

**Integrating Career-Connected Learning and Academics in K-12:
Starting the Conversation**

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Integrating career-connected learning and academics in K-12: Starting the conversation

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This improvement science inquiry uses a Plan, Do, Study, Act cycle (PDSA) to study the knowledge, attitudes, and behavioral change of academic leaders regarding integrating career connected learning (Langley, 2014). This model utilizes continuous improvement as a process to implement small changes with the goal of making long-term improvement (Shakman, et. al, 2017). This study includes educational leaders from nine school districts that are part of a consortium of schools whose students attend the career and technical school.

The literature indicates that integrated career and academic curricula for workforce and post-secondary education can better prepare students to compete in a 21st century economy (Gentry, Peters, Rizza, 2008). Students, however, often exhibit a lack of technical skills needed for future careers (Capelli, 2015). Currently, modern educational models strongly emphasize traditional disciplines instead of connecting skills and academics to modern careers (Gammil, 2015).

A professional development meeting held at the career and technical school in early October 2019 gathered educational leaders from the nine sending school districts. The participants included principals, assistant principals, directors of special populations, and school counselors. Participants of the professional development session completed an “entry ticket” survey several weeks prior to attending the meeting. The responses from the survey helped develop a portion of the professional development meeting. Participants then completed an “exit ticket” survey at the conclusion of the meeting. These two surveys were compared to the interviews conducted later in

January to analyze the knowledge, attitudes and behaviors of the participants. The professional development meeting provided the opportunity to address the knowledge and attitudes of the participants and for participants to identify actions they were willing to take to integrate career-connected learning at their school or district.

The PDSA cycle helped to build greater capacity in the knowledge, attitudes, and behaviors about career-connected learning among the districts and career center in this study (Langley, 2014). After the surveys and interviews were matched and analyzed, it revealed growth among the participants in knowledge, attitudes, and behavior. These participants were then able to increase capacity of knowledge, attitudes and behavior in their schools and districts.

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Preface

I could not have made it to this point in my life if it were not for those who believed in me and supported me along the way. First, I would like to thank my amazing wife Jamie. Thank you for your support and encouragement throughout this journey. I appreciate your understanding and patience over the last three years. My greatest motivators have been my two sons Callan and Rylan. Watching you two grow-up has been the most enjoyable part of my life. I cherish every single day I spend with you and your mother. To our baby girl on the way, I cannot wait to welcome you into our family. I already know you will be amazing, just like your mother and brothers. It is for you all, why I continue to work so hard. I love you!

I am thankful to have had such a strong and supportive foundation built early in my life by my parents. I want to thank my mom and dad for their unwavering support in all aspects of my life. Dad, I respect your humble and calm approach to what life brings along the way, your ability to rationalize situations and to keep moving forward. Thank you, mom, for your dedication to seeing that I pursue an education early in my life. Who knew it would go this far? Thank you both for always taking the time to listen. I am thankful that I can pick up the phone and have a conversation with either of you about anything anytime.

To Shawn and Tracy, I thank you both for being the great people that you are and the advice and support you have always provided. I am thankful to have a brother and sister who I can lean on and speak with whenever needed. In addition, just as you are the best brother and sister, you are a great aunt and uncle to my children. They love you both very much!

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that includes many wonderful aunts, uncles and seven amazing cousins. My Grandma Rosie and a very special Uncle Abe have undoubtedly made lasting impacts on me with their advice, insight, and support. There is truly nothing better than knowing you have such great people to lean on, seek advice from and spend time with, than family.

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1.0 Introduction

As a career and technical education administrator and former technology education teacher, I have come to value “career-connected learning” as the connection of career based experiences integrated with academics. The level of integration of career-connected learning can vary greatly in each school and program. Investigating the implementation of college and career readiness offers insight into varied perspectives and methods from many stakeholders. The skills gap has motivated educators to analyze the preparedness of high school graduates for post-secondary education and careers in the 21st century (Bentley University, 2014). The skills gap refers to the gap between the skills employees have and the skills their employers need (McDonough, 2017). Skill shortages have impacted the largest industries in the United States, including financial services, food and beverage, health care, information technology, manufacturing, retail, and travel and tourism (McDonough, 2017). Although the skills gap is often explained as a broad problem, it is more specific to industries, companies and specific job functions. Many factors contribute to the skills gap. There is not a single set of skills every person is missing (McDonough, 2017). James Besson (2014) explains that identifying specific skills that people lack is difficult because the skills required for new technologies are hard to measure. Additionally, Besson argues that with new technologies comes new skills that schools often do not teach and that business and industry do not supply.

Furthermore, the local, national and global economies are changing, obligating educational leaders to keep their instructional practices at pace with that change. The California Center for College and Career (2012) emphasizes the rise of new technology and the globalization of industry and increased unemployment rates to support curricular changes to integrate college, career,

technical skills, cognitive skills and character development with academics. The concept of integrating career-connected learning with academic content is a concept that is being implemented to best prepare students to succeed in the global economy (Bentley University, 2014).

1.1 Statement of the Problem

The lack of career-connected learning in high school yields less-prepared students for college and career in our current economy. Career and technical education (CTE) has been separated from academics in the United States for decades. This problem affects the college and career preparedness of K-12 students throughout the country. As a career and technical education administrator, I have seen the disconnect of academics with career education, which is reflected most literally with the career center placed separately from the sending schools. This disconnect challenges the career center and sending schools to find ways to collaborate to ensure quality career-connected learning. The separation of CTE and academic education can be a barrier for integrating academics with career and technical education.

I have seen the benefit of incorporating hands-on skills with academic areas such as math, English, and science as a previous high school Technology Education (Industrial Arts) Teacher for over a decade. Integrating career and technical skills with academic content has traditionally not been common practice in comprehensive schools (Gammil, 2015). Career and technical skills refer to the specific skills needed for a specific job or career. For example, career skills for a health and nursing career include understanding patient care, medical terminology, medical technology, and the processes of patient intake and discharge. These skills are specific to that career. Career skills

for health and nursing could be implemented into academic courses, such as biology or anatomy and physiology.

One barrier to integrating career-connected learning includes the knowledge and attitudes of stakeholders. Some educators and educational leaders are simply not informed of the benefit of integrating career and technical skills with academic areas to best prepare students for future endeavors. Others have specific notions on whose responsibility it is to teach academics versus career skills. Unfortunately, there are educators and parents who do not see career and technical education as valuable, which creates a barrier to integrating academics and technical skills (Gammil, 2015). The lack of knowledge leading to current attitudes and behaviors around career-connected learning is a problem for students' career development. Currently, as an administrator of a tenth through twelfth grade career center, I often hear from employers in business and industry as well as post-secondary representatives that students are lacking the blend of academic knowledge and technical skills needed for today's jobs. Often, employers see graduated students who are either highly skilled or are high academic achievers, but not both.

Modern careers infuse high levels of technical skills with strong academic knowledge. Integrating career and technical skills with academic curricula for workforce and post-secondary education can better prepare high school students to compete in the 21st century economy (Bentley University, 2014). This will likely require teachers and educational leaders to restructure the current separation of career and academic education to a more integrated educational model. In surveying the literature, I explored methods of career-connected learning in secondary education by studying models locally, nationally and internationally. The literature on career-connected learning provides local, national, and international models and frameworks for integration,

implementation, and delivery methods for integrating career-connected learning with academics in secondary education.

1.2 Purpose

This inquiry investigates academic leaders' knowledge, attitudes, and behavioral changes regarding the integration of career-connected learning with academics and the increased collaboration with the career center to better prepare students for college and careers. In western Pennsylvania, career centers are considered half-day non-comprehensive schools. Students in non-comprehensive career centers attend their sending school for academic courses and then are bused to the career center for their career and technical programs. A local report, *Inflection Point* (Burning Glass Technologies & The Council for Adult and Experiential Learning, 2016) explains the disconnect between academic learning and career-connected learning among career centers and the sending schools in the Pittsburgh region. The disconnect is partly attributed to the framework of career and technical education in western Pennsylvania, in which students attend the career center part-time and their sending school part-time. This disconnect further contributes to the lack of combined academic and technical skills needed for students to succeed in postsecondary and career opportunities. Although many schools are integrating career-connected learning with academics, there is still opportunity to increase collaboration toward integrating career-connected learning between sending schools and career centers. Currently, many students exhibit a lack of technical skills needed for future careers. Cappelli (2015) argues that the lack of basic skills for future employment is attributed to the failure of schools in teaching basic skills, thus resulting in students graduating without the skills needed for current and future job markets. In addition,

business associations, individual companies, and independent organizations claim they cannot fill vacancies because of the widespread skill problem (Cappelli, 2015). Current education models emphasize traditional disciplines, sometimes lacking connection with skills needed in most careers (Gammil, 2015). Gammil (2015) advocates for changing school culture to embrace models that replicate real-world learning. Traditionally, K-12 education has focused more on test scores and performance in areas such as reading, science, and mathematics, with considerably less focus on preparing students with career and technical skills. However, there has been increased awareness of the importance of integrating career education with academics. Many schools in Pennsylvania have adopted initiatives such as project-based learning and career pathways for students to pursue in their academic settings. However, there is still a need to increase collaboration between sending schools and CTCs to integrate academics and technical skills for students who attend career centers (Burning Glass Technologies and The Council for Adult and Experiential Learning, 2016).

Integrating career and academic curricula for workforce and post-secondary education in high school can better prepare students to compete in the 21st century economy (Gentry, Peters, & Rizza, 2008). Doing so will require teachers and educational leaders to restructure the current separation of career and academic education to a more integrated educational model (Gammil, 2015). According to Perry and Wallace (2012), integrating career education may motivate teachers to develop career-based lessons aligned with academic curricula. The model in the United States has been to separate career education from academic courses. Other models of career-connected learning in secondary education locally, nationally, and internationally offer different methods of integrating academics with career-connected learning.

1.3 Inquiry Questions

This inquiry was guided by the following questions.

- What knowledge do academic leaders need to better understand career and technical education and the opportunities for collaboration to integrate with academic areas?
- What are academic leaders' attitudes about career and technical education and their students who might best benefit?
- What actions are academic leaders willing to take to better collaborate for integrating career and technical education and academic areas?
- What follow through actions, after professional development, can be taken to better collaborate to integrate career-connected learning with academics?

The career center in this study utilizes many methods to connect with the nine sending school districts. One method is a professional development meeting that occurs early each year for principals, assistant principals, school counselors, and special population directors. The professional development provides information about topics such as cooperative education, curriculum, articulation agreements, National Occupational Competency Testing Institute (NOCTI) Exams, and district Science, Technology, Engineering, Art, Math (STEAM) activities. The career center connects with the sending districts and community to bring awareness of career and technical education through a traveling STEAM program. During the 2018-19 academic year, the career center organized 25 events for 8,500 students in the sending school districts and communities. However, inquiries from stakeholders still indicate a lack of knowledge regarding the curriculum and expectations of students at the career center. The design of this study will aid in collecting information about the knowledge, attitudes, and behaviors of educational leaders

toward career and technical education. Many stakeholders influence a student's academic and career decisions, sometimes based on misconceptions. Middle and high school counselors are among those who aid students with information about choosing a high school path of study. Finlayson (2010) emphasizes the importance of providing information to students and parents in order for them to make informed decisions in selecting an academic, technical, or dual enrollment pathway in high school.

All stakeholders who provide information to students about career and technical education should have accurate information. Sometimes students have issues with scheduling at their home school that interferes with their ability to attend the career center. Scheduling can often interfere with a student's access to career and technical education. All programs at the career center have a three-year curriculum except for the pharmacy program, which has a one-year curriculum. Not all of our districts provide students the opportunity to attend for three years. Students who participate in a program of study at the career center could benefit from the integration of career-connected curriculum at their home school. Currently, there is a dysfunctional split between their academic school curriculum and a student's career and technical education program.

2.0 Literature Review

Career-connected learning refers to connecting careers to academic programs or courses. The integration of career-connected learning can vary greatly in each school and program. Investigating the implementation of college and career readiness offers insight into varied perspectives and methods from many stakeholders. The skills gap has motivated educators to analyze the preparedness of high school graduates for post-secondary education and careers in the 21st century (Bentley University, 2014). Furthermore, the local, national and global economies are changing obligating educational leaders to keep their instructional practices at pace with that change. The California Center for College and Career (2012) emphasizes the rise of new technology, the globalization of industry and increased unemployment rates support the argument that it is worth investigating the change to integrate college, and career and technical skills into academics.

A review of the literature points to key areas that may affect the knowledge, attitudes, and behaviors of educational leaders regarding integrating career and technical education with academics. The areas that better situate the problem include state and local economies, Pennsylvania standards and policies, perceptions of CTE, and models of integration nationally and internationally. The literature points to influencing the need for organizational change, including adapting current K-12 educational models to better prepare students for careers in the current and future global economies.

2.1 State and Local Economies

The global economy influences the United States to motivate educational institutions to build programs that best prepare students for future careers. The U.S. economy added 182,000 jobs per month in 2017, which amounted to about 2.2 million jobs total for the year (Addressing America's re-skilling, 2018). In the first quarter of 2018, gross domestic product continues to grow which has the potential to increase the demand for jobs. Labor productivity rates are predicted to grow and employers may be searching for skilled workers. The booming economy requires more skilled workers for high demand jobs (Cappelli, 2015). These high demand jobs require skills in areas such as artificial intelligence and automation (Addressing America's re-skilling, 2018).

The trend to solving the skills gap has been for young people to attend college to attain these skills. College enrollment is at its all-time high, though many students are not completing with degrees (Addressing America's re-skilling, 2018). Educational institutions and the federal government are charged with finding solutions to educate young people for the current and future careers in a financially responsible manner. Career and technical education has gained attention in offering a solution to this problem. Students can attain certifications and move from high school into the workforce or post-secondary education taking with them skills for modern careers. Career and technical education address the skills gap by utilizing advisory boards comprised of stakeholders such as business and industry representatives as well as post-secondary representatives to modify the curriculum and programs to fit the needs for local, national and global careers.

Career and technical centers (CTC) collaborate with employers and postsecondary institutions to identify the skills gap. This collaboration allows CTC leaders to modify and adjust policy and curriculum to meet the needs of the current workforce. CTC administrators align Career

and technical education (CTE) curriculum with academics to address the skills gap and to maintain rigor within programs. This is often done through the use of integration instructors in math and science to co-teach lessons in CTE programs. Career and technical school leaders also lobby for local and federal funding to grow and invest in the career center programs. Many state initiatives have aided in CTC's ability to target the skills gap. The reauthorization of the Carl D. Perkins Career and Technical Education Act was reauthorized to provide federal funding to career centers to operate innovative up to date educational facilities. This creates an opportunity for more students to enter the workforce or postsecondary education with the skills and knowledge to succeed in high demand jobs in our economy (United States, 2016). Policy makers at the state and national level recognize that cutting funding to career and technical education does not support the important education provided by career and technical schools. These stakeholders have identified the importance of connecting academics with work-based training in the programs at the career centers (United States, 2016). The skills gap the nation faces allows CTE programs to be an option to help close that gap. The reauthorization of the Carl D. Perkins Career and Technical Education Act by policy makers was done to support CTE programs that drive economic success through career-connected learning.

CTC's focus on connecting classroom content to the career choice of the students. This is evident through job shadowing and apprentice programs coordinated at the CTC with local employers. Integrating on the job training with classroom content is one of many ways the career centers are addressing the skills gap (Wilson, 2011). In addition, career centers stay current with industry certifications and accreditations for students. Many career and technical schools utilize advisory boards to build and maintain their programs. Advisory boards are comprised of students, teachers, administrators, business owners and post-secondary representatives. These individuals

meet several times throughout the school year. Each program of study has an advisory board that makes recommendations on curriculum, equipment and current industry needs. The input from advisory board stakeholders keep the programs current with industry standards and college readiness. It is important to stakeholders that students are learning on the most advanced equipment, tools and technology. The advisory boards keep the CTC informed on the skills gaps that are evident in their field of practice. Educators communicate with advisory board members frequently to maintain career-connected learning.

Closing the skills gap requires support from governors, states, employers and CTE leaders (Wilson, 2011). Each of these stakeholders play a role in establishing connections between education and businesses to address the skills gap. The strategic planning of career connected learning and school to business partnerships is different from state to state. Each state has its own local economy and community needs. The outcome should be evidence of business and education partnerships that are known in the community (Wilson, 2011). Creating these partnerships provides authentic opportunities for students to experience the connection between their academic studies and the many connected career paths.

2.2 Pennsylvania Standards and Policies for Career Education

Pennsylvania has created the Future Ready PA Index as a component of the Every Student Succeeds Act (ESSA) to help motivate schools to connect education to careers and post-secondary education. Embedded in the Future Ready PA Index are guidelines for evidence collection, monitoring and reporting of career readiness indicators. The Career Readiness Indicator creates accountability for schools to provide access to career exploration through a standard-aligned and

evidence-based system (PA Department of Education, 2019). The Career Readiness Indicator utilizes grade level benchmarks aligned to career education and work (CEW) standards. Pennsylvania public schools are required to follow CEW standards for all students (PA Department of Education, 2019). The benchmarks occur at grades 3, 5, 8 and 11. At each grade level, the career readiness indicator identifies the percentage of students in a cohort who exhibit career exploration and preparation experiences (PA Department of Education, 2019).

The creation of career readiness indicators was based on the states outlook that by 2025 more than six out of ten Pennsylvania jobs will require postsecondary education or training. The majority of the jobs in Pennsylvania will be in STEM fields. In fact, 91% of those jobs will be STEM related but only 45% of Pennsylvanians currently have the skills and credentials for those occupations which results in a significant skills gap (PA Department of Education, 2019). Many of these occupations require some postsecondary training but not a four-year degree (Future Ready PA, 2018). The economic future of Pennsylvania depends on having a well-educated skilled workforce that can compete globally in a knowledge-based 21st century economy (Future Ready PA, 2018). The Pennsylvania State Board of Education also created regulations in 2006 establishing the state Academic Standards for Career Education and Work. These standards address four areas of knowledge; career awareness and preparation, career acquisitions, career retention and advancement and entrepreneurship (Future Ready PA, 2018). Pennsylvania also established the creation and implementation of (Chapter 339) a comprehensive K-12 guidance program aligned to Career Education and Work standards. Since the adoption of these standards, Pennsylvania has worked with educators, administrators, business and industry leaders and other stakeholders to develop and maintain rigorous standards-based career-connected instruction (Future Ready PA, 2018).

2.3 Perceptions of Career and Technical Education

Many stakeholders influence a student's academic and career decisions. Middle and high school counselors are among those who aide in providing students information to choose a path of study in high school. Finlayson (2010) emphasizes the importance of providing information to students and parents in order for them to make informed decisions about their post-secondary path to decide their academic, technical or dual enrollment pathway in high school. Some would say the perception is that CTE is not academically rigorous and that most students who attend have behavior problems and are not academically driven.

Gammill (2015) indicates that the stigma comes from the perceptions of parents and academic teachers who have been misinformed or are not familiar with career and technical education. Often leading to the belief that CTE courses are often "less than" classes for "less than" students taught by "less than" teachers" (Gammill, 2015). This perception is then portrayed to students.

Educational leaders often recognize this stigma exists and work to develop a culture in schools to embrace real-world learning opportunities that integrates academic and career education (Gallup, 2018). Moving toward career-connected learning with a blend of academic classes may better enable student success as a competitor in a global economy (Gallup, 2018).

2.4 Models of Integration Domestically and Internationally

The possibilities of integrating concurrent career and post-secondary education in districts was presented to district superintendents in a national Gallup survey. The superintendents felt that

students would be very interested in such programs. Sixty four percent of superintendents surveyed about implementing concurrent work/higher education programs felt teachers and counselors would support the program (Gallup, 2018). However, superintendents in larger districts seem to be more optimistic than superintendents in smaller districts. Larger school districts often have more resources to initiate programs (Gallup, 2018).

The Gallup 2018 Survey of K-12 school district superintendents stated that more than seven out of ten superintendents, 73%, have collaboration between their school districts and local businesses or institutions to promote career or vocational training (Gallup, 2018). The school districts that collaborate more with business and institutions are most commonly located in cities or are large districts. School districts located in rural areas, suburban or are smaller districts in addition to districts in the Western U.S. are less likely to have business and institution partners (Gallup, 2018). The superintendents have reported that industries hiring students after high school graduation include, manufacturing, healthcare, construction, heavy equipment, automotive, agriculture and computer technology industries (Gallup, 2018).

There are many ways to integrate career-connected learning in K-12 education. One notion is to pair academics with career and technical education. This model is one in which academic schools send their students to a career center for half of their school day. This model combines career education with academics but still keeps them separate. Lachimia (2005) highlights this issue by explaining that industry representatives are pleased with the technical skills students are acquiring at the career center he studied but they are lacking the academic knowledge much needed in their respective professions. He emphasized employers noted the lack of ability for students to be able to read, write and analyze technical material (Lachimia, 2005). Lachimia (2005) studied three districts who utilize this method and concluded that success was built upon the relationships

amongst the sending schoolteachers and the career and technical education teachers. Administrators created workshop days in which teachers could meet at the career center to discuss integration methods. The workshops allowed teachers time to collaborate and plan meaningful academic integration. The academic teachers began to understand the scope and sequence of the CTE curriculum and all teachers developed respect for one and other. The collaboration amongst the teachers and planning of the administrators provided a structure to integrate academics with career and technical education to address the problems identified by local industry and business.

One-method CTE schools have implemented are dual enrollment programs to offer incentive for high achieving students to enroll in CTE programs. These programs allow high school students to earn college credits through their CTE course. Chumbley (2015) states that adopting dual enrolment programs in CTE has changed program structures and rigor making programs more aligned with post-secondary education and careers. CTE's have adopted this type of program to help meet the skills gap addressed by President Obama in 2009 (Chumbley, 2015). In addition, Chumbley (2015) indicates that students are more successful in post-secondary education had having the opportunity to participate in a dual enrollment program. Utilizing a dual enrollment program promotes accountability for all stakeholders to make the program meaningful and successful. Teachers, administrators and college faculty work cohesively in order to deliver effective content with adequate rigor for the course. Referencing dual enrollment programs to parents, teachers, counselors and students should help remove the stigma that CTE programs are less rigorous than academic courses. The data shows CTE dual enrollment programs are aligned to post-secondary education as well as workforce standards (Chumbley, 2015).

The skills gap and the need to engage students in learning has led to many initiatives to connect careers to the classroom. Many school districts have taken steps to integrate career-

connected learning in their schools. This has led to schools adopting STEM (Science, technology, engineering, math) programs into their K-12 curriculum.

2.4.1 Maker Movement

Others have adopted the Maker Movement as a way to promote hands on learning and innovation. Some local Pennsylvania schools and others throughout the country have created career academies to promote specific programs connecting education to careers. There are some schools in the Pittsburgh region that have adopted Remake Learning programs to integrate curriculum to best prepare students for college and career (Remake Learning, 2019).

2.4.2 Technology Education

Many local school districts are using their Technology Education programs to integrate career-connected learning with partnerships with business and industry. The Technology Education programs allow for hands-on learning blended with academics to introduce students to a variety of career choices in the STEM fields. Pennsylvania School Code (4.22) requires students to take a Technology Education course at the middle school level to integrate academic skills and problem solving with modern technology (The Pennsylvania Code, 2019).

2.5 Professional Development

In addition, professional development for teachers has changed to adapt to the changing economy and the need to address the skills gap. Some schools such as Alameda Unified School District in California have initiated teacher externships to broaden teacher's understanding of the careers that are available relating to their curriculum and content (Teacher Externships, 2009). California has invested in teacher externships as part of the teacher's professional development through grants associated with their career and technical education pathways initiative. The career and technical education initiative provide funding for high school and middle school teachers, counselors and community college faculty to participate in externships (Teacher Externships, 2009). The externships include job shadowing for teachers to allow for in-depth understanding of the skills and knowledge needed for a specific career. Connecting careers to the classroom with teacher externships is integrated with academic teachers as well as career and technical education teachers. Ultimately, that knowledge and experience is to be carried over to the classroom to connect curriculum to real world careers.

Career-connected learning has also been implemented into schools in the form of career academies. These academies directly link academic studies to career pathways. Wake County School Systems in North Carolina utilize the career academy system for college and career readiness. The Wake county school system has 20 career academies in 14 high schools focusing on careers in the health services industry, information technology. Academies such as this are typically embedded within high schools and offer specialized training in specific career areas (Hemelt, Lenard, & Paepflow, 2018).

After reviewing several international models, including the Chinese and German models, the German model offers several useful ideas for integrating career-connected learning in the

United States. In addition, it offers approaches to education that may be beneficial to integrating career-connected learning in the United States. Germany and China have paid close attention to how globalization has changed economic development throughout the entire world. China has invested deeply in this understanding and has benefited the most as compared to other countries (Betts, 2006). Both countries have focused on pre-vocational education, which is an introduction to the labor and business world in primary and secondary education prior to a student choosing to attend a vocational program. The focus includes teaching knowledge, skills, insights and behaviors for students to transition to vocational education. They have implemented interventions to adjust education to better prepare students for future competition. Germany and China both have moved to reform pre-vocational education (Li, 2013).

The Federal Republic of Germany divides its education system into preschool education, primary education, secondary education, tertiary education and continuing education (Lohmar and Eckhardt, 2010). The general education students concluding grade 9 or 10 either attend the general upper secondary education, or go into vocational training. The German model emphasizes vocational education during higher secondary level education including company training in addition to school based vocational education with some students moving into the labor market based on their qualifications (Li, 2013).

2.5.1 Conclusion

The review of literature reveals areas where change can be initiated to better integrate career and technical education with academics. The literature points to possible change in current organizations and in the possible integration of career and technical education with academics in Pennsylvania. The current separation of academic areas and career and technical education can be

addressed, as some of the literature shows. If we are going to change, we need to first understand the knowledge, attitudes, and behaviors of educational leaders towards integrating career and technical skills with academic areas.

3.0 Applied Inquiry Plan

The following inquiry investigated the knowledge, attitudes and behavioral change of academic leaders to better prepare students for college and careers. The lack of integrating academic areas with career and technical skills puts students at a disadvantage locally and nationally when pursuing post-secondary opportunities and careers. Locally, in western Pennsylvania, many career centers are considered half-day non-comprehensive schools. Students who attend half-day non-comprehensive career centers are bused from their sending school to the career center. The career center and sending schools can do a better job of collaborating to provide students the highly needed technical skills and academic knowledge needed to succeed in post-secondary education and the workforce.

The current divide of CTE and academic courses creates barriers to students acquiring technical skills blended with academic curriculum. *Inflection Point* (2016) describes the disconnect between academic learning and career connected learning amongst career centers and the sending schools making it problematic for graduates entering the workforce and post-secondary education with the skills and knowledge needed to succeed. This further contributes to the lack of combined academic and technical skills needed for students to succeed in postsecondary and career opportunities. Capelli (2014) attributes students' lack of basic skills needed for future employment to the K-12 education system. Students graduating high school and college are not adequately equipped with the skills needed for the current and future job market. In addition, business associations, individual companies and independent organizations claim they cannot fill vacancies because of the widespread lack of skills (Cappelli, 2014). Current education models strongly emphasize traditional disciplines, sometimes lacking connection with skills needed in

most modern careers. Gammil (2015) suggests we change the culture of our schools from current practices to embrace models that replicate real-world learning opportunities. K-12 education has focused more on test scores and school performance in traditional areas such as reading, science and mathematics, with considerably less focus on preparing students with career and technical skills needed to succeed.

3.1 Inquiry Setting

The setting for this inquiry includes a career center and the nine-school district that send students to that center. These sending school districts are often referred to as a student's home district. The sending school district is where students receive the majority of their academic instruction. Students attend their home school for half of the day and then are bused to the career center for the second half of the day. The career center has seven hundred and ninety students currently enrolled from the nine sending school districts.

The career center currently offers twenty college and career ready programs. The twenty programs include:

- Advertising design
- Automotive collision technology
- Automotive technology
- Building construction
- Carpentry
- Health and nursing sciences
- Heating ventilation and air conditioning
- Introduction to pharmacy
- Network engineering and cyber security
- Pastry arts
- Computer systems
- Cosmetology
- Culinary arts
- Dental careers
- Early childhood education
- Emergency response technology
- Robotics Engineering Technology
- Sports medicine-rehab therapy
- Surgical sciences technology
- Veterinary sciences.

The career center of today is much different than the “vo-tech’s” of the past. There are still “trade” programs in career centers, but there are also now more “academic” programs within career centers. The programs have curricula directly aligned with college and careers, with the assistance of advisory boards. The advisory boards consist of stakeholders who provide input regarding the design of the program. Each advisory board must include a business industry representative as well as a post-secondary representative to ensure that each program’s curriculum, technology, and, if applicable, tools and machines are at industry standards.

Students who attend the career center are still able to participate in their sending school sporting programs and extracurricular activities. There are many students who attend the career center that balance academics, career and technical education with sports, band, chorus and other extracurricular activities. Often, there is a misconception that career and technical education students are excluded from participating in those programs because of their split time with the career and technical education center.

The career center is funded by the nine sending school districts. The cost for a district to send a student to the career center is approximately \$9,000. The career center does not have tax authority in the state of Pennsylvania, meaning the CTC does not collect taxes like a school district. Therefore, it relies on the nine consortium districts for funding. A large part of the budget comes from the member consortium district shared funding as well as Carl D. Perkins federal funding. The Carl D. Perkins Career and Technical Education Act was reauthorized to provide funding to career centers to operate innovative state of the art educational facilities. This creates an opportunity for more students to enter the workforce and post-secondary education with the skills and knowledge necessary to succeed in high demand jobs in our economy (United States, 2016). The career center receives approximately \$250,000 – \$275,000 a year from Carl D. Perkins federal

funding. Additionally, the career center receives funding from state subsidies such as supplemental equipment grants (100%), social security (50%), retirement (50%) and a vocational education subsidy (100%). Other areas of revenue include an adult cosmetology program and tuition from a small population of charter school students.

The career center is located in a suburb of a mid-sized city. Students travel by bus or car from the nine sending districts. Students from the furthest school travel 12 miles for approximately 25 minutes. The majority of the district students travel less than 15 minutes to the career center. Students are bused to the career center for either a morning or afternoon session. Three districts only attend for the morning session. All students arrive at the same time in the morning, but dismissal times are staggered. Students attend their morning programs for two hours and twenty-five minutes. The afternoon session has staggered arrival and departure times. Students attend their programs in the afternoon for approximately two hours. The afternoon session is the same length as the morning session. However, some districts have scheduling restraints that reduce the amount of in-class time for students attending in the afternoon. This can result in some districts attending in the afternoon up to twenty-five fewer minutes per day.

Career and technical schools collaborate with employers and post-secondary institutions to determine curriculum. Advisory boards are used to create and maintain the curriculum for the career center programs. The advisory boards are comprised of an administrator, teacher, student, parent a business or industry representative and a post-secondary representative. The purpose of the advisory board is the take input from key stakeholders to develop and maintain programs relevant to real-world careers and current post-secondary practices. The advisory board members also make recommendations on program equipment, tools and technology to provide students the most up to date technologically advanced resources. The skills gap is the lack of academic

knowledge and hands on technical skills students have in regard to specific careers. This collaboration allows career and technical center leaders to modify and adjust policy and curriculum to meet the needs of the current workforce. CTC administrators align career and technical education (CTE) curriculum with academics to address the skills gap and to maintain rigor within programs.

Staffing teaching positions at CTCs is uniquely challenging. The teachers at the career center often are professionals who have worked in the career field in which they teach. The hiring requirements and attainment of teachers at the career center is different from that of a traditional academic school. Some candidates do not have teaching experience but have an extensive background in their career field. Hiring such teachers requires that the career center follow strict state guidelines to attain emergency certification for the individual as well as to enroll them into a teacher preparation program. Three universities in Pennsylvania work with career centers to train and prepare teachers. These teachers obtain vocational one and vocational two teaching certifications. The career center must financially support the teacher training programs for newly hired teachers. Additionally, prospective-teaching candidates must meet specific criteria with their work experience to be eligible to teach at the career center. Some of those criteria include recent experience in their field within the last five years. Depending on the program, some teachers will also have to pass an occupational exam to demonstrate their skills and knowledge for that particular field of study. Attaining career and technical education instructors is difficult because of the strict criteria CTCs must meet in addition to the commitment the candidates must make to continue their education in a teacher preparation program. The requirements, commitment, and workload can be daunting to prospective candidates. Another point of difficulty in hiring teachers is that teaching

salaries are often lower than the salaries of the individuals leaving industry and business to pursue a teaching career.

The benefit of hiring teachers from business and industry is that they bring real-world experiences to the classroom. A typical classroom lesson at the career center includes the instructor delivering content knowledge while blending scenarios and situations students would encounter in the workforce. A level of problem-solving is integrated into daily lessons, allowing students to understand very detailed operations of their chosen program of study. This blend of content knowledge and business/industry expertise is not duplicated in a traditional academic school setting.

The career center accepts tenth through twelfth grade students from the nine sending schools in addition to local charter schools. Many students attend the career center because they have a strong interest in their program of study. However, school districts often send students they believe are not on an academic path or that of a four-year degree. Some school districts often send many students who have significant and multiple discipline infractions. Additionally, the career center receives a high percentage of special education students. Students with IEP's (Individual Education Plans) make-up 42% of the career center population. Mixed amongst these students are students most would consider to do well in an academic setting. These students are very focused on their program of study and excel at their sending school as well as the career center. The career center graduates approximately 200-250 senior students a year.

3.2 Participants

This inquiry focuses on work with a particular stakeholder group: educational leaders at the school and district level who impact student access to connecting career and technical skills to academics. These leaders can integrate career-connected learning to address the skills gap to promote student success. In the current education model, educational leaders and teachers are often focused on academic achievement through mandated standardized testing leaving other areas less supported. This creates a challenge to develop authentic programs to address career-connected learning to target the skills gap.

Career-connected learning affects many stakeholders including, administrators, parents, teachers, students, business, industry, post-secondary institutions and community members. Career-connected learning challenges these stakeholders to look at education through a different lens: to view traditional education of academic content areas such as reading and math in a post-modern area connected to career and technical skills of careers in our current and future economy.

3.3 Improvement Science

This improvement science inquiry uses a Plan, Do, Study, Act cycle (PDSA) through initial professional development to study the knowledge, attitudes and behavioral change of academic leaders to integrate career connected learning (Langley, 2014). This approach assures a continuous improvement goal, using professional development as a process to implement small changes with the goal of making long-term improvement (Shakman, et. al, 2017). This approach to inquiry also provide an opportunity for inquiry to refine practice and the development of efforts to connect

career learning with academics. Students pursuing career education often face many obstacles. Those obstacles include stakeholders holding limited knowledge and sharing their beliefs of career education. This inquiry will identify the knowledge, attitudes and behaviors of stakeholders who influence student's access to career education.

The career center held a career and technical education professional development session on October 3, 2019. This was the third annual professional development meeting for sending district administrators, counselors and special education directors. Participants of the professional development session completed an "entry ticket" survey prior to attending the meeting. The data from the survey helped develop a portion of the development meeting. Participants then completed an "exit ticket" at the conclusion of the meeting. These two surveys were then linked to the interviews conducted later in January. The professional development meeting provided the opportunity to address the knowledge and attitudes of the participants and for participants to identify actions they were willing to take to integrate career-connected learning at their school or district.

The "Plan" part of the study was designed to collect baseline data about knowledge and beliefs of career and technical education to begin to move toward increasing integration. Part of the "Plan" portion of the PDSA cycle included the development of a driver diagram. A driver diagram was created to develop the focus for improvement as part of the improvement science planning method (Shakman, et. al, 2017). The driver diagram identifies the desired aim for the PDSA Cycle and the "Do" portion of the professional development. The aim is the improvement goal (Shakman, Et. Al, 2017). The desired evidence of integration and the improvement toward the change ideas in the diagram include but are not limited to increased teacher visits to the career center, discussions about joint projects and increased STEAM participation. These desired

outcomes are just some examples of actions that may lead to increased for career-connected learning opportunities between the sending schools and career center. Please refer to Figure 1 to see the planning toward the desired outcome of behavioral change.

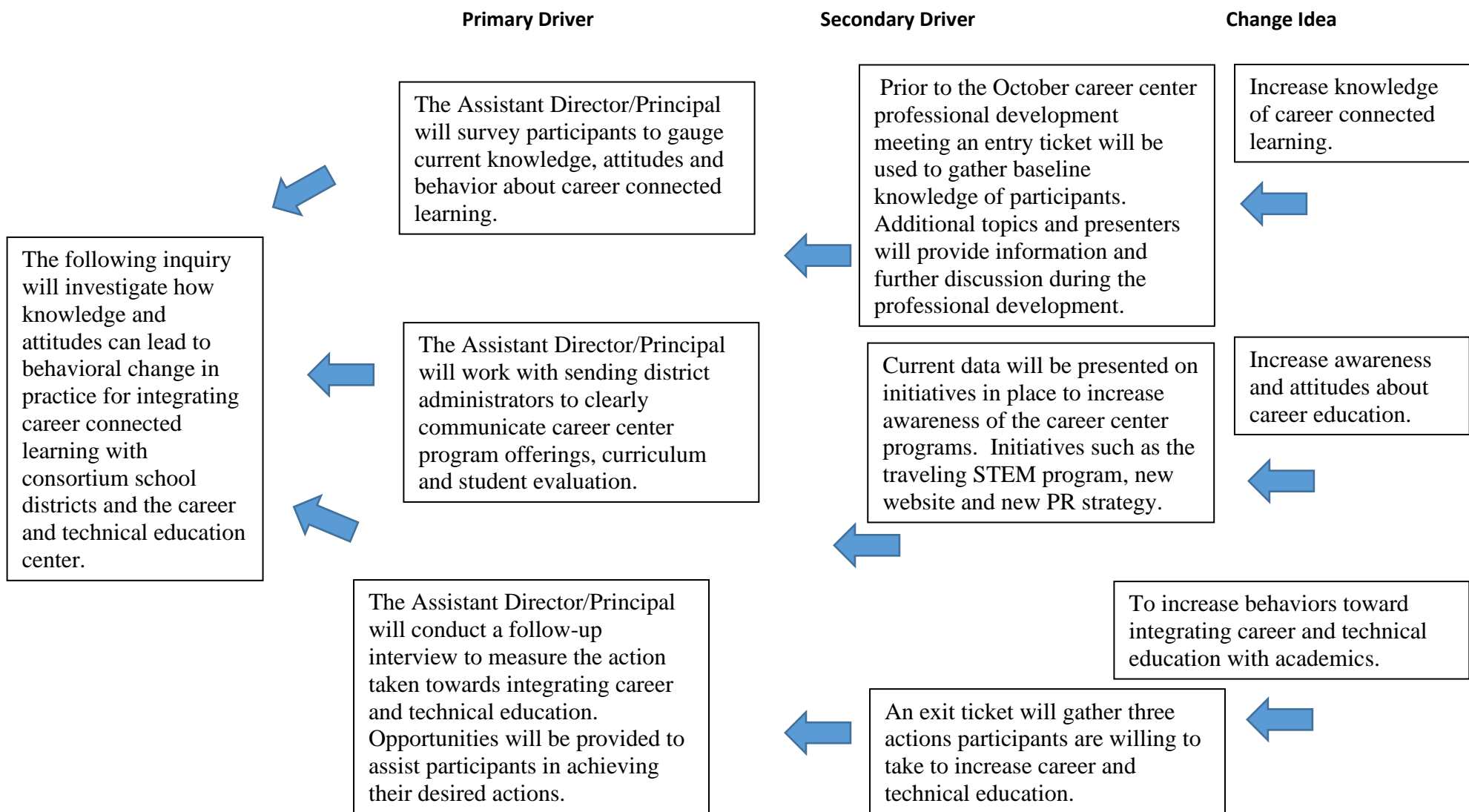


Figure 1 Change Flow Chart

The creation of the change flow chart led to the development of an entry ticket survey as part of the plan to collect data regarding the knowledge academic leaders need to better understand career and technical education and the opportunities for integration. Additionally, the survey collected data about the attitudes academic leaders have about CTE and their students who might best benefit. The data collected includes the percentage of students currently sent to the career center, common reasons for attending the career center and current methods of integrating academics. The entry ticket collected data on participant's current knowledge, attitudes and behaviors associated with career-connected learning. The entry ticket was sent out in late September 2019, via Qualtrics.

The review of literature pointed to the problem of not implementing career-connected learning in secondary school years. There are many ways to integrate career-connected learning in K-12 education. The model used for the career center in this study is for students to attend their sending school for half of the day and the career center for half of the day. This model combines career education with academics but also forms a separation between the two. Alchermic (2005) highlights this issue by explaining that industry representatives are often pleased with the technical skills students are acquiring at the career center he studied but they lack the academic knowledge much needed in their respective professions. He noted employers expressed concern about the student's lack of ability to read, write and analyze technical material (Lachimia, 2005). Lachimia (2005) studied three districts who utilized a collaboration effort and concluded that the corner stone of success was built upon the relationships amongst the sending school teachers and the career and technical education teachers. This further reinforces the notion that integration of academics with career and technical education can be achieved through planning and doing.

The “Do” part of the PDSA cycle begins with the professional development meeting occurring on October 3, 2019. This meeting allowed for further conversation about the possibilities of integrating career and technical education. This is the third time I have planned and facilitated this professional development meeting. I developed the professional development meeting three years ago to increase communication between primary stakeholders within the sending schools and career center. The inquiry of current knowledge, attitudes and behaviors of administrators and counselors was imbedded in other activities and topics covered at the meeting. The meeting also focused on the integration of career-connected learning with traditional academics and the need for collaboration between the sending schools and the career center. Other topics were covered at the meeting as well. Including, special education, NOCTI Testing, program highlights and student organizations. Please reference Appendix D for the detailed agenda. The theme to increase collaboration amongst sending schools and the career center has been used in the past with minimal results. Those results included an invitation from a participant for me to present career-connected learning at a sending school board meeting. Additionally, there has been increased communication amongst administrators and tours of the career center given to newly hired administrators and counselors.

The structure of this year’s professional development meeting was action based, informed by the change flow chart, toward integrating academic and career education and increasing collaboration between the sending schools and career center. During the meeting, participants were engaged in conversations about their entry ticket responses. The discussion included their current beliefs and attitudes about students who pursue career and technical education and those who choose an academic path. The goal was to begin the opportunity for leaders to consider how all students can benefit from career-connected learning.

Vignettes were used in the presentation highlighting career pathways and success stories to present examples of student success. A slide show of students engaged in learning cycled as participants ate breakfast. Students engaged in career-connected learning was referenced throughout the presentation. Participants completed an exit ticket prior to leaving in which they listed three actions they hope to take on return to their district to integrate career-connected learning. Opportunities and examples of collaboration for integration were provided for them to consider in their responses. The expectations of the participants was for them to generate a list of actions they will take to collaborate with the career center to better integrate career-connected learning. Those actions can be any measurable behavior toward understanding or integrating career and technical. Examples that were provided include but were not limited to; academic teachers visiting the career center programs, career center teachers visiting sending school programs/classes, discussions about collaborative projects, collaborative community events, curriculum discussions, and professional development planning. They were informed that I would follow-up with them to check the progress of their responses. As a continuation of the “Do” part of the PDSA cycle, an interview script was developed based on their responses and used during a phone call or private meeting with participants. The interviews began in January 2020, to allow time for participants to begin their action plan. A coaching model was also used to encourage and lead individuals to reach their listed goals if they were having difficulty implementing their goals. I sought to identify barriers they faced and brainstormed potential next steps toward action. The follow-up interview was structured to revisit the professional development and to problem solve ways for each participant to reach their desired outcome of change. The collected data from the interviews was compared to their initial responses on the entry ticket and exit ticket. An analysis was made to determine if and how respondent’s knowledge, attitudes and behaviors changed since

the earlier October meeting. Additionally, findings of barriers and impediments to progress were identified.

The exit ticket and interview script were part of the “Study” process that was designed to mobilize the professional development into action. The “Study” portion of the PDSA cycle started once the data was collected from the entry ticket, exit ticket and interviews. The findings were collected, paired and analyzed as part of the “Action” portion of the study. For further explanation of the PDSA cycle and Inquiry Design, please refer to Figure. 2.

The limitations included the number of participants. The study was also limited to the nine consortium districts and the participants who attended.

Inquiry Question	Evidence	Methods	Analysis and Interpretation
1. What knowledge do academic leaders need to better understand career and technical education and the opportunities for integration?	Responses from “entry ticket” survey questions provided baseline data about prior knowledge, attitudes and behaviors toward career and technical education.	<p>An “entry ticket” survey was distributed (via Qualtrics) to administrators and counselors prior to a professional development meeting in October.</p> <p>A Plan Do Study Act (PDSA) cycle as described by Shakman, et. al (2017) frames the inquiry design. In addition, the driver diagram developed the focus for improvement.</p>	The survey responses were coded for frequency and themes.
2. What are academic leaders’ attitudes about career and technical education and their students who might best benefit?	The evidence collected provided perception of attitudes administrator and counselors provide career and technical education students, compared to traditional academic students who are best qualified for career and technical education.	Participants received additional information throughout the professional development about CTE testing, special education, program offerings, certifications, open houses and district tour dates.	Activity results were analyzed for common themes and frequency of responses.

3. What actions are academic leaders willing to do to better integrate?	<p>Responses from follow-up script.</p> <p>Examples: increased teacher visits, discussions of collaborative projects, increased district STEM activities.</p>	<p>An Interview script was created to follow-up with participants. The script was framed to address the three actions they listed to implement.</p> <p>Phone or in-person conferences were used to conduct the interview.</p>	<p>Interview responses were compared to initial responses on the entry ticket as well as the professional development activity.</p>
4. What follow through actions after professional development, can be taken to better integrate career connected learning?	<p>Evidence of increased teacher visits, discussions of collaborative projects, increased district STEM activities.</p>	<p>On site, coaching for career connected learning projects.</p>	<p>Record evidence of behavioral change of integrating career and technical education with academics.</p>

Figure 2 Inquiry Design Template

3.4 Instrumentation

The professional development session was developed utilizing data from the entry ticket survey. The entry ticket survey provided baseline data about the knowledge and attitudes of career-connected learning from the participants. The exit ticket survey was used to collect data on the knowledge and attitudes of participants about career-connected learning after the professional development session. The exit ticket also asked for participants to list three actions they would be willing to take to integrate career-connected learning. The entry ticket survey and exit ticket survey were then linked or paired together for each participant. The two surveys were coded and analyzed to measure changes prior to professional development and thereafter the session. A follow-up, scripted interview was developed from the entry and exit tickets to analyze participant's progress on the three actions they listed on the exit ticket. The interviews were conducted four months after the professional development session. The interviews were also linked to the surveys of the participants.

The entry ticket, exit ticket and interview script instruments have been aligned with the inquiry questions as illustrated below in figure 4. Participant names, school district and job title were collected initially for the entry ticket survey, exit ticket survey and the interview. They were then de-identified and coded. All data is represented anonymously. Codes were used in data reporting for identification purposes only. Individual and school district names, including the career center, are not be identified in this study.

Each instrument was designed to specifically measure knowledge, attitudes and behaviors of participants. The illustration shows which questions align with each area of data that were

collected. Some instruments were designed to collect more information in a specific category compared to other categories. For example, the entry ticket was designed to collect data on the knowledge and attitudes of participants. Each instrument follows a sequential order, entry ticket, exit ticket and interview to collect data and follow the PDSA cycle as described earlier.

See table 2 for a timeline of the study.

3.4.1 Entry Ticket Survey

The entry ticket (see Appendix A) was sent using Qualtrics in September 2019. The survey collected quantitative and qualitative data in addition to demographic data. This included questions designed to obtain qualitative data on opinions and attitudes of career-connected learning and quantitative data on school district facts. Additionally, demographic data was collected and later coded and de-identified to identify participants names, job titles, and school districts. Participants of the professional development meeting had to bring the survey as their entry ticket for the day. Responses from the entry ticket were used to develop the presentation on career-connected learning and discussion topics with participants. The data from the entry ticket helped develop a portion of the professional development meeting to further inquire about participant's knowledge, attitudes and behaviors for integrating career-connected learning. Participants were asked to reflect on the career-connected learning topics prior to completing their exit ticket.

3.4.2 Exit Ticket Survey

The exit ticket asked participants to select three actions they are personally willing to take to move forward with career-connected learning in their school building or district (see Appendix

B). Examples such as teacher visits , school board presentations, and community engagement opportunities were provided for them to consider during the professional development session. (see Appendix D). Participants were informed that a follow-up interview would occur within six weeks. However, the follow-up interviews actually occurred more than six weeks later. They were informed that the interview would also assist in initiating action to help them reach their listed goals. The interview script was developed to focus on the progress of their goals in accordance to their responses on the entry and exit ticket survey.

3.4.3 Interview

The follow-up interviews occurred about three months after the professional development meeting, not the anticipated six-weeks. This was due to working through a slight delay in the approval process with the IRB. Once approval was granted, participants were contacted via email to make appointments for the interview. Participants were notified that they would be asked five questions and that the interview would last approximately thirty minutes.

Additionally, they were notified that the interview would not be audio or video recorded. Participants were provided the option to interview in person or over the phone. Notes were taken on a laptop during the interview. Upon completion of the interview, the notes were reviewed and edited for accuracy.

Table 1 Inquiry Question Alignment

Instrument	Knowledge	Attitudes	Actions	
	<p>Inquiry question 1:</p> <p>What knowledge do academic leaders need to better understand career and technical education and the opportunities for collaboration to integrate with academic areas?</p>	<p>Inquiry Question 2:</p> <p>What are academic leaders' attitudes about career and technical education and their students who might benefit from such programs?</p>	<p>Inquiry Question 3, 4:</p> <p>3. What actions are academic leaders willing to take to better collaborate in integrating career and technical education and academic areas?</p> <p>4. What follow-through actions, after professional development, can be taken to better collaborate to integrate career-connected learning with academics?</p>	
	<p>Questions: 3,4,5,6,7,8,9,10,11</p> <p>3. What percentage of students attend the career center from your district?</p> <p>4. What programs of study have the highest enrollment from your district/school? Please select three.</p> <p>5. Are you familiar with the term career-connected learning?</p> <p>6. Rate your current level of knowledge about career-connected learning.</p> <p>7. Do you know about the career center traveling STEAM program?</p>	<p>Questions: 12,13,15, 16, 17</p> <p>12. Select each of the listed barriers for students attending the career center from your district. You may select more than one option.</p> <p>13. Does your school/district promote the NOCTI Exams for career center students?</p> <p>15. Please select all of the words that you think would best describe a career and technical education student.</p> <p>16. How do you think your students can best benefit from career center programs?</p> <p>17. Please describe a student who would best benefit from career</p>	Planned	Completed

	<p>8. Does your district participate in our traveling STEAM program?</p> <p>9. Please select the grade levels that participate in the STEAM program?</p> <p>10. How many schools participate?</p> <p>11. Select each of the listed reasons students attend the career center from your district. You may select more than one option.</p>	and technical education placement.		
Exit Ticket	<p>Questions: 1,3,4</p> <p>1. Rate your current level of knowledge about career-connected learning</p> <p>3. Describe the most important concept you have learned today.</p> <p>4. Describe any further information you would like us to provide you about career-connected learning.</p>	<p>Question: 2</p> <p>2. How important do you feel it is to integrate career-connected learning with academics?</p>	<p>Question: 5</p> <p>5. Please describe three actions you are willing to take in the next 4-6 weeks toward integrating career-connected learning in your schools</p>	
	<p>Question: 3</p> <p>3. What other knowledge or information do you need about career-connected learning to assist you in making progress toward change?</p>			<p>Questions: 1,2,3,4,5</p> <p>1. Have you been able to take action on your three listed items on the exit ticket? Probe: Do you recall the three items you listed? Reference the three listed items.</p>

Interview Script	<p>Probe: Is there anything that could have been explained better in the professional development meeting?</p>		<p>Probe: Go through each item listed.</p> <p>2. A. How successful have you been at implementing those actions? Probe: What type of barriers have you faced? Probe: Have you been able to overcome them? How? Probe: What was the most difficult part of implementation?</p> <p>B. How can I help you achieve one of those actions on your list? Probe: Provide examples and opportunities for integration. Probe: When can we schedule a date/time to plan for integration.</p> <p>2. What other knowledge or information do you need about career-connected learning to assist you in making progress toward change? Probe: Is there anything that could have been explained better in the professional development meeting?</p> <p>3. Have you discussed career-connected learning opportunities with colleagues in your school/district? Probe: What was their awareness of career-connected learning?</p>
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4.0 Data and Findings

Participants were sent an electronic survey prior to a professional development meeting in early October. The participants included principals, assistant principals, directors of special populations and school counselors. The survey helped inform the development of develop the professional development session. This survey was referenced as the entry ticket survey. There were 13 completed entry ticket surveys. Participants, who did not complete the survey online, were given a paper copy to complete on the day of the professional development. Although, their responses would not influence the topics of the professional development, it would allow for a comparison to their exit ticket survey and eventually their survey.

Participants who attended the professional development meeting were required to complete an exit ticket survey. The exit ticket survey has questions aligned with the entry ticket survey to see if there was evidence of growth in knowledge and attitudes of participants prior to the meeting and thereafter. Nineteen participants completed the exit survey. Due to last-minute cancellations of participants attending and individuals who did not complete the entry ticket survey, not all participants had completed both the entry ticket and exit ticket survey. Eleven participants completed both surveys, which were aligned together to analyze the data.

The participants who attended the professional development meeting were contacted three months after the meeting to schedule an interview. Nine participants completed the interview. This allowed their interview to be aligned to the entry and exit ticket surveys. One individual was on medical leave, another took a position in another district, two declined to participate, and two did not respond. Participants from seven of the districts completed the two surveys and the interview.

Two of the districts did not have participants who completed the survey. Seven out of the nine districts had participants who completed all components of the study.

4.1 Entry Ticket

Participants completed an entry ticket survey via Qualtrics or a paper copy that included 17 questions. Thirteen participants completed the entry ticket survey. All nine of the sending schools were represented. The participants provided demographics such as, their name and school district to initially identify their entry and exit surveys. After alignment, all identifying information was removed from the data file. A large majority (85%, n=11) indicated a low percentage (0-10%) of their student population attends the career center. They also gave information about the programs with the highest enrollments. Respondents could select more than one option. The highest enrolled programs include cosmetology (11), culinary arts (5), automotive technology (4), automotive collision repair (3), and heating and ventilation (3). Interestingly the selected programs are reflective of the more traditional vo-tech programs popular in earlier decades.

Participants were asked about their familiarity with “career-connected learning.” Ten indicated they were familiar with this concept, with one additional person indicating “very familiar” and only two respondents indicating not familiar. Prior to the professional development meeting, 77 percent of respondents were familiar with the term “career connected learning.” Nine participants then responded that they had moderate knowledge on the concept of career-connected learning, and four responded that their knowledge was “low.” Prior to the professional development meeting, 69.2 percent of participants said that they had moderate knowledge about career-connected learning.

The “entry ticket” survey included questions to measure participants’ current knowledge of the STEAM program that is offered to elementary schools at the nine sending districts. Seven participants said they did not know about the traveling STEAM program, while six indicated that they did. When participants were asked if their district participates in the traveling STEAM program, three responded yes, two responded no, and eight gave no response. The majority (61.5%) did not respond to this question. Furthermore, participants were asked about which grade levels participate in the STEAM program. Two said grade 5, one said grade 6, and one said grade 4. Again, the majority (69.2%) did not respond to the question. Participants were then asked how many elementary schools in their district participate in the traveling STEAM program. There were no responses identifying the number of elementary schools that participate.

Respondents selected each of the reasons students attend the career center. The most selected reasons included interest in a specific career (n=12), suggestion by a counselor (n=10), information from a recruitment visit (n=6), and their experience with a career center visit (n=6).

Table 2 Question 11

Responses	Frequency	Frequency (%)
Interest in a specific career	12	23.1%
Suggestion by counselor	10	19.2%
Information from recruitment visit	6	11.5%
Recommendation by parent	6	11.5%
Past experience of career center visit	6	11.5%
Participated in summer camp at the career center	4	7.7%
Recommendation by teacher	4	7.7%
Local and global job outlook	3	5.8%
Participated in our STEAM program	1	1.9%

Respondents were then asked to select each of the listed barriers for students to attend the career center from their district. Participants were able to select more than one choice. Some of the

highest responses included, n=10 (stigma of career and technical education), n=8 (parental influence) and n=6 (academic schedule conflict). Other responses included the following:

Table 3 Question 12

Responses	Frequency	Frequency (%)
Stigma of career and technical education	10	28.6%
Parental influence	8	22.9%
Academic schedule conflict	6	17.1%
Sports/extracurricular scheduling conflict	2	5.7%
School personnel influence	1	2.9%

The National Occupational Competency Testing Institute (NOCTI) exam is how student's academic knowledge and hands-on knowledge is measured at the career center. Participants were presented a series of questions in the survey pertaining to the NOCTI exams. When participants were asked if their school/district promotes the NOCTI exam, respondents indicated n=10 (yes), n=2 (no) and n=1 (no response). They were then asked specifically how the NOCTI exams are promoted, with participants allowed to select more than one method. The responses included n= 6 (other), n=2 (email) and n=2 (parent letter).

Participants were then asked to reflect upon descriptors of career and technical education students. The respondents were allowed to select more than one term. The highest selections included n=11 (focused), n=9 (driven), n=8 (ambitious), n=8 (motivated), n=7 (creative), n=7 (curious) and n=7 (problem solver).

Table 4 Question 15

Responses	Frequency
Focused	11
Driven	9
Ambitious	8
Motivated	8
Creative	7
Curious	7
Problem solver	7
Dedicated	5

Innovative	5
Attentive	4
Confident	4
Conscientious	4
Persistent	4
Tenacious	4
Proud	3
Respectful	3
Passionate	3
Studious	3
Stressed	2

The survey also included two open-ended questions:

- How do you think your students can best benefit from career center programs?
- Please describe a student who would best benefit from career and technical education placement.

The entry ticket survey provided baseline data of participants' knowledge and attitudes about career-connected learning. This information aided in the development of the professional development meeting held on October 3, 2019. At that meeting, participants completed an exit ticket survey to provide data on participants' knowledge and attitudes regarding career-connected learning after the professionally development presentations.

These responses were coded using quotations from participants that addressed knowledge and attitudes in their responses. The first open-ended question responses grouped into two categories: "real world experiences" and "opportunities." Four respondents indicated "real world experiences" based on their knowledge of the career center programs. These referenced real world experiences included "connecting to real world employment" and "skill sets". Additionally, four responses included a common theme of "opportunities." Participants referenced "opportunities" as "programs provide a direct link to the job market" and "be better prepared for college and careers". There were 5 "no responses" to this question in the entry ticket survey.

Participants then responded to what type of student would best benefit from a career center placement. Responses were grouped into three categories: hands-on learner, career-focused, and all students. One person mentioned “students who perform better in hands-on, active learning.” The next category, “CTE for all,” was suggested by two participants. Additionally, one participant responded “problem-solving based careers.” Across the surveys, five people did not respond to the question.

4.2 Exit Ticket

The exit ticket survey was given to respondents at the conclusion of the professionally development meeting. There were 17 exit ticket surveys submitted at the conclusion of the meeting. There were 11 exit and entry ticket surveys that could be matched with participants. There were six exit ticket surveys that could not be aligned with an entry ticket survey. Several of the questions from the entry ticket were the same on the exit ticket to measure growth of knowledge and attitudes

The first question addressed participants’ current knowledge of career-connected learning. Two respondents rated their knowledge as “very high,” nine as “high,” and five as “moderate.” Participants were then asked how important they feel it is to integrate career-connected learning with traditional academics. Five said it is “critical,” two said “important,” and nine said it should be a “priority.”

The next series of questions presented to participants included open-ended questions:

- Describe the most important concept you have learned today:

- Describe any further information you would like us to provide you about career-connected learning:
- Please describe three actions you are willing to take in the next 4-6 weeks toward integrating career-connected learning in your schools.

Participants were asked to describe the most important concept they had learned during the professional development. The responses included four emerging themes. The themes included, “parents”, “higher education”, “collaboration” and “CTE specific”. The theme that received the most responses was “CTE specific.” With this response, participants mentioned specific information that they learned about the career center. For example, one participant cited the importance of the newly implemented standards-based grading system at the career center. Another respondent referenced the number and types of programs offered at the career center. The responses with this theme included concepts they found relevant that were exclusive to the career center. The theme “parents,” for example, indicated a strong emphasis on educating parents about career and technical education to increase their knowledge and decrease the stigma often associated with career and technical education. Three participants listed influencing the mindset of parents as an important concept they had learned that day. The theme of “higher education” also received three responses. Participants noted in the “higher education” theme that students and parents are often misled about college information and that not all successful career paths require a college degree. “Collaboration” was another theme that received three responses. Respondents noted that the CTC collaborates with the districts and business/industry partners. Respondents cited examples of district and CTC collaboration and the importance of such collaboration for students.

Another open-ended question asked participants to describe further information they would like the career center to provide them about career-connected learning. Eight did not respond to the question. The second highest coded category was “CTE exposure for younger students,” which yielded five responses. Many participants echoed the theme of exposing students to career and technical education at a younger age, mostly seventh and eighth grade students.

The final question on the exit survey was for participants to describe three actions they were willing to take in the next four to six weeks toward integrating career-connected learning in their schools. The most frequent response theme was “communication” (n=13). Participants felt they could take action to better communicate with teachers, students, parents, counselors, administrators, and their school board about career-connected learning. “Teacher opportunities” received six coded responses. Respondents were willing to organize opportunities for their teachers to gain more knowledge on career center programs and career-connected learning. Respondents also felt they could take action with “collaboration” (n=6). Ideas expressed in this theme included creating shared professional development and inviting CTC staff/administration to speak to staff during meetings. The theme “professional development” also received six responses. Participants felt that they could shadow a career center student to gain better understanding of student perspectives. One participant indicated personal research to further his/her knowledge of career-connected learning.

4.3 Interviews and Paired Responses

The interviews were conducted with participants three months after the professional development meeting. The interviews were conducted to identify behaviors of the participants

after the professional development meeting. Participants were asked to identify three actions they were willing to take to integrate career-connected learning into their schools. There were 9 participants interviewed via phone or in person. All participants were contacted through email on two occasions requesting their participation in the interview. Seven of the nine school districts were represented by participants who completed the entry ticket, exit ticket survey and interview. There were two individuals who opted out of the survey, one person was on medical leave, one who took a position in another district and two with no response.

The nine people interviewed had taken action on at least one of the action items they had listed on the exit ticket survey. Overall, there was significant evidence of action taken after the professional development meeting in seven out of nine school districts. The section below provides a participant review of this evidence for all nine respondents. Additionally, Table 5, is offered at the conclusion of this section (p. 58) to provide an overall summary of the findings across participants.

Participant A from school district 1 was unable to complete the interview due to being out on medical leave. This participant did complete the entry and exit ticket, which allowed for findings in the knowledge and attitudes of this participant. This participant responded “moderate” when asked *Rate your current level of knowledge about career-connected learning* on the entry and exit ticket survey. This participant’s knowledge on career-connected learning remained “moderate” after the professional development as indicated on the exit ticket survey. Participant A’s attitude was that it is a “priority” when asked, *how important do you feel it is to integrate career-connected learning with academics?* Although this participant was not able to conduct the interview to measure action taken on the exit ticket responses, another district representative reached out to me to collaborate on a grant proposal. This proposal would integrate career-connected learning and project based learning in three school districts, including school district 9

and the career center. This proposal also included partnerships with local businesses and industry. School district 1 did exhibit action of integrating career-connected learning. The findings from school district 1 included a desire to increase knowledge of career-connected learning, influence a positive attitude and take action on integrating career-connected learning within the district.

Participant B from school district 2 completed both surveys and the interview. This participant's knowledge, attitudes and behaviors were able to be paired among the surveys and interview. When asked on the entry ticket, *Rate your current level of knowledge about career-connected learning*, the participant responded "low". When asked the same question on the exit ticket survey, the respondent answered "moderate". The participant increased their knowledge on career-connected learning after attending the professional development meeting. When asked, *How important do you feel it is to integrate career-connected learning with academics?* Participant B replied that attitude was "critical". However when asked in the interview, *Have you discussed career-connected learning opportunities with colleagues in your school/district?* The participant responded "no". Although, participant B answered "no", the participant's actions showed there was communication amongst administrators, counselors and special education teachers. Regular education teachers were the only population not included in discussing career-connected learning.

The participant indicated three actions they would be willing to take to integrate career-connected learning into their school or district. This participant completed one action, has planned another action and did not complete one. The action completed was "sending new teachers/staff to the career center for a visit". This participant took a counselor and special education teacher on a student visit to the career center. The action that the participant planned is for the career center assistant director/principal to present to the district school board in the spring. Permission was given from the assistant superintendent for this presentation. The action that did not occur was to have the principal present to the high school teachers during one of their morning meetings. It was

determined that these twenty-minute meetings did not provide adequate time to discuss career-connected learning. Participant B increased their knowledge of career-connected learning and influenced others to increase their knowledge. The participants' attitude toward career-connected learning aided in motivating school district 2 to take action to integrate career-connected learning.

Participant C from school district 3 also completed both surveys and the interview. This participant's knowledge on career-connected learning went from "low" to "moderate" when asked the same question on the entry and exit ticket survey. When asked about their attitude of the importance of integrating career-connected learning, the participant responded "important". The respondent answered in the interview "yes" to having discussed career connected-learning in their school/district. Participant C indicated that the attitude from individuals was that, "AP courses are king and test scores are very important".

Participant C did complete the three actions they had listed on the exit ticket survey. In addition to completing the three actions, we were able to plan a fourth action during the interview. The three actions completed included working with the college and career essentials class, seeking practicum opportunities, and organizing a career opportunities fair. Additionally, the fourth plan of action included having 7 career center teachers and 2 administrators visit the sending school for professional development. The opportunity allowed teachers to learn the educational model of the district, their teaching strategies and visit academic classrooms. Participant C has increased their knowledge on career-connected learning, and has attempted to influence others attitudes about career- connected learning. This participant has taken action to promote integrating career-connected learning through increasing people's knowledge and influencing attitudes about career-connected learning in the school and district.

School district 4 had two participants complete all of the surveys and the interview. Those participants were participant D and E. Participant D and E ranked their knowledge of career-

connected learning as “moderate” on the entry ticket survey. After the professional development meeting, participant D and E ranked themselves as “high” on their knowledge of career-connected learning. Participant D offered suggestions after being asked on the exit ticket, *What other knowledge or information do you need about career-connected learning to assist you in making progress toward change?* One suggestion included, “share standards based reports with the districts”. Standards based-report cards breakdown the curriculum of a program into competencies. Students are given a numerical ranking on their skill level for each competency. The standards-based report card is given to students with their traditional report card. The traditional report card includes a percentage and a letter grade. The standards-based report card provides a deep analysis of the student’s current skill level. Participant E offered the suggestion, “that schools would benefit from up to date standards (pre-requisites) for programs that include levels of math, etc. to help teachers better prepare students for admission”.

Participant D was able to complete the three actions listed on their exit ticket to integrate career-connected learning. They included, writing a competitive integrated employment opportunities grant, sharing information with teachers about career indicators, and promoting career center programs as an option to students with IEP’s (individual education plan). When participant D was asked on the entry ticket about how important they felt, career-connected learning is to academics, they answered a “priority”. When asked during the interview if they had discussed career-connected learning with colleagues in their school or district, participant D replied “yes”, they had spoken to teachers, parents and administration. The interview response reflected an attitude that career-connected learning is a priority within the school and district. Participant D was able to influence the knowledge, attitudes and behaviors of others within the school and district. Action was taken to integrate career-connected learning in school district 4.

Participant E was able to complete two of the three actions listed on their exit ticket. The two actions completed included, meeting with ten math and science teachers to discuss how they could relate careers to their academics. The other action completed was meeting with all freshmen parents to discuss career-connected learning and career center programs. The action that was not completed was to meet with elementary counselors to discuss integrating career-connected learning at the elementary level. Participant E did respond “yes” to discussing career connected learning with colleagues in the school and district. Participant E commented on the attitudes of the these individuals, stating “ some individuals said students will change their major in college, therefore our job should be to provide a good foundation, not necessarily have students make a decision on a career.” Despite differences in attitudes about career-connected learning, participant E was able to influence knowledge; attitudes and behaviors of people within their school and district to integrate career-connected learning.

Participant F from school district 5 completed the entry ticket survey, exit ticket survey and interview. This participant listed their knowledge of career-connected learning as “moderate” on the entry ticket survey and then “high” on the exit ticket survey. When asked on the exit ticket survey, *what other knowledge or information do you need about career-connected learning to assist you in making progress toward change?* They responded, “to look at data of job placement rates and to see what students are earning and the career path they had chosen.”

Participant F completed all three actions listed on their exit ticket. These actions included, sharing two videos presented at the professional development meeting with English teachers and emailing a link to parents. School district 5 teachers also visited the career center in early spring to tour the programs. The assistant director/principal was also invited to present at a community-connections event hosted at the middle school. In addition, private tours had been set-up for parents and students at the career center. Participant F feels that it is a “priority” to integrate career-

connected learning. They have also spoken to colleagues in their school and district about career-connected learning. Participant F stated that, “overall people are interested. Trying to sit down and get a plan together has been difficult.”

Participant F was able to increase the knowledge, attitudes and behaviors of people in school district 5 to integrate career-connected learning. This participant has increased their knowledge and took action to integrate career-connected learning with academics in their school/district.

Participant G from school district 6 completed both surveys and the interview. Participant H is also from school district 6 but did not respond to the request to complete an interview.

Participant G only listed two actions they would be willing to complete. The action this participant completed was meeting with the student advisory committee to discuss career connected learning. Participant G feels it is a “priority” to implement career –connected learning based on the response on the exit ticket. This participant also answered “yes” to discussing career connected learning with colleagues in their school/district. The response was “other people feel it’s not their world so no need for them to know or understand.” Although, participant G only completed part of one of their actions, they were still able to begin the conversation of integrating career-connected learning in their school/district.

Participant H listed their knowledge of career-connected learning as “moderate” on the entry ticket and “high” on the exit ticket. They did not list any additional information they would like to have on their exit ticket. This participant completed part of one of the two actions they had listed.

School district 7 had two participants attend the October professional development meeting. Only participant I completed both surveys and the interview. Participant J did not reply to the request for an interview. Participant I listed their knowledge of career-connected learning as

“moderate” on the entry ticket, then as “very high” on the exit ticket. Participant I responded, “Can we help keep track of career readiness indicators” when asked, *what other knowledge or information do you need about career-connected learning to assist you in making progress toward change?* Participant I completed the three actions they had listed on their exit ticket survey. Those actions were, coordinate others to integrate career-connected learning by pushing into the classrooms, having 5th grade students tour the career-center, and having 9th grade students tour the career-center. Participant I stated that integrating career-connected learning with academics is a “priority” when asked on the entry ticket. This participant responded “yes” to discussing career-connected learning with colleagues in the school/district. Participant I stated that there was pushback from teachers who often state, “take our courses not the career center’s” for fear of declining enrollment in their classes. Despite pushback, Participant I was able to increase knowledge and behaviors of educators in school district 7.

Participant K from school district 8 completed both surveys and the interview allowing for the surveys and the interview to be paired. This participant listed their knowledge of career-connected learning as “moderate” on the entry ticket. They then listed their knowledge as “very high” on the exit ticket. When asked on the exit tickets, *what other knowledge or information do you need about career-connected learning to assist you in making progress toward change?* They responded, “to offer flyers with pre-requisites of each program and also to provide digital program flyers to the counselors in each district.” Participant K completed one action and planned another action for early spring. The action completed was having the assistant director/principal meet with the career counselor and students in the college and career office. Although, no students visited the college and career office during the visit, it was still very beneficial meeting with the college and career counselor. During the interview, discussion of a new action was planned in addition to the others listed on the exit ticket. The participant did not complete the action to shadow a student.

The action that was planned and occurred was to have the assistant director/principal present to the high school parent teacher organization. Participant K listed the importance of integrating career-connected learning with academics as a “priority.” This participant replied “yes” to the exit ticket survey question, *have you discussed career-connected learning opportunities with colleagues in your school/district?* Participant K has been able to increase knowledge of career-connected learning and create action within school district 8 to integrate career-connected learning with academics.

School district 9 had a participant complete only the exit ticket. This did not allow for the surveys and interviews to be paired. However, a representative from school district 9 reached out to me to collaborate with school district 1 and an outside school district on career-connected learning and project based learning. School district 9 took the lead on writing a grant for this collaboration. The assistant director/principal met with stakeholders from school district 1 and school district 9 to set preliminary terms on this collaborative project. Although, the surveys and interview could not be paired, school district 9 is taking action to integrate career-connected learning.

Table 5 Findings Across Participants

School 1

Participant A

Knowledge	Attitude	Behavior
Knowledge of career-connected learning stayed at <u>moderate</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Unavailable for interview

School 2

Participant B

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>low</u> to <u>moderate</u> after the professional development meeting.	Participant feels it is <u>critical</u> to integrate career-connected learning and academics.	Participant completed two of the three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center.

School 3

Participant C

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>low</u> to <u>moderate</u> after the professional development meeting.	Participant feels it is <u>important</u> to integrate career-connected learning and academics.	Participant completed all three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center. During the interview process, another action was planned and completed.

School 4

Participant D

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>moderate</u> to <u>high</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Participant completed all three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center.

School 4

Participant E

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>moderate</u> to <u>high</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Participant completed two of the three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center.

School 5

Participant F

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>moderate</u> to <u>high</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Participant completed all three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center.

School 6

Participant G

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>low</u> to <u>moderate</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Participant completed one of two actions they listed to integrate career-connected learning with academics and/or collaborate with the career center.

School 6

Participant H

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>low</u> to <u>moderate</u> after the professional development meeting.	Participant feels it is <u>critical</u> to integrate career-connected learning and academics.	No response to request for interview

School 7

Participant I

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>moderate</u> to <u>very high</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Participant completed all three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center.

School 7

Participant J

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>moderate</u> to <u>high</u> after the professional development meeting.	Participant feels it is <u>critical</u> to integrate career-connected learning and academics.	No response to request for interview

School 8

Participant K

Knowledge	Attitude	Behavior
Knowledge of career-connected learning increased from <u>moderate</u> to <u>very high</u> after the professional development meeting.	Participant feels it is a <u>priority</u> to integrate career-connected learning and academics.	Participant completed one of three actions they listed to integrate career-connected learning with academics and/or collaborate with the career center. During the interview process, another action was planned and completed.

5.0 Conclusions and Recommendations

This inquiry into career-connected learning among the nine sending districts and the career center has allowed me to build very positive relationships with educational leaders, counselors, and teachers. It is very rewarding to work as an administrator at this career center. By enacting the Plan, Do, Study, Act cycle (Langley, 2014), I have gained more knowledge about the hard work educators have put forth to provide students the most relevant education, including career-connected learning, to ensure their future success. I have increased my awareness over the past seven months on the actions our districts are taking to integrate career-connected learning. Equally, I have had many opportunities to educate people in our sending schools about career and technical education and how the career center integrates academics and career-connected learning. The PDSA cycle aided building greater capacity in the knowledge, attitudes, and behaviors about career-connected learning between our districts and career center. The surveys and interviews together showed growth among the participants in knowledge, attitudes, and behavior. These participants were then able to enhance knowledge, attitudes, and behavior of stakeholders in their schools and districts.

The research participants were dedicated to incorporating career-connected learning in their building or district because they feel it is relevant to student success. These leaders communicated effectively with others and myself in their schools/districts and successfully collaborated on many projects and initiatives to integrate career-connected learning. Overall, I was very impressed with what we had accomplished in seven months. The participants and I have committed to projects and processes for integrating career-connected learning that will lead us into the future.

5.1 Practices and Policies

I learned that many districts and schools are navigating through the Pennsylvania Department of Education state standards for career readiness in order to meet educational mandates. These standards address career awareness and preparation, career acquisition, career retention and advancement, and entrepreneurship (PA Career Standards, 2020). Educational leaders are then challenged to meet these requirements with their (often limited) resources. Each district or school has to create their own strategies for addressing career readiness standards. The career center is a hub for the districts and can help schools to meet their career readiness requirements. Many educational leaders have utilized the career center's traveling STEAM program to meet these requirements in their elementary schools. All of the sending schools also use ninth grade tours to meet career readiness requirements at the high school level. I have found that schools and districts are eager to do more than meet the minimum required standards. They look for authentic opportunities for students to gain career-connected learning experiences. Many educational leaders believe it is necessary to connect education to careers (Gallup, 2018). This has been true with the participants I have worked with throughout this research. The relationships developed over the past seven months between the career center and the districts has opened the door to collaborate and implement more career-connected learning into the schools.

The educational leaders who participated in the October professional development meeting listed three actions they would be willing to take to integrate career-connected learning in their school or district. I was very impressed with the success these leaders had in accomplishing the actions they had listed. Through the interview process, I was able to help others initiate plans to accomplish their actions. Additionally, during the interview process, we came up with more opportunities to influence the knowledge, attitudes, and behaviors of parents, teachers, and

students. This continuous improvement model has utilized a process with small changes that lead to long-term improvement (Shakman et al., 2017). This model has been evident through the actions the participants have taken to integrate career-connected learning in their schools and districts. We were able to collaboratively take the following actions:

- Teacher visits to the career center
- Collaborative presentations to parents in two districts
- Professional development session presented by the career center assistant director/principal to one district's teachers
- Presentation from the assistant director/principal to one school's PTO. From this, future presentations were recommended by the PTO to administration
- Student tours of the career center for all ninth grade students as well as fifth grade students from two districts
- Presentation scheduled to one school board from the career center assistant director/principal
- More STEAM events at the elementary schools
- Meeting with career counselor from one district and the career center assistant director/principal to discuss future collaborative efforts
- Professional development from one district to the career center teachers about their educational model
- Sharing of ideas and resources with educational leaders from the October professional development meeting
- Collaborative grant proposal with two sending schools and an outside district to institute collaborative career-connected learning and project based learning amongst the three schools and business/industry partners

An important outcome from this research has been the relationships I built with educational leaders, counselors, teachers, parents, and students in the sending districts. I found that once contact was made with these individuals, they were eager to discuss plans to integrate career-connected learning. I was able to meet new stakeholders through collaboration with the participants in the study. These stakeholders were able to educate me on district initiatives regarding career-connected learning, as well as processes and plans for future integration and collaboration between the career center and the schools. I was able to grow the network of educators and other stakeholders who are interested in learning and implementing career-connected learning. A major outcome from this study has been building a community of educational professionals who see the significance and importance of integrating career-connected learning with academics to best prepare students for post-secondary education and careers.

5.2 Barriers

There were several barriers discovered through this research. Each district has its own specific barriers, but there were common barriers that became evident through discussions and planning. These included:

- Time
- Resources
- Mandates
- Attitudes
- Stigma

5.2.1 Time

Often it was difficult to find time to meet with individuals from nine different districts to discuss and plan for career-connected learning. Educational leaders and teachers have many demands and limited time, making it difficult to find shared time for collaborative planning. It took a lot of patience and advance planning for everyone to discuss and formulate actions to move toward career-connected learning. Through everyone's dedication, we had great success moving forward in the seven months since the initial professional development meeting. It is still a slow-moving process to plan the more intricate collaborative projects.

5.2.2 Resources

The schools and districts all have different resources that they can utilize for career-connected learning. Finances are a significant barrier for some schools/districts. Some districts serve affluent socioeconomic communities and others do not. For example, busing sometimes becomes a barrier when planning collaborative activities. Some districts cannot afford to bus students to the career center for collaborative activities. The career center does apply for grants to help districts with issues such as busing.

Facilities sometimes create a barrier for districts. Many of the participants in this study have applied for grants to help update facilities and provide students with modern resources for integrating career-connected learning. Some districts have very up-to-date facilities and classroom resources, whereas others are not so fortunate. Facilities, class materials, and technology barriers make it difficult for some districts to provide opportunities for their students. The career center tries to overcome this barrier by utilizing the STEAM roadshow. The career center takes equipment

and materials to the schools to provide students resources for career-connected learning opportunities with the latest technology and tools used in business and industry.

5.2.3 Mandates

Schools and districts also have many other state mandates they must meet in addition to career readiness. Standardized testing and Pennsylvania state standards are a major influence on educational practices and processes. The PA Future Ready Index has led to increased awareness of integrating career learning (Pennsylvania Department of Education, 2018). However, navigating through test preparation and state standards leaves little time to implement authentic career-connected learning opportunities for students.

5.2.4 Attitudes

Although I did not encounter negative attitudes toward integrating career-connected learning during this study, some of the participants discussed encountering such attitudes. The experience I had from educational leaders, parents, teachers, and students was overwhelmingly positive, with many helping to take action to integrate career-connected learning. However, there were some reports of resistance for providing this type of education. Participants shared responses from individuals they had spoken with that included statements such as “not my forte,” “college for all mentality,” and “provide good foundation, not necessarily have students make a decision on a career.” The participants I interviewed were very optimistic about educators in their schools/districts embracing career-connected learning. There was little pushback and negativity in most cases, but it was still present. All of the participants I worked with during the past seven-months problem-solved methods to overcome the barriers they encountered.

5.2.5 Stigma

The entry ticket survey revealed that 28.6% of educational leaders believe that negative stigma is the number one barrier for students. This stigma portrays students who enroll in career education as less adequately prepared for academically challenging careers and post-secondary schooling. It is evident through discussions with parents about career and technical education that the stigma influences their attitudes and behavior to inform and support their children in considering CTE as an educational option. The stigma also influences the attitudes and behaviors of educators who are not equipped with the knowledge about career and technical education and integrating career connected learning. The stigma does seem to be decreasing as more educators, educational leaders and parents become more knowledgeable about CTE can career connected learning.

Table 6 Barrier Actions and Recommendations

Barriers	Actions	Recommendations
Time	<ul style="list-style-type: none">• Utilized advanced planning• Communicated consistently with building principals and counselors	<ul style="list-style-type: none">• Be flexible• Plan meetings well in advance
Resources	<ul style="list-style-type: none">• Used the career center resources when appropriate• Sent a traveling STEAM program to schools/districts	<ul style="list-style-type: none">• Be mindful when working with many school districts that resources are not the same• Travel to schools if needed• Apply for grants individually and collaboratively• Provide busing to districts for students to visit the career center
Mandates	<ul style="list-style-type: none">• Well organized and advanced planning around standardized testing	<ul style="list-style-type: none">• Obtain academic calendars from each district• Plan well in advance• Be mindful of other initiatives in each district/school• Offer assistance in meeting mandates (CEW standards, etc.)

Attitudes	<ul style="list-style-type: none"> • Sought opportunities to provide knowledge and information to educators, parents teachers, and students • Followed recommendations on making information accessible 	<ul style="list-style-type: none"> • Collaboratively present to parent and community groups • Present to students in their sending schools • Use platforms such as district websites to deliver information • Find opportunities to increase knowledge on career-connected learning and career and technical education
Stigma	<ul style="list-style-type: none"> • Focused on increasing people's knowledge about career-connected learning and CTE • Provided opportunities for parents, community and students to visit the career center • Celebrate the successes of students • Used data on local and global economies 	<ul style="list-style-type: none"> • Seek opportunities to increase people's knowledge about career-connected learning and CTE • Collaborative presentations to parents and community with the sending school and career center • Seek opportunities to collaborate and integrate career connected learning between the sending school and career center • Be aware of local and global economies and job markets

5.3 Actions in Progress

Moving forward, I will continue to collaborate with our sending schools to provide career-connected learning opportunities for all of our students. The ideas and projects discussed during this study will continue into the future. Plans have already been made to increase collaboration and integration for the next school year. These plans include one school district sending their high school teachers to the career center for the first time on a district wide professional development day. Another school district's parent teacher organization would like another presentation for next school year. Depending on the outcome of a grant application, there are plans to collaborate with two sending schools to integrate career-connected learning. Discussions will continue in order to better integrate career-connected learning with academics and increase collaboration between the

sending schools and career center. These discussions include in-depth analysis of processes and procedures for integrating career and technical education and academic curricula.

Each district faces unique barriers when integrating career-connected learning. Additionally, the career center faces its own barriers as the hub for career and technical education for nine sending school districts. Conversations and analysis on many aspects of the current system will continue with the participants and other stakeholders who have become involved throughout the study.

The participants from the October professional development have been supportive in discussing and creating opportunities for students at the career center as well as in their schools and districts. The relationships that were established over the last seven months have been fruitful in generating thoughts, ideas, perspectives, and data to create more possibilities for career-connected learning in the future.

Appendix A Entry Ticket Survey

Career-Connected Learning Inventory (Entry Ticket)

Start of Block: Default Question Block

Q1 Please provide your name.

Q2 In what school district are you employed?

Q3

What percentage of students attend the career center from your district?

- ☐ 0-10% (1)
 - ☐ 11-20% (2)
 - ☐ 21-30% (3)
 - ☐ 31-40% (4)
 - ☐ 41-50% (5)
 - ☐ 51-60% (6)
 - ☐ 61-70% (7)
 - ☐ 71-80% (8)
 - ☐ 81-90% (9)
 - ☐ 91-100% (10)
-

Q4 What programs of study have the highest enrollment from your district/school? Please select three.

- ☐ Advanced Computer Programming (1)
 - ☐ Advertising Design (2)
 - ☐ Automotive Collision Technology (3)
 - ☐ Automotive Technology (4)
 - ☐ Building Construction (5)
 - ☐ Carpentry (6)
 - ☐ Computer Systems, Network Engineering and Cyber Security (7)
 - ☐ Cosmetology (8)
 - ☐ Culinary Arts (9)
 - ☐ Dental Careers (10)
 - ☐ Early Childhood Education (11)
 - ☐ Emergency Response Technology (12)
 - ☐ Health and Nursing Sciences (13)
 - ☐ Heating, Ventilation and Air Conditioning (14)
 - ☐ Introduction to Pharmacy (15)
 - ☐ Pastry Arts (16)
 - ☐ Robotics Engineering Technology (17)
 - ☐ Sports Medicine - Rehab Therapy (18)
 - ☐ Veterinary Sciences (19)
-

Q5 Are you familiar with the term career-connected learning?

- ☐ Never heard of before (1)
 - ☐ Not very familiar (2)
 - ☐ Familiar (3)
 - ☐ Very Familiar (4)
-

Q6 Rate your current level of knowledge about career-connected learning.

- ☐ Very low (1)
 - ☐ Low (2)
 - ☐ Moderate (3)
 - ☐ High (4)
 - ☐ Very high (5)
-

Q7 Do you know about the career center traveling STEAM program?

- ☐ Yes (1)
 - ☐ No (2)
-

Display This Question:

If Do you know about the career center traveling STEAM program? = Yes

Q8 Does your district participate in our traveling STEAM program?

- ☐ Yes (1)
 - ☐ No (2)
-

Display This Question:

If Does your district participate in our traveling STEAM program? = Yes

Q9 Please select the grade levels that participate in the STEAM program?

☐

Grade 4 (1)

☐

Grade 5 (2)

☐

Grade 6 (3)

☐

Grade 7 (4)

☐

Grade 8 (5)

Display This Question:

If If Please select the grade levels that participate in the STEAM program? q://QID5/SelectedChoicesCount Is Equal to 1

Q10 How many schools participate?

Q11 Select each of the listed reasons students attend the career center from your district. You may select more than one option.

- ☐ Interest in a specific career (1)
 - ☐ Local and global job outlook (2)
 - ☐ Past experience of career center visit (3)
 - ☐ Participated in our STEAM program (4)
 - ☐ Participated in Summer Camp at the career center (5)
 - ☐ Recommendation by parent (6)
 - ☐ Recommendation by teacher (7)
 - ☐ Suggestion by counselor (8)
 - ☐ Information from recruitment visit (9)
-

Q12 Select each of the listed barriers for students attending the career center from your district. You may select more than one option.

- ☐ Academic schedule conflict (1)
 - ☐ Lack of information on programs (2)
 - ☐ Parental influence (3)
 - ☐ Peer influence (4)
 - ☐ School personnel influence (5)
 - ☐ Sports/extracurricular scheduling conflict (6)
 - ☐ Stigma of career and technical education (7)
 - ☐ Transportation issues (8)
-

Q13 Does your school/district promote the NOCTI Exams for career center students?

☐ No (1)

☐ Yes (2)

Display This Question:

If Does your school/district promote the NOCTI Exams for career center students? = Yes

Q14 Please select how your school/district promotes the NOCTI exam? You may select more than one option.

☐ Email (1)

☐ Newsletter (2)

☐ Parent letter (3)

☐ School audio/video announcements (4)

☐ Social media (5)

☐ Other (6)

Q15 Please select all of the words that you think would best describe a career and technical education student.

- ☐ Ambitious (1)
- ☐ Attentive (2)
- ☐ Conscientious (3)
- ☐ Confident (4)
- ☐ Creative (5)
- ☐ Curious (6)
- ☐ Dedicated (7)
- ☐ Driven (8)
- ☐ Focused (9)
- ☐ Innovative (10)
- ☐ Motivated (11)
- ☐ Passionate (12)
- ☐ Persistent (13)
- ☐ Problem solver (14)
- ☐ Proud (15)
- ☐ Respectful (16)
- ☐ Stressed (17)
- ☐ Studious (18)
- ☐ Tenacious (19)
- ☐ Unmotivated (20)

Q16 How do you think your students can best benefit from career center programs?

☐ Please write response (1) _____

Q17 Please describe a student who would best benefit from career and technical education placement.

End of Block: Default Question Block

Appendix B Exit Ticket Survey

Career-Connected Learning Inventory (Exit Ticket)

Name _____

District _____

Title _____

Please take time to answer the following questions as your responses will be followed up with an interview.

1. Rate your current level of knowledge about career-connected learning.
 - ☐ Very low
 - ☐ Low
 - ☐ Moderate
 - ☐ High
 - ☐ Very High
2. How important do you feel it is to integrate career-connected learning with academics?
 - ☐ Not at all
 - ☐ Somewhat
 - ☐ Important
 - ☐ Critical
 - ☐ Priority
3. Describe the most important concept you have learned today:
4. Describe any further information you would like us to provide you about career-connected learning:
5. Please describe three actions you are willing to take in the next 4-6 weeks toward integrating career-connected learning in your schools.
 - A.)
 - B.)
 - C.)

Appendix C Interview Script

Career-Connected Learning Inventory (Interview protocol)

Name _____ Date/Time _____

District _____

Title _____

1. Have you been able to take action on your three listed items on the exit ticket?

Probe: Do you recall the three items you listed? Reference the three listed items.

Probe: Go through each item listed.

2. A. How successful have you been at implementing those actions?

Probe: What type of barriers have you faced?

Probe: Have you been able to overcome them? How?

Probe: What was the most difficult part of implementation?

B. How can I help you achieve one of those actions on your list?

Probe: Provide examples and opportunities for integration.

Probe: When can we schedule a date/time to plan for integration?

3. What other knowledge or information do you need about career-connected learning to assist you in making progress toward change?

Probe: Is there anything that could have been explained better in the professional development meeting?

4. Have you discussed career-connected learning opportunities with colleagues in your school/district?

Probe: What was their awareness of career-connected learning?

Probe: What needs do they have?

Probe: What sort of attitudes and beliefs did you discover?

Probe: How might we help?

5. What are your further goals?

Probe: What are your next steps?

Probe: What action are you going to take?

Appendix D Professional Development Agenda

October 3, 2019

8:00am-11:00am

Check-In/Entry Ticket – 7:45am

Breakfast 8:00am

Introduction, Jason Watkins

- Entry Ticket
- Career-connected learning
- CTE for all students
- Examples of collaboration/integration
- Exit Ticket and Follow-up
- Examples of Partnerships

Standards Based Gradebook, [REDACTED]

- Purpose/Use – Pilot program
- Example
- District consultations
- Follow-up study
- Certifications

Cooperative Education, [REDACTED]

- Co-Op Procedures
- Student Opportunities

Student Services, [REDACTED]

- Student Needs
- Scheduling
- Tours
- Recruitment

STEM Roadshow, [REDACTED]

- Purpose
- Schools participating
- Sending school student involvement

Public Relations, [REDACTED]

- District communication
- Community engagement
- Parents
- Students
- Student Successes
- Recruitment

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