the researcher obtain

private information about them (e.g., medical information by reviewing their medical records).

The Research Review Analyst stated,

> IRB oversight is required only when a project meets the criteria for both research and human subjects' involvement based on two criteria: (1) The project must be "research," and (2) the project must include "human subjects', this study was considered research; however, it did not meet the federal definition of human subjects. The interview questions were requiring the person to provide any information about their self or any other identifiable individual. The "petrochemical and plastic industry" is the subject of the interview and therefore there are no human subjects. IRB oversight is required only when a project meets the criteria for both research and human subjects' involvement, therefor was not required for this study. See Appendix B.

3.5 DATA COLLECTION

The assessment of the workforce training demand and needs based on semi-structured interviews with petrochemical and plastics manufacturing employers served as a guide for surveying participants in this study. Interviews with regional industry employers were conducted to gain an understanding of their perspective on the education and training needs for careers in these industries (Wallentin et.al, 2015). A seven-item questionnaire was designed to obtain information from the participants pertaining to workforce and training needs in manufacturing. All questions were open ended and designed to gain extensive feedback from each participant.

Two questions concentrated on an analysis of the potential growth in the petrochemical and plastics industries. These questions focused on familiarity with the ethane cracker plant currently under construction in Beaver County. One question sought to determine challenges in meeting workforce needs. Three questions were designed to target education and training needs to meet workforce demand. The final question was an open-ended question that allowed for each participant to provide feedback on how Clarion University and higher education can assist in providing the needed education and training. See Appendix C.

The primary mode of inquiry for this research was interviews. Before engaging in the project each participant was informed of the purpose of the study and agreed to participate. Participants were given the option of in-person interviews and/or phone interviews to allow convenience given their work responsibilities. Interviews took place at a time conductive to their schedule. The professionals were interviewed for approximately 35-40 minutes. Interviews were conducted as a conversation with an opportunity to ask questions during and after the interview. All interviews were audio recorded with a digital recorder. Several interviews once completed, led to additional conversation and questions participants had regarding Clarion University's current education and training opportunities. The additional conversations identified a need to provide stakeholders with information on Clarion University programs. All participants were thanked for their time and showed a great level of appreciation for participating in the study.

3.6 DATA ANALYSIS

Qualitative data was compiled and analyzed from interviews with a survey instrument consisting of 7 questions. See Appendix C. The data was recorded using a digital recorder while note-taking was simultaneously engaged. The recordings were then transcribed and reviewed for accuracy and compared against notes. The transcripts and notes were then analyzed to determining the appropriate alignment of responses to research questions. The data was then categorized in the findings section based upon identified predominant emerging categories and themes.

After initial coding on each transcript, responses were compared and contrasted across each research question and interview question. These categories were developed from "broad organizational categories" to "explicit substantive categories" (Maxwell 2013). Throughout the analyses of the data, the "who", "what", "where", "how many', and "how much" were revisited in order to investigate further the "why" and "how" involved in understanding the broader context specific employer and industry training needs (Yin, 2017).

During the initial coding process, each interview questions was aligned to a research question. Some interview questions aligned to more than 1 of the 4 research questions developed for the inquiry of this study. Throughout the coding process, participant responses to all 7 interview questions were reviewed to determine if within the response to a specific question, there may also be information and data that aligned with multiple interview questions and/or research questions. For example, as a result of the initial review of responses, the 6th interview question, "What barriers and/or obstacles must be overcome to meet those needs?" was aligned to research question 2, "What is the current relationship between workforce development and higher education in meeting the needs of employers in the region?" and research question 4,

"How can the Pennsylvania State System of Higher Education, Clarion University, and the Office of Continuing Education help to bridge the connection?"

Furthermore, while coding, responses that indicated job specific training needs were aligned to research question 1, "What is the current need for specialized workforce training in petrochemical and plastics industries in the Northwest Pennsylvania region?" and research question 4, "How can the Pennsylvania State System of Higher Education, Clarion University, and the Office of Continuing Education help to bridge the connection?". These responses were also aligned with the 4th interview question, "What employee job skills are you and your company seeking to meet the demand of the petrochemical and plastics industry?", the 5th interview question, "What levels of education are required for positions within your company?", and the 7th interview question, "How can Clarion University best meet your companies needs in training the future petrochemical /plastics workforce?"

In addition, open conversation that took place at the conclusion of each interview led to additional data that could be analyzed and reported in the findings section to ultimately support actions and recommendations presented in the conclusions section.

The analysis was expanded to also evaluate regional and state workforce and economic development agency and stakeholder collaborative efforts in providing education and training. Predominant and emerging themes found in the data were again cross-analyzed to address research question 2, "What types of workforce development and skills training programs does Clarion University currently offer?", research question 3, "What is the current relationship between workforce development agencies and higher institutions in meeting the workforce development needs in the region.", and research question 4, "How can the Pennsylvania State System of Higher Education, Clarion University, and the Office of Continuing Education help to

bridge the connection?" Specifically, within the coding, identifying employers' involvement in or knowledge of workforce training initiatives with the NWPA region was sought. Understanding the current relationship and culture in workforce development and higher education will assist in identifying how the two stakeholders can work together toward a common goal.

The next step, once interview questions were aligned to research questions and all responses were cross-analyzed, involved the identification of emerging and similar themes from participant responses. Within the responses, identical and/or like terms and phrases were coded as predominant and emerging. This process was repeated multiple times in order to limit the influence of personal interpretation of a participant's response and to ensure validity in the data collected.

The intent of the research was to understand employers' needs and to determine how the Office of Continuing Education at Clarion University can assist in educating and training the needed labor force, as identified in the research. From this study I was able to identify comprehensive categories that emerged, which further presented explicit categories. Broad categories include: "community workforce and economic development", "skills training", and "labor force characteristics". Clearly defined categories are listed below in table 2 and discussed in the findings section.

Community workforce and economic development comprises of identified explicit categories to include industry knowledge and workforce and economic impact. Industry knowledge can be further categorized into two areas, employer knowledge and individual knowledge of industry. Explicit categories falling under skills training include stackable credentials and technical, trade, and apprenticeship programs. Labor force characteristics can be

further defined as the convention and standards of work, included within the explicit category, work ethic, attitude, integrity, and accountability.

Table 2: Categories

COMMUNITY WORKFORCE AND ECONOMIC DEVELOPMENT	**SKILLS TRAINING**	**LABOR FORCE CHARACTERISTICS**
Industry Knowledge	Stackable Credentials	The Conventions and Standards of Work
Workforce and Economic Impact	Technical, Trade, and Apprentice Programs	

Predominant and emerging themes when coding identified under the current need for specialized workforce training in petrochemical and plastics industries in the Northwest Pennsylvania region and employers' familiarity with the Shell petrochemical plant also known as an ethane cracker plant under construction in Beaver County and what it is, indicated overall limited knowledge of both the construction of the plan and an anticipated regional impact. While there is uncertainty, employers are hopeful that growth in the petrochemical industry will create growth in other industries as well. When diving further into the research related to how the cracker plant might impact industry in this region and specific companies, an analysis of the findings indicates employers anticipate a negative impact on the labor force. This impact may create an even greater shortage in a skilled workforce. In addition, this may increase the already apparent competition in attracting and retaining a skilled labor force.

Employers see a potential for economic growth in Northwestern PA. Participants value their communities and the region in which they work, indicating that Northwestern PA has the majority of essential resources for economic progress and advancement. Those resources include natural resources; capital, land, and buildings, technology development, and a transportation

infrastructure. According to the study, one valuable resource, considered to be the most important determinant for economic growth that the region lacks capacity in is human capital.

Lower unemployment rates combined with consistent job openings is making it more difficult for manufacturing companies to fill open positions. According to the HR and executive professionals, it's becoming more difficult to find qualified individuals for the jobs they are seeking to fill. Kelly stated, "We're all (manufacturing companies) fighting for the same 9 (skilled) employees." According to the study, factors impacting the labor shortage include fewer applicants, lack of work experience, competition from other employers, and a lack of education and technical skill training. There is a concern of a shortage in the production of qualified candidates entering the labor force. As such, there is a clear need for educating and training an unskilled labor force while simultaneously building a pipeline to expand the future labor force with the skills needed in manufacturing, plastics, and petrochemical industries.

The quality of the labor force is dependent on employee skills, abilities, training, and education. If the labor force is well trained and highly skilled there is a greater probability of economic growth. A labor shortage can negatively impact economic growth with in a company, community, industry, and region. Therefore, the labor force must be adequate in numbers with the necessary skills, abilities, training and education so that economic growth can be achieved. Research indicates individuals benefit from earning workforce training and vocational credentials in addition to degree attainment.

Participant responses support the identification of an area of problem, herein restating, the Pennsylvania Department of Community and Economic Development (2018) Industry Factsheet reported a 10.5% job growth in plastics in PA with a 50% greater employment concentration than the U.S. In addition to the anticipated growth, as of April 30, 2018,

Pennsylvanian's current unemployment rate was at a low 4.7%, down from 6.5% in January of 2014.

Close analysis revealed, expert responses hint to one major factor that will influence the supply and demand of labor…wages. Liz's response aligned with other experts. She indicated,

> The rate that we have to pay is only going to go up because it's highly competitive in general for people. I think the very first obstacle is getting those kids interested and not pushing them.

As the unemployment rate decreases, the demand for a skilled labor force increases. According to the Laws of Supply and Demand, the supply of labor is elastic. In industry, if an employer seeks to increase the labor force, they can attract labor from other industries by offering a higher wage. As such, and subject to the law of supply, a lower wage indicates a smaller supply. As employers' expectations of a skilled and educated worker rises, so must the wages they are willing to pay in order to attract applicants to careers in the manufacturing, plastics, and petrochemical industries. As growth in these industries expands, the demand for labor will increase, in order to meet that demand, wages in these industries will need to increase. Figure 2 below illustrates a visual model of the supply and demand for labor. Workers supply the labor and industry provides the demand for labor. According to the analysis, participants are experiencing a labor shortage for skilled workers. With the potential for an increase in demand as a result of the construction of the cracker plant in Monaca, PA, the already apparent shortage will increase. Industries response to move the supply and demand curve back to a point of equilibrium is to increase wages.

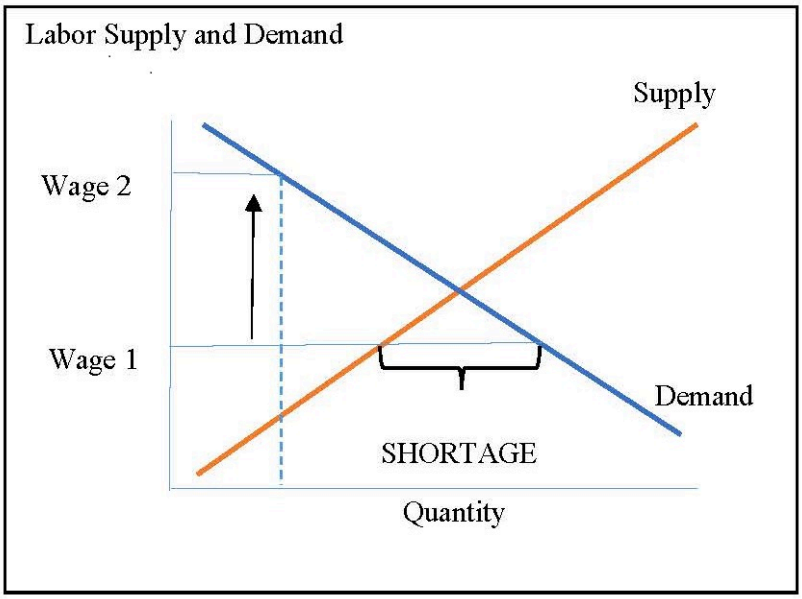


Figure 2: Labor Supply and Demand

Kelly's response supports the law of labor supply and demand. She stated,

> Well, it's interesting, because we lost one to the oil industry here. He was an apprentice, a machinist apprentice. And all of a sudden, he got this great offer with a lot more money to go to the company, the oil company, and off he went.

As a result of analysis via coding, soft skills, basic math skills, technical and trade skills, and apprentice programs emerged as common themes. These findings assisted in identifying the levels of education required for positions within the plastics, petrochemical, and manufacturing industries. Dependent on the level and educational credential required for jobs and careers within industry, potential employees' educational training levels could vary from a high school diploma, continuing education certificates, trade certifications, on-the-job training, and apprenticeships, to technical, mechanical, and engineering degrees. Based on the qualitative data collected, deficient technical applied skills linked to labor shortages emerged in specific areas

including: basic machinery skills, welding, machine operators, material handlers, inspectors, and engineers. Jane stated,

> Sometimes even though they (applicants and employees) have a high school degree, if they have enhanced skills in those areas it can be very helpful here.

Analysis of the findings also indicated funding for education and training, high school students' knowledge of trades and the potential for jobs that pay a sustainable wage, attitude, expectation, and reality of work are all influenced and impacted by the collaborative initiatives and relationships between employers, workforce development, and education, both secondary and postsecondary, in order to address or remove barriers to meet labor force needs.

In analyzing the data to understand and identify how the Pennsylvania State System of Higher Education, Clarion University, and the Office of Continuing Education can/should development and deliver programming that meets employers' needs in training the future petrochemical /plastics workforce, the predominate themes found, offering training at multiple levels from certificate to degree that can be built on stackable credentials appeared to be favorable among participants. They also indicated a strong need for the introduction of trade shills to begin at the high school level. Sam stated,

> Kids coming out of high school even at the elementary level need to know there are good paying jobs in technical and trade careers.

Analysis of the findings also indicated stackable credentials, defined by the researcher as, a sequence of experience, education, and training credentials accrued over time that will assist individuals in upward mobility along a career path is valued by employers. An example of credential stacking in manufacturing may include a high school diploma in conjunction with a

technical school certification in areas of concentration such as plastics technician, welding, or machining.

Stackable credentials, referred to as sequential qualifications, training, certifications, and degree attainment that can be accrued over time allowing an individual to progress along a career path, are valued by employers. With the shortage in availability of educated and skilled workers, employers and industries are concerned with maintaining and increasing their labor pool. Stacking credentials is a model in that can assist in addressing this concern.

The pathway for credential attainment can take multiple routes at various intersections. For example, an individual after high school graduation could enter the labor force and begin to obtain industry certifications through on-the-job training (OJT) or enter into a post-secondary track, such as Clarion University's associate degree in Applied Technology. At completion of this juncture, an individual would have the opportunity to once again enter the labor force, earn industry specific certifications, or continue on for a bachelor's degree in an area designed to expand upon the associate degree. Figure 3: Technical Training and Career Pathway below is a model I created as a visual for career pathways that indicates multiple "on" and "off" ramps to continued education and credential stacking.

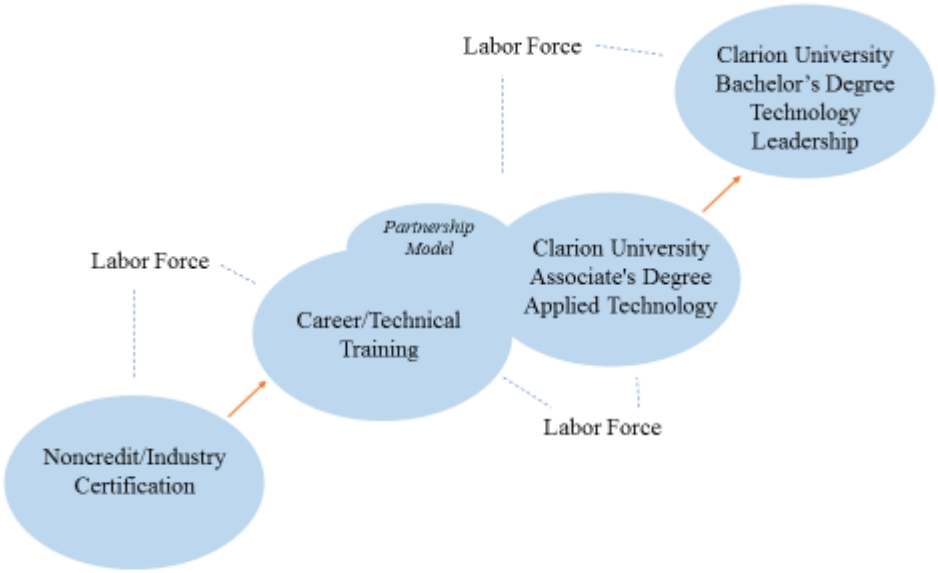


Figure 3: T.Dulaney, Technical Training and Career Pathway

Figure 3: Technical Training and Career Pathway, represents pathways students have to exiting and reentering education in order to stack credentials. The fundamental goal is to provide the future workforce with the skills needed for high demand occupational fields ensuring graduates have the educational foundation to pursue educational credentialing. Furthermore, there is an intent to meet the ever-changing needs of regional employers and workforce through an innovative and entrepreneurial approach to program and course delivery with the resolve to aid students in the seamless transition to continue education or stop out to enter the labor force with the ability to return for credential attainment.

Introductory courses including discipline-based career exploration in partnership with industry leaders, in addition to credit and noncredit courses in math, reading, writing, and job search/readiness skills support students' transition onto the next step of the credential ladder. A continuing education certificate can lay the foundation for students to transition to academic

programs for additional certifications, associate degrees, and beyond. Implementing continuing education programs that target specific market populations, could present financial growth opportunities for departments in the short run and longer-term recruitment and enrollment growth for the university. Specifically, addressing academic deficiencies and supporting students' persistence to credential attainment through the initial introduction to a certificate program. Such programming can be designed with the intent to provide opportunities for noncredit certificate seeking students to transition into degree programs while increasing revenues for CE departments. During development of certificate programs, curriculum should ensure rigorous academic and skills training with clearly defined outcomes. The Office of Continuing Education has developed a workforce readiness program that addresses skills desired by employers. These skills include: (1) learning how to learn, (2) competence in mathematics, reading, and writing, (3) effective listening and communication skills, and (4) critical thinking and problem solving as it relates to manufacturing. The program provides employees with a basic course of studies designed to increase the likelihood of success in entry-level manufacturing positions. See Appendix D.

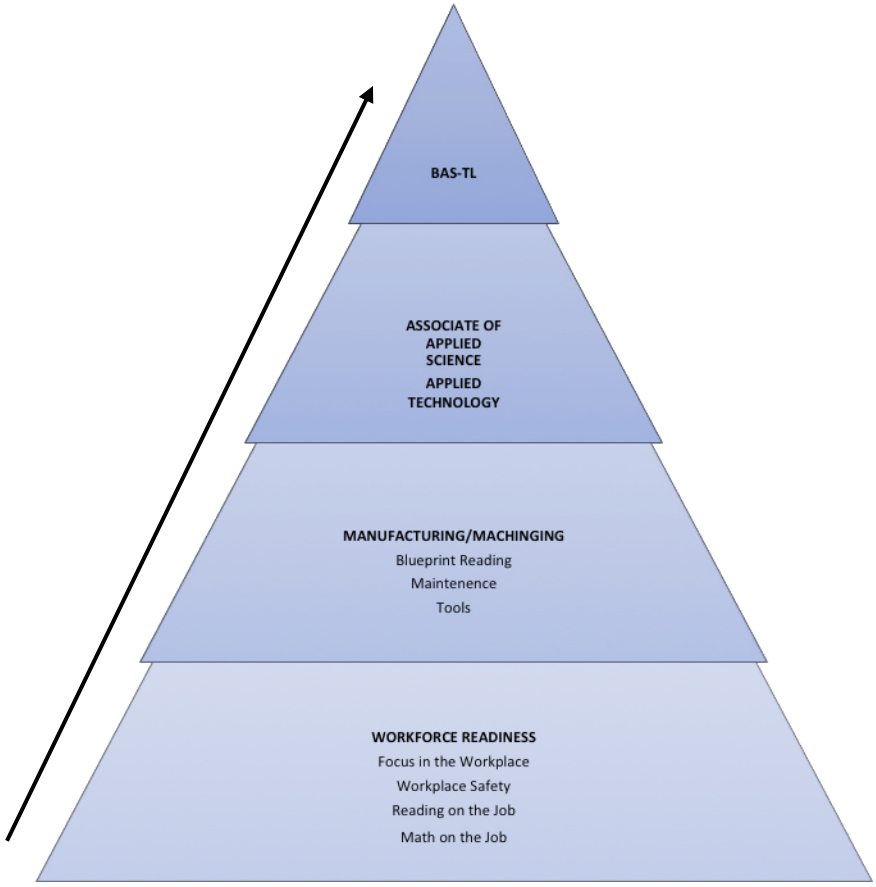


Figure 4: T. Dulaney, Ladder approach for training beginning at a workforce readiness level, progressing through credential stacking with a path to a bachelor's degree.

I created figure 4 above as a model for credential stacking. A "credential ladder" approach in developing continuing education programs designed to assure a specified level of competency in math, reading, writing, and job discipline builds the foundation of entry level skills training and educational attainment. Participation in career exploration opportunities through partnerships with business and industry in strategic sectors prepares students for gainful employment, while teaching industry specific skills. Programming and development to include a clear set of actions that support financial sustainability by considering a variety of approaches including continuing education certification, technical training, and the traditional class model build the framework for credential stacking. Projects should emphasize promoting target

programs to adult audiences and facilitating their admission to a certificate program and, potentially, an eventual degree program.

Individuals successfully completing competency-based training programs could provide a useful gage for identifying "high-potential" job candidates (Franklin & Lytle, 2015; & Lorenzo, 2012). Higher education institutions and workforce development training providers are recognizing that becoming outcomes-focused is central to achieving the mission of meeting regional workforce needs (Murray, 2014; & Stevens, 2010). Some workforce training programs use employer and participant satisfaction as a measure of evaluation for training programs to determine if students' education and skills training meet employers' needs.

In addition, close analysis of responses found participants value apprenticeship programs. Apprentice programs can be defined as OJT, consistent with industry standards, supplemented by related technical instruction (RTI) in a defined trade. Kasey stated, "I've been trying to push with the state's apprenticeship programs." Pennsylvania state approved apprentice programs occupations include Computer Numerical Control (CNC) Operator and Programmer, Electrical Systems Technician, Machinist and Welder/Fitter to name only a few.

Close analysis of the findings supports employers' aspiration and need for a skilled labor force in manufacturing, plastics, and petrochemical industries. The specific skills employers are looking for in an applicant can be obtained through multiple avenues, these include but are not limited to, technical vocational training, on-the-job training in a specific trade with years of experience, and apprentice programs for new workers entering the labor force.

Technical vocational training provides job-specific training in the trades. Technical vocational training programs typically offer students both in-class lecture and hands-on technical training. Regional school districts partner with county Career and Technical Centers (CTCs) to

provide academic study, hands-on experience, as well as opportunities for work experience. Kasey stated a need for introduction at the high school level and in CTCs by stating,

> I've just gotta go back to the high school…there's a point in time where they start to teach them work skills. What you're expected to do, educate them a little bit more on manufacturing in general. Or a job in general, I mean showing up and doing the different things that are necessary. Okay. Yeah, I've been working with them trying to work along the lines of supporting apprenticeship programs for the plastics industry to help out. But I also think it's gotta go back to the high school and like up in Erie, it should be a situation where the local high schools, like the VoTechs here have plastics again. They used to at one point in time, but they don't anymore.

Community Colleges and technical schools offer technical vocational training to postsecondary students. Technical vocational training programs at both the high school level and postsecondary can lead to industry certifications, a diploma, or a certificate of completion. At the postsecondary level, these programs are typically shorter in length. Clarion University's certificate programs are one-year or less.

In addition to technical vocational training in the trades, apprenticeship programs offer individuals and opportunity to learn a trade, typically through an employer. Liz stated, "Types of apprenticeship. Because, they would've been in an apprenticeship type program for longer." Apprentice is defined as an individual in process of learning a trade skilled from an experience skilled professional. An apprentice is often a beginner in the trade. In some cases, an apprentice could have theoretical training in the field, while the apprenticeship provides the foundation for practical applied training. Registered apprentice programs have PA state defined standards and competencies requiring a combination of 2000 work hours, supplemented with a minimum of

144 hours per year of apprentice training. Apprenticeship programs must be a minimum of 1 year in length. See Appendix F.

Through a high school sponsored apprenticeship program, high school students would have the opportunity to begin as a pre-apprentice while completing their senior year. The program could be structured to work in tandem with the students' high school schedule and curriculum. Upon graduation, the student would have the opportunity to complete a second year as a paid employee and apprentice within a company. Apprenticeship programs are part of a greater workforce development initiative underway at the PA State level in collaboration with industry and educational and training institutions. Through apprenticeship programs employers have the opportunity to take a leading role in developing their pipeline of highly-skilled and motivated workers.

Customary and traditional conventions and standards of work appeared to be among the top challenges employers face on a continuous basis. The challenge is bridging the connection between employer and employee assumptions and expectations in a manufacturing environment. Findings indicate knowledge capital, defined as, the intangible assets that represent valuable ideas, methods, processes and other intuitive talents that employees bring to the industry, appears to be a skills gap trend in manufacturing. Most participants stated that there is knowledge disconnect between employees and applicants and human resource management in manufacturing.

Employers questioned their responses as to whether the change needs to take place in reshaping the future labor force or if the employer needs to reevaluate their expectations of how employees conduct their work. Employers discussed the traditional 40-hour work week and the

challenges they face in filling positions that have set schedules and hours, stating, employees want flexibility. Allen stated,

> Being brought up in the generation that if you're five minutes early for a meeting, you're 10 minutes late.

Employer responses, however, pointed out, in many cases employees need flexibility because of their personal situations that impact their availability to work. He also acknowledged today's labor force has different expectations of what a day's work really means and looks like, creating a challenge of balancing employer and employee expectations.

Given the analysis of the findings, an opportunity exists for higher education and the departments responsible for workforce development training to engage employers more proactively as partners in competency-based program development and assessment, by defining the skills needed to be successful on the job (Franklin & Lytle, 2015; Lorenzo, 2012; & Valenzuela et.al, 2016).

3.7 LIMITATIONS TO THE STUDY

Limitations to this study include the one-time engagement with participants. Participants' limited knowledge of current developments in the plastic and petrochemical industry identified a limitation, specifically the construction of the ethane cracker plant in Monaca, PA. As such, participants were unable to adequately provide insight on the potential for economic and workforce growth in the region. Future research will want to address these challenges before engaging in additional research on the educational and training needs specific to the plastic and

petrochemical industries in Northwestern Pennsylvania. Although this study had the preceding limitations sound data was collected.

4.0 FINDINGS

4.1 INTRODUCTION

Chapter 4 focuses on the identification and comprehension of employers' familiarity with the ethane cracker plant under construction in Beaver County, Pennsylvania, the potential growth in the plastic and petrochemical industries, and the impact anticipated growth could have on the region, from both a workforce and economic development stance. In addition, the research focused on the potential impact growth would have on a specific company, in order to assist in identifying educational and training needs to meet employers' needs. The intent was to determine if stakeholders are working collaboratively to (1) identify the needs of Commonwealth employers and (2) support the educational and training needs of the labor force and Clarion University students. This study was intended to explore qualitative data to determine if mutual and concerted investments in academic and non-credit programming are aligned and furthermore to develop workforce training programs that meet the needs of regional plastic, petrochemical, and manufacturing employers within the commonwealth while simultaneously supporting Clarion University students.

As stated above, from the analysis of the qualitative data collected, the identification of comprehensive categories emerged including, "community workforce and economic development", "skills training", and "labor force characteristics"., which further presented

explicit categories, “industry knowledge”, “workforce and economic impact”, “stackable credentials”, “technical, trade, and apprentice programs”, and “the conventions and standards of work.”

4.2 COMMUNITY WORKFORCE AND ECONOMIC DEVELOPMENT

4.2.1 Industry knowledge

Manufacturing companies located in Northwestern Pennsylvania have limited knowledge of the Shell Cracker plant currently under construction in Beaver County. As a result, companies are unable to adequately gauge the potential for industry and economic growth. Of the ten participants, eight responded they had limited knowledge of the cracker plant. Three participants stated, “I am not familiar”, “very limited”, “just heard of it.” Two employers stated they only know what they have heard in the press. Janet stated, “Just the little bit that I read in the media, that's all.” Allen stated,

> Really not that much. We're up in Erie, so I don't a lot of whole lot of detail, the Pittsburgh press. Obviously, I'm aware of the fact that it is coming, but I don't have a whole lot of input yet on how it's actually going to affect polymer molding or the polymers that we buy. For the most part, I know about what they will be able to provide is the by-products. This will allow someone else to manufacture polyethylene, polypropylene, and things like that. So, until somebody comes up behind them and says that I'm going to be building a plant to produce polyethylene or other types of polymers,

it doesn't have that much of an impact on me, so I guess I have followed it from afar would be the best way to put it.

Employers also lacked knowledge as to when the construction of the cracker plant in Beaver County would be completed and when they may experience growth with their production. William stated,

> I've just read things online where it says it's underway, and I think it's supposed to come on line the next year or the year after. So, it seems like a really good idea because we have a lot of shale. It seems like there would be a really big need for something like that up in our area. With the Shell gas and everything, it seems like they have the raw materials to make it, but my understanding is most of that stuff is done down in the Gulf Coast and there's not too much of it up there. So, I think it's a pretty good idea.

Liz added,

> They are installing equipment that we could potentially install, but what they did was, they brought it in from, I believe, from China on barge up the Ohio River. So, we have not been able, as a local company, to be able to install in that plant. I can tell you that it has built up all the labor resources that we need, so that's good.

Experts in their respective fields offered a mix of responses that ultimately culminated into a common theme of uncertainty, yet hopeful for economic growth. Employers are optimistic, when asked, "What do you see as potential growth in the petrochemical and plastics industry in NWPA?" Matt responded with,

> Sure. I think that could be a good indication of what's next to come. From our company, we're working on different commodities that we mine, and our industry has been very cyclical over the years. We have strong years, we have weak years, and of recent it has

been a lot stronger. I would say over the last two or so years we've seen an uptick in business, but I really hope that's a trend that's going to continue to come down the line. But in terms of the petrochemical industry, I think we've heard some more and more things about it, maybe not directly relating to what we do, but it's really piqued our interest to see what's going to come next within the Northwestern PA region as it comes to petrochemicals and how we may be able to jump upon that, with attracting more employees to the region, more jobs, more business levels to our four or so plants that we have. It's an interesting balance that we've seen, and we don't know really how it's going to impact us and our organization, but it's really interesting to see how things may spread out over the coming years.

William stated, “I think that we're ripe to bring industry here.” Liz’s response echoed that of William’s, she responded,

> We currently have a natural resource for that industry. The way we would be impacted by it is all the piping that's required to get natural gas out of the ground and to the plant in the cracking blocks. Those are all things that our clients make. But we're servicing the furnaces that make those materials that are used.

Allen stated,

> Most of our polyethylenes, polypropylenes, materials like that come from the Gulf of Mexico. They come in through Texas, so there's a lot, it's just like gasoline. Northwest Pennsylvania, we kind of get hosed on transportation costs, and it's all in that pipeline, how are they going to get the material and everything to us, so if it already is being sourced in the Pittsburgh area, or southeastern Ohio, or West Virginia, which is other places I've heard of, that might be putting something online that obviously transportation

costs and things like that are going to come right off of the cost of the material and save us some money.

Northwestern Pennsylvania has many valuable resources to offer, including access to the Marcellus-Utica shale region, a strong transportation infrastructure, and manufacturers of by-products in the region. William, referring to the by-product of the polyethylene that would support the plastics manufactures in the NWPA region, added,

> As far as potential growth, I read a lot of stuff about processing, I'm not sure exactly where they talk about processing or anything, but I'd hope that maybe we get some of that around here.

Allen shared his views on the potential by stating,

> Well I guess, again, going back to what I just said, it all depends on what they do with it. This plant that they are building will be able to produce the by-products that are used in the petrochemical industry so as far as polymer production goes, it all depends on where that's going to go. If somebody else is going to build a plant down the road and produce polyethylene out of it, it could have a great effect on a company like Polymer Moldings, or even Northwest PA Molders only because of transportation costs alone.

Ann's perspective on the potential for growth was on a larger scale, she stated,

> With the plastics, I think that it would be.... only because the manufacturers are here, I think that I would have to look at it globally, what they're selling around the world and I'm thinking one of our main customers who's in the plastic industry, they're international. So, what they grow here, a lot of times they're growing internationally as well.

The real potential and opportunity for economic growth for the Northwestern region enthuses employers that operate and employ in the area. Jane was passionate about the idea of development by stating,

> I do believe there will be growth here. Well, hopefully it will not only increase productivity but I'm hoping it will increase some spending in the area because, this area has been extremely economically depressed. You know, maybe it will bring more people and hopefully help out in other industries.

In addition to the limited knowledge surrounding the cracker plant, participants expressed a concern that the future labor force has very limited knowledge of career opportunities in the trades. It was apparent from the responses, expert experiences and interactions with the current labor force and general population indicates there is a lack of knowledge and interest in learning a trade skill such as machining, welding, or fabricating. Experts expressed a need to promote, at an early age, career opportunities in manufacturing and technical trades. Participants indicated a need to inform and educate the future workforce on careers and training opportunities in manufacturing and other trade related occupations. Ann stated,

> Paint a realistic picture, look at education, especially parents of the students, they want their children to succeed and be more successful than they were. So, when they are, they being the parents, doing the research for the children, they want their kids to go into careers or jobs that are paying a lot of money, or more than they made or that they're currently making. One of the things that I tried to expand upon in Venango County is that not everybody is meant to go to college. So, we miss out on very good technical employees because the parents want their kids to go to college.

Participants' responses also stressed an importance of presenting opportunities to individuals at the high school level in order to promote and create an awareness and interest in technical training. At the high school level, students are beginning to explore education, training, and career opportunities. Allen stated,

"I think you almost need to get into the high schools. Get into the technical schools."

There appeared to be a consensus that while high school students are encouraged to further their education, opportunities are often missed in identifying and nurturing the career pathways for those interested in technical and trade occupations. A student's high school career is a prime time to present and introduce them to a variety of career fields, many of which may only require industry certification and/or technical skills training.

4.2.2 Workforce and economic impact

Employers are experiencing difficulties in recruiting for positions within manufacturing. Participants identified skills that are lacking amongst applicants. Employers responded to how the cracker plant may impact industry in this region and their companies shared concerns of a negative impact on the labor force. In addition to an increased labor shortage, current applicants lack essential basic skills participants identified include: math skills, reading, critical thinking, professionalism and work ethic, and knowledge of proper safety. Matt stated,

> Some of that more skilled set is something that we've kind of struggled with recruiting for at our manufacturing plants.

Ann thought the impact of industry growth and the construction of the cracker plant would mostly affect the skilled labor force and more specifically create an even greater labor shortage she and others are currently experiencing. She stated,

> The (shortage of a) skilled labor that's required. I think we're far enough away (from the cracker plant) that we're not being impacted to much in the building of it, but it depends on their wages and such that they may draw employees down to that area, away from the rural areas like Venango County and ultimately Clarion county.

Participants are concerned growth in the plastics and petrochemical industries will impact the labor market. Phillip and Kelly's responses supported Ann's concerns that industry growth in the region will increase the already apparent labor force shortage. Phillip stated,

> For myself, I mean it's always has the potential to take away employees that I might have used for myself. If they're paying more or they're getting benefits, whatever, that would definitely impact me.

Kelly responded with,

> Well, the thing it'll do is, it'll take potential employees from the other manufactures in the area. Because especially if they pay higher wages. So, it's gonna be a burden on us because there's just not enough people.

Phillip concluded with,

> Normally people from this area wouldn't travel that far, but if the price is right, they would. So yeah, anything like that could always impact, especially if they're gonna make seven of those plants, that could definitely impact me as far as my employee pool goes.

Experts also shared similar concerns with having a labor force that is skilled in technical trades. Matt stated,

> Within our company, we have multiple functions. Engineering is a key one for us. Our global engineering base is located in Franklin, and we have probably about 160 to 180 employees that are in our engineering department at our administration facility in Franklin. We really are trying to attract jobs to the Franklin area in terms of engineering, we also have supply chain, finance, marketing, we have a few HR positions as well, IT. We used to have a large manufacturing facility, but that closed down about three years ago I believe, two or three years ago, and so even though we don't focus a lot on the heavy machinery manufacturing in the Franklin area we do have other plans that are seeing a huge increase in business, and the skilled labor skillset is really key to those locations in terms of machinist roles, welding, heavy labor, even operating equipment.

Jane's response aligned with others, she stated,

> Well, we do a lot of on the job training here. The people that come to work here in the do need basic skills. And this may sound elementary but things such as reading, reading tape measures, micrometers, different scales and gauges. We do give a basic skills test here and the employees that come to work have to be able to do their basic skills. Math is a big thing. Reading is a big thing. So, we need people that have good skills in math, reading, welding skills, basic machinery skills.

Kasey's company needs employees with skill specific training. When asked, "What employee job skills are you and your company seeking to meet the demand of the petrochemical and plastics industry?" he responded,

> Mid-level people where we're in a situation where it's ... machine set up people, color materials handler, maintenance people, a step up above from just a sampler.

Kelly's company is also looking to hire individuals with specific skills. She stated,

> So, what now we're looking for, we have a hard time finding machine operators, CNC machinists, machinists, inspectors, welders.

Matt is looking for engineers to fill positions. He stated, “for the most part we always look to fill more engineering positions.”

In addition to entry=level skills to be successful in a manufacturing work environment, employers are also in search of employees and applicants with specialized education and training.

4.3 SKILLS TRAINING

4.3.1 Stackable credentials

From the findings is it apparent, employers support employee advancement in training and educational attainment. Participants stated their companies offer various forms of career and professional development. There are opportunities for in-house training, such as apprenticeships programs and on-the-job training (OJT) and third-party training, in which employers contract training vendors for essential skills trainings and more advance training needs, such as CNC programming. Some employers offer tuition reimbursement for employees enrolled in degree programs. Matt stated,

> We do have opportunities available for employees to work on continuing their education, so (we) will support any kind of a tuition reimbursement for employees going for any kind of certification, degree.

The levels of training vary between companies, from high school diploma to bachelor degrees depending on the position. Allen stated,

> The quality person's going to have a bachelor's degree. Our accounting clerks have an associate degree. My controller, however, does have a bachelor's degree. I've got toolmakers, also, which is more on the trades side, they go through an apprentice, journeyman, and then finally get their toolmaker papers after years of service.

William stated, “The more education and the more training, definitely the better.” Jane stated, “If they could have something in addition to their degrees.” Indicating a value for noncredit and industry certifications in areas ranging from soft skills, intrapersonal skills, communication and manufacturing fundamentals to more specific customized training such as welding, process technician certifications and occupation health and safety administration certification (OSHA). William stated, “Continuing education or advanced certification classes. So definitely things like that.”

William’s response was similar,

> Depends on the position. Some engineering degrees, some zero experience, more like you to have experience, at least a few years. But I would say training dependent on the position and where you're at or whatever. So, we have a pretty wide range. The more education and the more training, definitely the better.

Matt stated,

> It would differ based on the position itself. For a lot of our engineering-based roles, a four-year degree at an accredited university. For our hourly roles in the shop, we take into consideration any kind of past experience, they don't have to be degrees. We really see

that unique skillset in these skilled labor workforce of the experience and the perspective really coming into play with the hands-on equipment that we have.

4.3.2 Technical, trade, and apprentice programs

Participants responded to a need for multiple levels of education and training dependent on the nature of the position and job specific duties. While some positions require a high school diploma and on-the-job training, other positions require certifications and post-secondary degrees. Sam stated, “We're looking for a lot of our positions coming right out of high school, learn a trade.” Kasey’s response was similar. He stated, “High school, then go do something, but I mean a certificate in maintenance, they have some industrial maintenance classes, that would help along those lines and definitely have a bonus in that sense.

Employers’ responses emphasize the need for recruiting, training, and retaining qualifies workers. Matt identified the need for recruitment by stating,

> It's important for us to really recruit to these small areas in Northwestern Pennsylvania, especially if we have large facilities.

Ann indicated the multiple levels of education needed with her company stating,

> People that come to work here must have a minimum of a high school diploma. Now, we have other areas, like for example, in our chem lab. We like them to have a degree in chemistry. It's very helpful. Degrees in welding are very helpful. We've had people that come into our maintenance areas that have gone to trade schools ..... universities. And have mechanical degrees. We have some engineers, like process engineers is another area ...Degrees in production planning. Those are all degree areas that we look for. Engineers,

accountants, production planning. I could say welding, mechanical, maintenance, those are all e areas that if people have training, would be very helpful.

Kasey stated,

> A certificate in maintenance, they have some industrial maintenance classes that would help along those lines and definitely have a bonus in that sense. It's more your aptitude and how easily you can learn, I guess. Yeah. I think ... and often I've been trying to push with the state's apprenticeship programs for set up and along those lines, so we're trying to develop

4.4 LABOR FORCE CHARACTERISTICS

4.4.1 The conventions and standards of work

Participants expressed their need for a labor force that understands the nature of work and the diligence it requires to enter the labor force and to maintain employability in one's career. Specifically, participants discussed what they referred to as "work ethic". Allen stated,

> Having a solid work ethic as far as being on time, showing up, doing a good job, and punching out…just getting someone that shows up to work, focuses for eight hours, and gives you a good, honest eight hours' worth of work, that's actually extremely challenging these days.

Sam's response echoed those of Allen's. Sam stated,

> Show up every day, but have a good work ethic, willing to learn and train.

HR managers and company executives stressed the need to instill in the labor force an understanding of the principles of obtaining and keeping a job. Jane stated,

> Sometimes, people don't realize, I hate to say it, but what a commitment to come to work means. We need people that are gonna come every day. We understand that people have personal problems once in a while, illnesses once in a while, but they need to be committed to going to class every day in college, in high school, so that they will come to work every day as well.

Participants discussed how employees value or feel about their jobs to how employees conduct their work. They spoke of individual characteristics that impact job performance; such as attitude, integrity, and accountability. Kasey stated,

> Teach them morals and values, teach them how to show up for work. That alone. I mean, most of the time, especially even in the plastics industry up here it's a situation where it's just hard getting people to come to work all the time. Just to show up every day.

A predominant challenge is increasing the level of motivation employees have and their engagement in the work they do. Experts spoke of a time when one's work ethic defined the individual. Allen stated,

> These guys all seem to think, "You know what, I get there when I get there, and if I miss work, I miss work," having no sense of what problems that causes for my company or anything like that, either having to shut machines down or have other people from other departments cover, and things like that. It really does throw monkey wrenches into the operations. I guess the whole nonchalant I-really-don't-care-if-you-hire-me, really-don't-care-if-I-work-today type of attitude. We get a lot of people, "I'm just working long

enough to get my benefits kicked back in, and then I'll probably quit or else I'll get fired." It's just, you don't have that work ethic, and I think that starts back in the schools.

Particularly, they described the pride long time employees have in the daily work they do. With an aging labor force, that motivation, work ethic, and pride seems to be lost as we look to current and future labor pools. Allen shared an example, saying,

> Nowadays, we'll see six, eight, 10 people come through before we find one that sticks, and that's the unfortunate thing because that's where a lot of the entry-level, lower, middle-class jobs are. The people that are going to earn 35 to $40,000 dollars a year, and it's just very difficult to find those type of people anymore… Nowadays we give 42 chances to try to keep them around, and they learn that there's no real downside to their poor behavior, and unfortunately, they don't really learn that until they get in the real world, and people like me fire them.

Phillip shared,

> It goes back to, I remember, and I don't mind using myself as an example but, I went for a job interview, and the job interview was to clean bathrooms at rest stops. But I dressed up. I put a tie on. I put a nice shirt, pants all that stuff. Because, I wanted that job. Because, I needed that job. If they come in here and they are dressed and ready to interview, that's like the first thing you see. So, I don't see that piece of paper they've got from a college. I see what they're presenting to me right then and there, so I'm already making that assessment in my head. This guy knew enough to clean himself up, to put a tie on, to come to this interview. So, now I see potential in this person. Whether they have the background in it, or not, they're obviously eager and willing to learn.

Findings indicated there is a need for a more collaborative and concerted effort in educating and training the future labor force and pipeline. These efforts must begin at the high school level if not sooner. Efforts should focus on educating the future labor force of training and career opportunities in manufacturing. Providing the future labor force with the information and skills needed to be successful in such careers.

5.0 CONCLUSION AND RECOMMENDATIONS

The Research findings conclude that Higher Education and more specifically, as related to this study, Clarion University of Pennsylvania is in a prime position to assist the Commonwealth, industry, employers, and individuals with meeting education, skills, and training needs as identified throughout the research in order to meet emerging and changing workforce needs in the petrochemical and plastics industries.

Recommendations based on this research include building stronger collaborative partnerships among all stakeholders, Clarion University strengthened relationships with employers, and higher educations' need to actively participate in workforce development training initiatives.

The first recommendation is to build strong communication and partnerships with the NWPA Workforce Investment Board, regional Economic and Development Authorities, regional career and technology centers (CTCs) that serve school districts, technical training providers, and local Chambers of Commerce. Such collaborations will create a foundation for stakeholders to work cooperatively to identify, develop, and offer training at local and regional levels within Northwest PA. Partnerships and collaborations at the local levels with CTCs will also assist in addressing the need to educate high school students and the future labor force of career

opportunities in manufacturing and other trades. Partnerships with technical training providers will assist in meeting industry specific training needs within the great NWPA region.

Today's employers seek highly skilled personnel with comprehensive knowledge that applies to real-world settings (Potter, 2015). By clearly identifying competencies, postsecondary institutions and training providers in collaboration with workforce and economic development agencies can assure they are providing the skills needed to develop a strong and talented workforce with the abilities to perform on the job.

As a second recommendation, Clarion University in collaboration with employers and workforce development agencies could identify and provide additional training opportunities for continued education. Noncredit training could address soft skills training that focuses on topic areas that include: critical thinking and problem solving, time management, interpersonal skills, leadership & management, professionalism, public speaking and presentations, conflict management, teamwork, and communication skills. Clarion University could also expand their current offerings of certificate programs to align with industry certifications. When creating a plan to develop new programs, department leaders need to prepare for obstacles and have processes in place when confronted with challenges. According to Layne Harpine, (2015), a contributor for the Learning Resource Network (LERN),

> "It doesn't happen by accident. In order to do this flawlessly, you must have set goals and a well thought out plan. Department leaders need to have a plan."

There are three distinct priorities identified in meeting employers' labor force needs; programming, operations, and marketing of workforce development and training programs.

There is substantial research supporting the value of workforce development focused on education and training (Arena, 2013; Grubb, Badway, Bell, 2003; Ozmun, 2012; and Simone &

Cesena, 2010), however, there is limited literature on credential stacking beginning at the noncredit level, again, which underscores the value of educational credential stacking. There is a needed collaboration to bring workforce delivery and noncredit programming to the labor market. With the Northwest PA region lacking a community college presence, Clarion University and Venango Campus can take a leadership role in this area. The intent should be to expand and coordinate the patchwork of existing academic and support services across campuses to introduce workforce development programs to meet the educational and skill-building needs of the labor force. Priorities include: 1) access to higher education; 2) targeted skills building; 3) retention of workforce funded-eligible students/dislocated workers; and 4) employment opportunities for displaced/dislocated workers. The research indicates that employers' education and training needs for their future labor force cannot be met solely by Clarion University. As such, there needs to be a greater concerted effort on the part of secondary education, higher education, workforce and economic development agencies, the Commonwealth, and individuals to work collectively to address the education and training needs of business and industry.

The third recommendation is a challenge for the higher education and more specifically Clarion University as related to this research, is to devise a competency-based workforce development training programs can measure competencies mastered through student experiences and assessments. Such an outcome-focused framework would increase the awareness and accountability for workforce training programs and make job-related credentials more transparent and relevant to employers, students, and educational institutions. Such a framework could also assist higher education professionals in developing industry-based curriculum, focused on student learning outcomes, potentially improving employment and outcomes for students.

Existing literature provides insights into the varied performance measures that are currently utilized to evaluate the efficiency and effectiveness of delivering the needed shills to be successful in today's labor market. Assessment and evaluation with defined standards must form the foundation of planning for economic and workforce development training opportunities. This involves assessing workforce development needs and evaluating how well current program offerings respond to those needs. Competency-based assessment can assist in providing the needed data to evaluate student learning outcomes in non-credit workforce development training programs. Higher education institutions can successfully integrate the assessment of economic and workforce development activities into their institutional strategic and operational planning processes (Jones, et.al, 2002).

A competency-based framework for workforce development training can be used to standardize the language for defining learning outcomes of training programs. This would provide a metric for gauging student learning outcomes and mastery of job-related skills. With a well-developed and proficient process for defining competencies required for a specific program and job skill, and for measuring and assessing student achievement, the model could also maintain the flexibility and responsiveness associated with such programs designed to meet employer and workforce needs.

There is a significant importance for an educational institution in staying well-informed of changes in business and industry by conducting continuous environmental scans. Findings also conclude there is a necessity for institutions to establish systematic methods of collecting, distributing, analyzing, and applying information regarding external influences for the purpose of planning, training development, and curriculum development as directly related to labor force initiatives. An institution must adapt to the environment by devising methods of collecting

information and putting processes in place for the analysis and utilization of the information in order to provide necessary and pertinent information that will assist in guiding the planning process and further assist in the development and delivery of training programs. It is also notably difficult for any one individual to be knowledgeable of all factors that may affect the broader context, and it often requires collaboration from multiple individuals from multiple disciplines and areas of expertise to assist in the collection and analysis of information collected. Environmental scanning should provide opportunity for all individuals and stakeholders with invested interest to contribute.

In conclusion, State and federal government, economic development agencies, secondary education, and higher education institutions; including trade schools, community colleges, and four-year public and private institutions; need to play an active role in adequately supporting the needs of employers and students seeking education and training in order to meet the changing and emerging workforce development training needs in Northwest Pennsylvania.

5.1 IMPLICATIONS FOR PRACTICE

Clarion University of Pennsylvania is currently working on several initiatives to address the workforce education and training needs in Northwestern Pennsylvania and across the Commonwealth. These initiatives include working directly with regional employers to develop and provide training opportunities, collaboration with workforce and economic development agencies to identify training needs, partnerships with educational and training providers for the delivery of programs, and support of Pennsylvanian State training initiatives.

In response to limited knowledge and understanding of the potential impact, The NW PA Oil & Gas HUB has taken a lead on educating and informing the region on what the cracker plant is, how it is related to the plastics industry, who will be impacted by the construction of the plant and how the region and communities, to include manufacturing companies, could be affected. Clarion University is a member and sponsor of the Oil & Gas HUB, I serve as a committee member. The NW PA Oil & Gas HUB hosted a summit, *Growing the Petrochemical Industry in Western PA*, on September 11, 2018. The events agenda included topics and speakers that presented on the Economic Impact of Chemical and Plastic Manufacturing in Appalachia, Chair Reaction: from Petrochemicals to Plastics Manufacturing, Pennsylvania's Path to an Advanced Energy – Enabled Economy, Harnessing the Potential of the Appalachian Basin – Encouraging Growth in the Chemical and Plastics Manufacturing Supply Chain, and Procurement Requirements (https://NWPAoilandgashub.com).

Recently, Clarion University appointed university and community members to serve on a Venango Campus Strategic Steering Committee. The purpose is to lead a discussion on plans to grow Venango campus, as well as define its distinct mission with the university, region, and in relationship to other institutions. Much of the conversation and discussion has given attention to the need for educational and training opportunities in meeting workforce development needs. Furthermore, the University intends to develop opportunities for Pennsylvania's labor force, a means to obtain credentials beginning at the noncredit certificate level with opportunities to "stack" those credentials. See Appendix D.

In ongoing progress to support employers and employees, the University has requested and received, from the Pennsylvania Department of Apprenticeship and Training, the standards and competencies for PA State registered apprenticeship programs. The University has begun

evaluating competencies for credit, in order to work with regional manufacturing companies and their employees, to present a structure and process for which individuals that have successfully completed a registered apprenticeship program to receive credit towards Clarion University's Associate of Science Degree in Applied or the Bachelor Degree in Technology Leadership. Involved in the evaluation process is the Clarion University's Interim Provost, the Associate Dean for the College of Business, the Chair of the Management Department, and myself, interim Director of Workforce development.

In immediate response to employers' needs, the Office of Continuing Education is offering industry training on Geometric Dimensioning and Tolerancing (GD&T), and Blue Print Reading. The course objectives in GD&T explain the importance of accurately specifying dimensions and tolerances. Students will recall the history and development of dimensioning and tolerancing methods. Explain how teamwork can result in better definition of the dimensions and tolerances shown on a drawing or in a computer-aided design (CAD) file incorporated in the course. Students will recall the dimensioning and tolerancing skills needed for success in design- or production-related occupations and analyze possible industrial changes and the impacts of these changes on dimensioning and tolerancing. The will also identify how views are created using orthographic projection. This program is geared to the first-time student who has never been exposed to GD&T. Upon successful completion of the Blue Print Reading course, students will be able to understand the basic principles of orthographic projection, identify key manufacturing information from a machine print, apply proper dimensioning for projected views, describe the purpose of lines found on a print., interpret information found in a title block and its compounds., define terms that apply to dimensioning and tolerancing, fractional, decimal, metric and angular dimensions., recognize symbols used for specifying holes, evaluate and determine

dimensions and specifications, analyze title blocks and special notes as it applies to prints, determine tolerance ranges of bilateral and unilateral tolerances, identify datum surfaces, and identify basic (GD&T) geometric dimensioning &tolerancing characteristics.

In addition to the above-mentioned University initiatives, I also serve as a WEDnetPA partner for Clarion University. As such, I serve as a point of contact for manufacturing companies applying for state funding to train their employees. I assist companies in understanding the program, developing training plans, applying for funding, and submitting invoices for reimbursement.

Finally, Clarion University of Pennsylvanian in collaboration with the American Injection Molding Institute, a provider of education and training to the plastic injection molding industry, submitted a proposal to the Keystone Education Council, on behalf of regional plastics companies, a collaborative approach to delivering a comprehensive solution to meeting plastic manufacturing employer needs. The proposal presented the curriculum development and delivery model for a Plastics Process Technician Apprenticeship training program. The approach also presents a credential ladder allowing for opportunities for further educational attainment. See Appendix H.

5.2 DEMONSTRATION OF PRACTICE

As an Action Research Project, this work has had an on-going impact on the practice as described above. The demonstration of scholarly practice is embedded in the plans for future implementation and continuous expansion of work. These plans include:

An executive summary of the findings has been prepared for distribution to the participants from this research. See Appendix G. The executive summary briefly discusses the industry issue, the data collection process, and findings. The executive summary also informs participants of immediate responses to their education and training needs, and the ongoing efforts to build a labor force pipeline for the future.

In addition, a marketing piece is in development to distribute to the manufacturing industry. The tri-fold pamphlet highlighting education and training opportunities in workforce development will be distributed across Pennsylvania. Programs include noncredit certificate training, manufacturing essential skills training, a workforce readiness noncredit program, opportunities to partner on company specific customized training development, the NWPA Plastics Apprenticeship program, and contact information for Clarion University prior learning credit evaluation of PA State registered apprenticeship programs.

Finally, a workforce readiness program has been developed to address employer identified needs in preparing the labor force for jobs in manufacturing. The curriculum focuses on two areas of training which include: Workforce Readiness: a basic course of studies on managing workplace expectations, workplace safety, literacy on the job, math on the job, and Manufacturing and Machining Essentials: topics in training cover plant overview, blueprint reading, tooling, maintenance, materials handling, quality, and health and safety. See Appendix D.

APPENDIX A

INQUIRY QUESTIONS

1. What is the current need for specialized workforce training in petrochemical and plastics industries in Northwest Pennsylvania region?
    - Question one was designed to elicit responses in reference to skills and training needs as perceived by employers.
    - While there is substantial literature on workforce training needs, there is a lack of information explicit to these industries and the skill specific training.
2. What types of workforce development and skills training programs does Clarion University currently offer?
    - Question 2 was designed to determine Clarion University's current programs, institutional capacity, and structures in place to support and development workforce education and training programs at both non-credit and degree levels.
3. What is the current relationship between workforce development agencies and higher education institutions in meeting the workforce needs of employers in the region?
    - The second inquiry question references the collaboration between workforce development initiatives and higher education institutions.

- Understanding the current relationship and culture in workforce development and higher education assisted in identifying how the two areas can work together toward a common goal.

4. How can the Pennsylvania State System of Higher Education, Clarion University, and the Office of Continuing Education help to bridge the connection between Commonwealth employers, Pennsylvania residents, and education and training providers and opportunities?
    - The final inquiry question intended to determine how Clarion University's Office of Continuing Education can assist in meeting the skills training needs of people and the workforce.

APPENDIX B

IRB EXEMPTION

Reply all | Delete Junk | •••

RE: IRB Approval

FB Fuhrman, Amy B
Tue 10/17/2017, 9:41 AM
Dulaney, Tammy M

Reply all |

Inbox

You forwarded this message on 10/26/2017 9:38 AM

Dear Tammy,

Thank you for your response. Your project is considered research; however, it does not meet the federal definition of human subjects. The interview questions are not requiring the person to provide any information about their self or any other identifiable individual. The "petrochemical and plastic industry" is the subject of the interview and therefore there are no human subjects. Therefore, you do not need to submit the project to the IRB. You may use this email as documentation if needed.

Sincerely,
Amy

Amy Fuhrman, MPA
Research Review Analyst
University of Pittsburgh
Human Research Protection Office | www.hrpo.pitt.edu
Hieber Building, Suite 106
3500 Fifth Avenue
Pittsburgh, PA 15213
412-383-1494
fuhrman@pitt.edu

From: Dulaney, Tammy M
Sent: Tuesday, October 17, 2017 8:49 AM
To: Fuhrman, Amy B <fuhrman@pitt.edu>
Subject: Re: IRB Approval

Hi Amy,

I am looking to interview HR managers in the petrochemical and plastic industries.

Directly from my paper:

APPENDIX C

INSTRUMENT

Interview Questions:

1. What is your familiarity with the Shell petrochemical plant also known as an ethane cracker plant under construction in Beaver County and what it is?
2. What do you see as potential growth in the petrochemical and plastics industry in NWPA?
3. How might the cracker plant impact industry in this region and for your company?
4. What employee job skills are you and your company seeking to meet the demand of the petrochemical and plastics industry?
5. What levels of education are required for positions within your company?
6. What barriers and/or obstacle must be overcome to meet those needs?
7. How can Clarion University best meet your companies needs in training the future petrochemical /plastics workforce?

APPENDIX D

WORKFORCE READINESS CURRICULUM AND CREDENTIAL STACKING

WORKFORCE READINESS:

Description*: The training program will provide employees with a basic course of studies designed to increase their likelihood of success in entry-level manufacturing positions.*

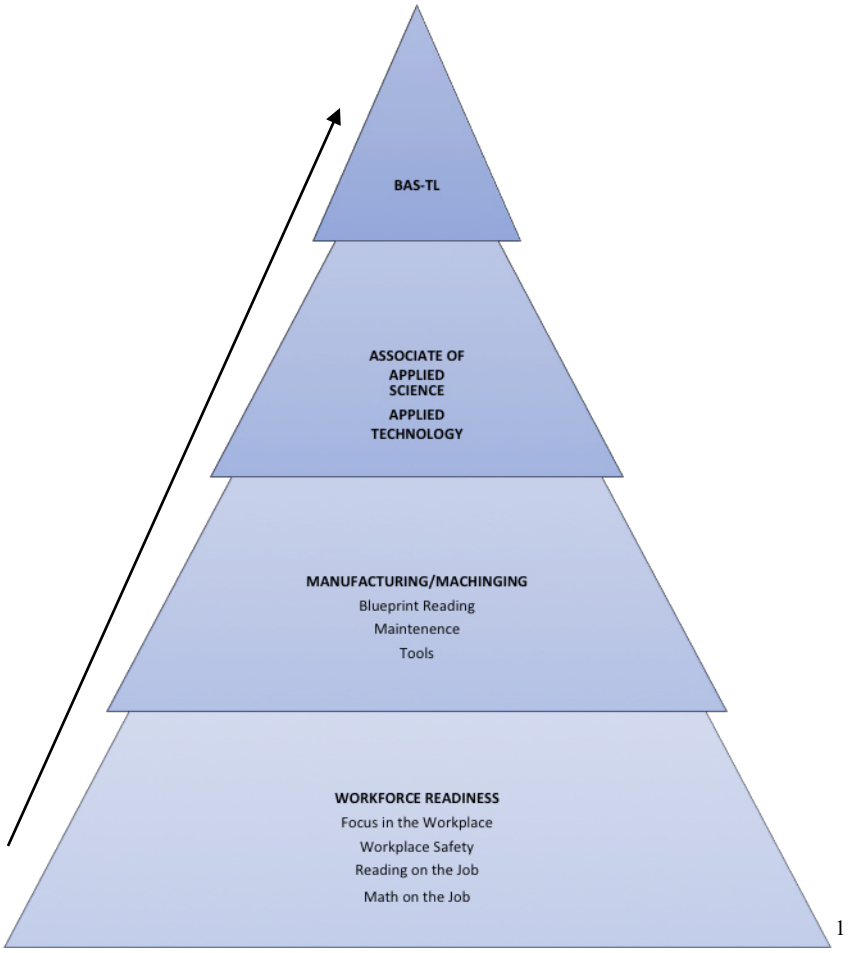
- ***Managing Workplace Expectations:*** Workforce Readiness Curriculum and Credential Stacking
  - The significance of a clear focus in the workplace. Work ethic, personal responsibility, accountability, expectations, teamwork, etc.
- ***Workplace Safety:***
  - Workplace safety culture begins with a well-trained workforce.
  - Safety awareness, understanding proper use of tools and machines, emergency protocols, correct safety equipment, etc.
- ***Literacy on the Job:***
  - Comprehensive understanding of the concept as written. To read / follow written instructions, and carefully apply instructions/data/information as needed to completion.
  - Read thoroughly (time management), read all the instructions to the end, and re-read if necessary.
  - The importance of thorough reading/reviewing of employment applications, emails, instructions to others, data, records, etc. prior to sending. Reviewing for incorrect or incomplete information, how documents are worded, and language content.
- ***Math on the Job:***
  - Basic Algebra concepts
  - Measurements
  - Conversions

MANUFACTURING/MACHINING:

- *Plant Overview*
- *Blueprint Reading*
- *Tooling*
- *Maintenance*
- *Materials Management*
- *Quality*

- *Health and Safety – OSHA 30*

ASSOCIATE OF SCIENCE IN APPLIED TECHNOLOGY
BACHELOR OF SCIENCE IN TECHNOLOGY LEADERSHIP



[1]

[1] The Workforce Readiness Curriculum and Credential Stacking document was created for the implementation of training to address employers' immediate need to prepare employees for entry-level manufacturing positions.

APPENDIX E

PENNSYLVANIA UNEMPLOYMENT RATE APRIL 2014 – APRIL 2018

Year	Period	labor force	employment	Unemployment	unemployment rate
2014	**Jan**	6393561(B)	5976665(B)	416896(B)	6.5(B)
2014	**Feb**	6393434(B)	5986813(B)	406621(B)	6.4(B)
2014	**Mar**	6393991(B)	5996055(B)	397936(B)	6.2(B)
2014	**Apr**	6393276(B)	6002473(B)	390803(B)	6.1(B)
2014	**May**	6391439(B)	6007518(B)	383921(B)	6.0(B)
2014	**Jun**	6390302(B)	6013863(B)	376439(B)	5.9(B)
2014	**Jul**	6390623(B)	6021955(B)	368668(B)	5.8(B)
2014	**Aug**	6393522(B)	6031582(B)	361940(B)	5.7(B)
2014	**Sep**	6398773(B)	6041865(B)	356908(B)	5.6(B)
2014	**Oct**	6403632(B)	6051001(B)	352631(B)	5.5(B)
2014	**Nov**	6405696(B)	6056929(B)	348767(B)	5.4(B)
2014	**Dec**	6406038(B)	6059760(B)	346278(B)	5.4(B)
2015	**Jan**	6406562(B)	6060921(B)	345641(B)	5.4(B)
2015	**Feb**	6408527(B)	6061886(B)	346641(B)	5.4(B)
2015	**Mar**	6412351(B)	6064850(B)	347501(B)	5.4(B)
2015	**Apr**	6417432(B)	6070270(B)	347162(B)	5.4(B)
2015	**May**	6421799(B)	6076529(B)	345270(B)	5.4(B)
2015	**Jun**	6423435(B)	6081445(B)	341990(B)	5.3(B)
2015	**Jul**	6422978(B)	6084751(B)	338227(B)	5.3(B)
2015	**Aug**	6421669(B)	6086835(B)	334834(B)	5.2(B)
2015	**Sep**	6421300(B)	6089074(B)	332226(B)	5.2(B)
2015	**Oct**	6424953(B)	6093761(B)	331192(B)	5.2(B)
2015	**Nov**	6433854(B)	6101195(B)	332659(B)	5.2(B)

Year	Period	labor force	employment	Unemployment	unemployment rate
2015	**Dec**	6444964(B)	6109111(B)	335853(B)	5.2(B)
2016	**Jan**	6454136(B)	6114683(B)	339453(B)	5.3(B)
2016	**Feb**	6459118(B)	6116326(B)	342792(B)	5.3(B)
2016	**Mar**	6459360(B)	6114031(B)	345329(B)	5.3(B)
2016	**Apr**	6456623(B)	6109343(B)	347280(B)	5.4(B)
2016	**May**	6453909(B)	6104677(B)	349232(B)	5.4(B)
2016	**Jun**	6452786(B)	6101694(B)	351092(B)	5.4(B)
2016	**Jul**	6453104(B)	6100843(B)	352261(B)	5.5(B)
2016	**Aug**	6453783(B)	6100991(B)	352792(B)	5.5(B)
2016	**Sep**	6453935(B)	6100922(B)	353013(B)	5.5(B)
2016	**Oct**	6452410(B)	6100217(B)	352193(B)	5.5(B)
2016	**Nov**	6449805(B)	6100524(B)	349281(B)	5.4(B)
2016	**Dec**	6447352(B)	6103106(B)	344246(B)	5.3(B)
2017	**Jan**	6445319(B)	6107264(B)	338055(B)	5.2(B)
2017	**Feb**	6443096(B)	6112047(B)	331049(B)	5.1(B)
2017	**Mar**	6439586(B)	6115395(B)	324191(B)	5.0(B)
2017	**Apr**	6434898(B)	6116745(B)	318153(B)	4.9(B)
2017	**May**	6429284(B)	6116394(B)	312890(B)	4.9(B)
2017	**Jun**	6423804(B)	6114818(B)	308986(B)	4.8(B)
2017	**Jul**	6420179(B)	6112950(B)	307229(B)	4.8(B)
2017	**Aug**	6418186(B)	6110992(B)	307194(B)	4.8(B)
2017	**Sep**	6418386(B)	6110417(B)	307969(B)	4.8(B)
2017	**Oct**	6418284(B)	6109456(B)	308828(B)	4.8(B)
2017	**Nov**	6418195(B)	6108750(B)	309445(B)	4.8(B)
2017	**Dec**	6418025(B)	6108483(B)	309542(B)	4.8(B)
2018	**Jan**	6413906	6103687	310219	4.8
2018	**Feb**	6410542	6100672	309870	4.8
2018	**Mar**	6393600	6089402	304198	4.8
2018	**Apr**	6378043(P)	6080553(P)	297490(P)	4.7(P)

B : Reflects revised population controls, model reestimation, and a new seasonal adjustment procedure.
P : Preliminary.

**United States Department of Labor

APPENDIX F

PENNSYLVANIA STATE REGISTERED APPRENTICESHIP DEFINITIONS

APPRENTICE: Any individual employed by the employer meeting the qualifications described in the standards of registered apprenticeship who has signed an apprenticeship agreement with the local program sponsor providing for training and instruction under these standards and who registers with the Registration Agency.

CAREER LATTICE: Career lattice registered apprenticeship programs include occupational pathways that move an apprentice laterally or upward within an industry. These programs may or may not include an interim credential leading to the Certificate of Completion of Apprenticeship credential.

CERTIFICATE OF COMPLETION OF APPRENTICESHIP: A nationally recognized credential issued by ATO to those registered apprentices certified and documented as having successfully completed the apprentice training requirements outlined in these standards of registered apprenticeship.

COMPETENCY-BASED OCCUPATION: An occupation using an apprenticeship approach that requires successful demonstration of acquired skills and knowledge by an apprentice, as verified by the program sponsor, with an OJT component and RTI. Program sponsors determine the most appropriate approach, subject to approval by PATC.

INTERIM CREDENTIAL: A credential issued as certification of competency attainment by an apprentice.

JOURNEYWORKER: A worker who has attained a level of skills, abilities, and competencies recognized within an industry as mastery of the skills and competencies required for the occupation. The term may also refer to a mentor, technician, specialist, or other skilled worker who has documented sufficient skills and knowledge of an occupation, either through formal apprenticeship or through practical on-the-job experience and formal training.

ON-THE-JOB TRAINING (OJT): Tasks learned on the job in which the apprentice must become proficient before a completion certificate is awarded. The training must be through structured, supervised work experience.

REGISTERED APPRENTICESHIP PROGRAM: An apprenticeship program registered with PATC and evidenced by a Certificate of Registration or other appropriate document as meeting the registered apprenticeship standards of PATC.

APPENDIX G

EXECUTIVE SUMMARY

How Can Clarion University of Pennsylvania Support the Region, Employers, and Students in Order to Meet Emerging and Changing Workforce Needs in the Petrochemical and Plastics Industries

Background and Research Design: With a decline in qualified workers, Plastics and Petrochemical industries are facing a very real issue addressing a skills gap. According to the Plastics Industry Association's (PLASTICS) 2017 Size and Impact study, total employment in plastic manufacturing in 2019 is expected to reach 735,000, with less than half the number of qualified applicants. In researching how Clarion University of Pennsylvania can support the region, employers, and students in order to meet emerging and changing workforce needs in the petrochemical and plastics industries, 10 manufacturing companies in Northwestern Pennsylvania were interviewed to determine their immediate and long-term training needs.

Summary of the findings: As a result of the research, the need for Workforce Readiness Programs and Technical, Trade, and Apprenticeship Programs with the below training topics were identified:

- Managing workplace expectations
- Health and Safety
- Teambuilding
- Communication skills, reading, writing.
- Technical math
- Critical Thinking
- Manufacturing essentials and materials handling
- Maintenance
- Plastics molding

Impact of the Practice: In immediate response to employers' needs, the Office of continuing Education has developed a workforce readiness program that can be delivered on-site at a company's location to allow for flexibility. The program provides employees with a basic course of studies designed to increase the likelihood of success in entry-level manufacturing positions. Clarion University will also award prior learning credits for individuals that have successfully completed a Pennsylvania State registered apprenticeship.

In addition, Clarion University of Pennsylvanian has teamed up with the American Injection Molding Institute, a provider of education and training to the plastic injection molding industry, to deliver a comprehensive solution to meeting plastic manufacturing employer needs. A two-year Plastics Process Technician Apprenticeship Program began November 12, 2018.

Acknowledgment of support for this research: Dr. Pamela Gent, Interim Provost, Clarion University of Pennsylvania; Dr. Jean Ferketish, Faculty, Administrative and Policy Studies, University of Pittsburgh School of Education; Dr. Stewart Sutin, Faculty, Administrative and Policy Studies, University of Pittsburgh, School of Education; The Keystone Community Education Counsel; Polymer Molding Inc., Komatsu Limited, Ones Corporation, Franklin Manufacturing and Powder Coat Company, GeorgeKo, Specialty Fabrication and Powder Coating, Electralloy Division, Schall Glass, Essentra, and Hamill Manufacturing.

APPENDIX H

NWPA APPRENTICESHIP

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