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CONTEXTUAL LEARNING FOR A GLOBAL ECONOMY: A COMPARATIVE CASE STUDY OF TWO CAREER TECHNICAL CENTERS AND TWO MACHINE-TOOL MANUFACTURING BUSINESSES

by

Jennifer L. Harrison

A Dissertation
Submitted to the
Faculty of the Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Educational Leadership, Research Technology
Advisor: Richard Zinser, Ed.D.

Western Michigan University
Kalamazoo, Michigan
December 2008
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The dissertation committee of Dr. Richard Zinser, Dr. David Gaunt, and Dr. Walter Burt were inspirational in more ways than I can express. Dr. Dave Gaunt may recall my humble start in the CTE world when I placed my best foot forward and promptly got it stuck in cement. He has made as much of an impression on my career as an educational leader as I did on the Building Trades Instructor when he had to resurface my footprints out of the newly poured sidewalk. Thank you, Dr. Gaunt, for being a real example of a transformational leader. Your compassion, humor, and balance continue to be inspirational. Dr. Burt’s passion for education and “the unwavering resolve to do what must be done” (Collins, 2002) resonated with me from his educational leadership supervision lectures. As an administrator, Dr. Burt’s advice keeps me on course and guides me through the sometimes daunting challenges administrators must face. Thank you Walter for your gift of the single question, “is it good for kids?”. Dr. Zinser is perhaps the most patient professor I have ever encountered. Richard has been a steady, encouraging, and gracious human being throughout this process. Thank you for your insightful ideas, countless hours reading and rereading each draft, and for not being condescending to me when I repeatedly made the same types of errors. (At least I did not make a Type II error.)

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Jennifer L. Harrison
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CHAPTER I

INTRODUCTION

Description of Research

This graduate student examined ways educational practitioners can better prepare Career and Technical Education (CTE) students and staff for the "Flat World". In his ground-breaking work, "The World is Flat", Thomas Friedman (2005) discussed paradigm shifts in the way business was conducted on an international playing field. Educators need to respond to the urgency of globalization by asking the following related questions: How will students in the United States compete in a global environment? How can education change to meet growing demands while teaching to our strengths? This body of work examined both changing economic shifts and global paradigms as well as how a systems thinking approach can help educators prepare students for the 21st century and beyond by implementing action research-based methodologies through effective professional learning communities.

Introduction

In career and technical education (CTE), it is crucial that students have the opportunity to explore contextual learning that is relevant to current trends in the job market (Eisenman, Hill, Bailey, & Dickison, 2003). Contextual learning varies from traditional teaching strategies because it involves a more hands-on approach to education. Students who are able to learn through tactile means can usually translate information and skills in an applied manner. CTE stresses workplace relevance and employability skills (Eisenman, et al., 2003).

This qualitative method research dissertation explored the reactions, insights, and current business practices as they pertained to effectively training workers in areas such
as problem-solving, higher-order thinking and customer service. Because the workplace environment is in a state of constant flux, it is imperative that educators remain current in reference to industry trends. Globalization has directly influenced where and how business is being conducted. The United States workforce must adapt to these changes in order to remain gainfully employed and stay ahead of global trends. Curriculum needs to address issues that can assist in preparing students for a global economy.

Statement of Problem

Schools and businesses need to effectively adapt to global economic changes in order to sustain economic growth. Contextual learning and awareness may be pivotal factors for success in this context. Successful organizations are able to provide adequate training for the new global paradigm. However, schools may not be providing adequate contextual learning opportunities for students to become proficient in higher-order thinking and problem-solving skills in the classroom. Moreover, businesses and organizations that are not able to compete in the new global economy may need to examine alternate forms of training. The problems to which this study sought to address were namely (1) to what extent and in what way are there disparities and similarities between career and technical education settings and workplace training; and (2) in what ways manufacturing trades sustain growth through training at both the school and business settings?

Purpose of the Study

The purpose of this project was to find solutions for preparing educators and students to operate in a global environment. More specifically, this study attempted to find answers to the following questions: 1) What are some key issues relating to
curriculum development, training, and implementation for Michigan’s Career and Technical Education (CTE) system in both school-based and business-based settings? 2) How are curriculum models developed through professional learning communities? 3) To what extent was there articulation between Michigan schools’ and employers’ needs within a global context?, and 4) Are Michigan CTE centers effectively preparing students to work within a global environment? These questions were assessed using a SWOT Analysis approach as it pertains to the leadership interview responses. Strengths, weaknesses, opportunities, and threats were identified based on the subjects’ responses to the aforementioned questions. The SWOT analysis is a business assessment tool that is used to determine the feasibility of a project and/or corporate success (Adams Associates, 2008; Houben, Lenie, & Vanhoof, August, 1999; & Piercy, & Giles, 1989). In this context the researcher was looking for perceptions of internal and external factors that contribute to the success or are opportunities for growth within the context of sustaining growth in a global environment.

Research Questions

This research has attempted to provide answers to the following questions:

1. What are the philosophical underpinnings, or big picture frameworks, of successful CTE operations as they relate to Manufacturing Technology (MT) business organizations and Career and Technical Education (CTE) centers in a globalization context? Do they have a coherent strategy to address or understand CTE in a global context? What are the differences and similarities between career and technical centers and MT businesses?
1.1 What are the differences and similarities between career and technical centers and MT businesses related to problem-solving as an element for success for CTE in a globalization context? If so, how are employees/students trained to problem-solve?

1.2 What are the differences and similarities between career and technical centers and MT businesses related to higher-order thinking as an element for success for CTE in a globalization context? If so, how are employees/students trained to use higher-order thinking skills?

1.3 What are the differences and similarities between career and technical centers and MT businesses related to customer service as an element for success for CTE in a globalization context?

2. What are the strategies career and technical centers and MT businesses could explore to adapt to changes in a global context relative to their philosophy and mission to address globalization change?

2.1 What are the differences and similarities between career and technical centers and MT businesses in the implementation process for problem-solving as an element for success for CTE in a globalization context? How are employees/students trained in problem-solving?

2.2 What are the differences and similarities between career and technical centers and MT businesses in the implementation process for higher-order thinking as an element for success for CTE in a globalization context? How are employees/students trained in higher-order thinking?

2.3 What are the differences and similarities between career and technical centers and MT businesses in the implementation process for customer service as an
element for success for CTE in a globalization context? How are employees/students trained in customer service?

3. To what level is there alignment between career and technical centers and MT businesses? Which aspects are weak? How can they improve collaborative efforts?

Methodology

The process of this dissertation was to examine successful companies that work within a global frame. Specifically, how they incorporate training as it pertains to contextual education and professional learning communities in similar Career and Technical Education (CTE) school and business settings. Two career and technical education centers and two manufacturing technology-based (MT) businesses that successfully operate within a global context were discussed in this comparative case study using qualitative research methodology. The subjects included CTE principals, and instructors as well as business personnel who were human resource managers, Chief Executive Officers (CEOs), or business executives.

Two similar towns in Midwestern Michigan with a similar industry-base and population were selected for this study. The communities that house the schools and businesses were still experiencing growth, at the time of this study, as Michigan continues to decline in population (State of Michigan, 2007) Additionally, the two companies were selected for their ability to sustain growth in the currently faltering Michigan economy (Smothers, January 28, 2007; Shaw, January 20, 2008; & Walsh, November 23, 2007). Moreover, the two companies in this case study conducted business on a global scale, meaning they may bought, sold, manufactured and/or traded with foreign countries.
Significance of the Study

The significance of this study was based in the focused qualitative design related to data collection as well as the similarities of the two regions. A school-based CTE center was selected from each of the two counties as well as one MT business from each of the aforementioned counties that conducted business in an international frame. Northwest lower Michigan counties were chosen for this study because they were similar in industry, tourism, and other economic factors. The researcher has examined similarities and differences within and between each of the sites and has uncovered emerging themes related to elements for success in a global environment.

Because the workplace environment is in a state of constant flux, it is imperative that educators remain current in reference to industry trends (McCarthy, & McCarthy, 2006). This research mainly focused on how closely schools and businesses are aligned in regards to relevance of training and the degree to which schools prepared students to successfully transition into the globally competitive workplace.

The study delved into the underlying meanings of three core questions.

1. What are the philosophical underpinnings, or big picture frameworks, of successful CTE operations as they relate to manufacturing technology business organizations and career and technical centers in a globalization context? To what extent do they have a coherent strategy to address or understand CTE in a global concept? What are the differences and similarities between career and technical centers and MT businesses? (GP – Global Philosophies)
2. What are the strategies career and technical centers and MT businesses could implement to adapt to changes in a global context relative to their philosophy and mission to address globalization change? (IT – Implementation/Training)

3. To what level is there articulation between career and technical centers and MT businesses? Which aspects are weak? How can they improve collaborative efforts? (AR – Articulation between CTE and workforce)

The first question examined the underpinnings of success in a global frame. This researcher interviewed individuals who have an in-depth understanding of the whole design of their training process and programming. Supervisory roles were considered for the philosophical foundation of the organization. Chief Executive Officers (CEOs) or Human Resource (HR) directors were considered for interviews as people who are in charge of the global picture of CTE programs. Career and technical center interviews were arranged with the CTE principal instead of the director because the structure of both Intermediate School Districts was similar and allowed for both direct supervision and systems visioning and input by both middle-level, or building-level school administrators. Artifacts from these organizations included: Documents, flyers, annual reports, web pages, recruiting tools, blueprints, logos, admission documents, training materials, and cultural materials that contained relevant data. These data were examined in order to find elements for success in operating within a global context. Connections between training programs that promote a comprehensive approach to contextual learning practices were considered valuable for the big picture scope of the problem.

Question two examined the curriculum and implementation. Interviews, observations and artifacts assisted in exploring how CTE subjects carry out the themes.
Coding was conducted in curriculum for problem-solving, higher-order thinking, and customer service, as well as two to four additional themes that emerged. The researcher observed two training implementation sessions for each business. Observations in the CTE classrooms were determined by recommendation of the CTE Principal. By viewing training in business and education the observer was able to ascertain how the philosophies and training of specific skill sets are being implemented or carried out. Further analysis encompassed the examination of training projects and experiences to see what the trainees were asked to do or produce. Connections pertaining to higher-order thinking, customer service, problem-solving and other similarities were gleaned from this process.

Articulation between career and technical centers and manufacturing technology business organizations was uncovered through qualitative questions in the semi-structured interviews of each of the subjects who were selected to participate in the study as training experts. The researcher looked to see to what extent the school was connected to business within a global context. Data previously collected from questions one and two provided the researcher with hunches on whether comprehensive answers to the third research question were directly answered or not. The third frame of questions pertained to the level of articulation between school career and technical education settings and professional corporate climates.

Limitations of the Study

Limitations were that the sample size only covered four organizations within Michigan. Moreover, this study only focused on one aspect of business. This study was limited to two counties in Michigan that are experiencing economic growth (Michigan
Economic Development Center, 2007). It did not take into account other emerging careers and industries. The exploratory study only reflected the interpretations and insights from a small sample; therefore the results may or may not be applicable to other organizations, populations, or subjects. Additionally, the manufacturing climate and economic factors in Michigan were in a state of constant flux prior to and for the duration of the study. During the course of this study several MT businesses in the region had downsized, relocated, or closed.

Definitions of Terms

_School-based career and technical education (CTE) setting_ – An educational facility that specializes in the training of individuals for the purpose of workplace readiness.

_Manufacturing technology business organizational settings_ – Companies that operate within the constructs of manufacturing, engineering, and complex technological areas. Usually these businesses perform a myriad of duties such as product design, implementation, assembly, marketing, and distribution.

_Area career technical center_ – A vocational education facility that offers a number of programs that are designed to prepare students for future careers. These centers typically are comprised of high school juniors and seniors who attend other school district high schools in conjunction with the area career technical center.

_Globalization_ – The international connectivity between people, cultures, businesses, and political structures through the exchange of resources including information technology.

_Problem-solving_ – The ability to effectively construct working and plausible solutions to complex situations.
Higher-order thinking – The ability to pull relevant information from a cache of experiences and knowledge as needed to be applied to dynamic issues.

Customer service – The ability to recognize and act on another individual’s needs in a positive and constructive manner.
CHAPTER II
LITERATURE REVIEW

Introduction

Differences and similarities between school-based career and technical education (CTE) settings and manufacturing technology (MT) business organizational settings were examined in this study. As discussed in chapter one, sustaining economic growth in a global environment may depend on effectively adapting training programs, to include a contextual approach, in both CTE school and MT business organizational settings. Perhaps links related to this topic may be discovered in both past and present training practices.

The review was organized into five sections: (1) History of career and technical education, (2) Business practices in a global environment, (3) School responsiveness to a global environment, (4) Work-based learning, and (5) Elements for success in CTE in a globalization context.

History of Career and Technical Education

It is imperative to understand the fact that CTE did not develop as a rapid response to the delivery of qualified workers. Rather, it evolved as a process over thousands of years. For brevity, this paper will examine the patterns of history as it pertains to the past two to three hundred years. Understanding the foundation of a discipline creates a more informed base for implementing change. The history of CTE is a relevant part of our educational culture. Many facets may be repeated. Educators learn from shortcomings and expand on the methodologies that have proven to be successful. Furthermore, it (history) creates awareness that this field has stemmed from tradition, thus giving it more credibility in contemporary pedagogy.
The American Revolution

Some of the first change agents in CTE reform stem from the American Revolution which brought about a drastic change in the traditional American lifestyle. Also, the new democracy required educated citizens to participate in the government. When the U.S. broke free from European culture, the country had to establish new educational and economic systems. Issues pertaining to the gap between social classes were apparent even then. There was a growing division between the upper, educated class, and the lower working and non-working classes. Additionally, people were becoming more urbanized and industry was growing at an enormous rate. Businesses needed to keep up with the demand for a more skilled labor force (Hughes, 1989). This demand was a result of the American Revolutionary War and the blatant refusal, of the new world’s consumers, to purchase goods from England. Kasson (1986) argued that the quality and price of American manufactured products were inferior in craftsmanship and were more expensive to produce. Improvements of the manufacturing process were driven by patriotism rather than consumerism (Kasson, 1986).

While the manufacturing trades were beginning to take shape, education reform needed to follow suit. Not unlike the social calamities of today, children of past times were growing up illiterate and with little or no supervision and guidance. Another similarity is related to the present day political climate, during the American Revolution, industry and government looked to education for solutions. Education became necessary to control the growing crime rate and provide well-trained and compliant employees. Citizenship, moral conduct and a sound work ethic became infused into the foundation of
public school curriculum. This was a pattern that would be repeated again during the industrial revolution.

European Reformers and American Education

In efforts to reform education, some American experts sought guidance from European reformers. Some models of vocational education reform were derived from successful practices in European countries like Sweden. The Sloyd system was designed by educators in Sweden as a means to provide youth the opportunity to make useable products that they could take after completion of the program. The culture of the time required people to barter with goods in order to survive. The Sloyd system of education provided skills training and social interaction for students, thus preparing them to become gainfully employed. The instruction was labor intensive and was delivered by a qualified and trained educator. This was one of the first fully developed and implemented models for CTE. Both economic and social successes were a result of this delivery (Scott, & Sarkees-Wircenski, 2004).

The American Sloyd was adapted from the Sloyd system of education. Helping students learn useable skills in order to be successful is a tradition that has been translated from Sloyd as well as other European reformers. Apprenticeships were another widely accepted practice in early America. This was a practical and cost-effective way for employers to train their employees. While apprenticeships dwindled during the late 1800s, it has become more prevalent in modern work-based learning (Scott, & Sarkees-Wircenski, 2004). Modern adaptations of the Sloyd System may include a contextual approach to skill competency in industrial arts classes. Students who take a wood shop
class are able to create and build pieces of furniture that they may own. This applied approach to learning helps students attain useful skills and creates a sense of ownership.

*The Industrial Revolution*

Perhaps one of the most pivotal moments in the history of CTE stems from the industrial revolution. This era created a rising need for skilled labor due to new industrial technology. Not only did corporations require workers to be more skilled, but also many took advantage of their employees. People were expected to work long hours doing dangerous tasks that were detrimental to their well-being and did not result in fair wages or treatment. Along with reforms in education to meet the demands of business and industry, labor laws and unions were formed to insure fair practices and treatment of employees (Scott, & Sarkees-Wircenski, 2004, pp. 146-147, 166, 172). In addition to shaping the contemporary labor practices, this movement in history also began to craft modern education. The authors further explain, “The industrial revolution created a large working class that demanded new educational opportunities for their children.” (p. 146). Before these changes could translate into American schools the widespread dilemma of increasing illiteracy rates among the working class began to spread. A growing disparity between working class and the elite was prevalent. Instead of learning in a structured academic institution, middle to lower class students would work along side their parents in, quite often, treacherous conditions. Interestingly, it was not solely the inhumane treatment of children and families that brought about change. Instead, it was more the political realm that incited reform. Crime was on the rise and there were fewer educated individuals who could make informed choices at the voting polls. The conditions of cities were beginning to decay. “The working class wanted schools that would provide basic
academic skills for their children and would also include instruction in practical subjects that would prepare their children for better jobs than the ones they presently endured.” (Scott, & Sarkees-Wircenski, 2004, p. 146).

*Educational Reform Led by CTE*

As manufacturing trades began to evolve, business and industry required more specialized workers. Proper training was, and is, crucial for the perpetuation of industry. This can be costly and schools lacked incentives to continue CTE programs. Moreover, there was not an effective means to regulate these programs. This sparked the Kalamazoo Case of 1872, Carl D. Perkins Vocational and Technical Education Act of 1998, Tech Prep, and the School-To-Work Opportunities Act of 1994, which were instrumental influences in contemporary CTE practices (Scott, & Sarkees-Wircenski, 2004; Richardson, 2001).

The Kalamazoo Case of 1872 was the pinnacle moment when schools began to receive funding for education. Taxes, not parents, should pay for education in order to benefit every learner regardless of his/her socio-economic background. Because taxes were to be allocated for educational funding, the government set standards for all schools which established some uniformity in curriculum delivery. This case provided for all students to be actively involved in the learning process and obtain practical skills that could be applied towards gainful employment.

Carl D. Perkins Vocational and Technical Education Act of 1998 continues to provide a significant source of funding for CTE programs through Perkins IV. Carl D. Perkins grant monies insure that CTEs are aligning their curriculum with state and national standards, integrating work-based learning, providing equal opportunities for all
students, and adhering to the seven strict guidelines of this act. In order to insure special populations are properly addressed, many career centers have employed paraprofessional staff who have specialized training in their program areas. These employees have been hired to work with any student who meets the special populations' qualifiers. Additionally, counseling staff, remediation tools, tracking, academic integration, and employability skills training are essential components of this initiative.

The Carl D. Perkins Act continues to evolve to meet the demands of globalization. The United States Department of Education recognizes this and has implemented higher standards with the reauthorization of Perkins IV. "The United States competes in a global economy. The purpose of the Perkins Act is to prepare a workforce with the academic and vocational skills needed to compete successfully in a world market." (Johnson, 2002, p. 2). Again, contextual learning and standardization of skills are repeated themes. The specific skills may be evolving, but the need for reform as a response to change is still ever present.

As the climate and culture of the U.S. and world economies change, so is the need to move from a single-style instructional delivery to one that engages all students. Johnson argues, "Vocational-technical education's combination of classroom instruction, hands-on-laboratory work, and on-the-job training meets students' different learning styles so that all may learn." (Johnson, 2002, p.2). This, in turn, assists in creating a more diverse and ultimately creative workforce. Adaptations in legislation have resulted as a response to workforce training. Tech Prep is an initiative that was created as a direct response to the Perkins Act. It is emphasized in the Perkins III and current Perkins IV grants (U.S. Department of Education, 2007).
Effective work-based training encompasses both secondary and post-secondary education. Tech Prep is a reform that focuses on the transition between vocational training and college. According to the United States Department of Education:

*The Perkins Act* requires that Tech-Prep programs have seven elements: (1) an articulation agreement between secondary and postsecondary consortium participants; (2) a two-plus-two or a four-plus-two (only four- or six-year programs are authorized) design with a common core of proficiency in math, science, communication, and technology; (3) a specifically developed Tech-Prep curriculum; (4) joint in-service training of secondary and postsecondary teachers to implement the Tech-Prep curriculum effectively; (5) training of counselors to recruit students and to ensure program completion and appropriate employment; (6) equal access for special populations to the full range of Tech-Prep programs; and (7) preparatory services (U.S. Department of Education, 2007, p.1).

Several initiatives continue to be generated from the Tech Prep grant dollars. Articulation agreements between secondary and post secondary institutions are a primary goal of the Tech Prep initiative. Career and Technical Education Centers align their curriculum with a community college or local university. In some cases, students can earn articulated credit at participating post secondary schools. For example, an individual in Health Occupation Trades at a CTE may have the opportunity to earn high-school credits in math and science. The same course might be the equivalent of both Human Anatomy and Algebra I at the college level. Thus, the student would have the option of applying the articulated credits towards his/her future degree requirements. (United States Department of Education, 2007). Typically, an articulated credit is only valid at the granting post-secondary institution.

Tech Prep was amended by the School-To-Work Opportunities Act of 1994. This was a five year endeavor designed to give “seed money” to school districts in order to
enhance and build career-focused curriculum for K-12 schools. School-To-Work initiatives were developed by local districts in order to best serve their communities by providing resources and programs to more effectively train a specialized workforce (Scott & Sarkees-Wircenski, 2004, pp. 259-262). The main distinction between a Tech Prep program and a vocational course is based on the premise that Tech Prep training is designed to prepare students for careers and not just an entry-level job (Center for Occupational Research and Development, 1999). The curriculum should contain rigorous college preparatory standards with a more contextual instructional delivery and student application.

Another legislative response to workforce development was the School-To-Work Opportunities Act. It was signed by President Bill Clinton in 1994 and designated 300 million dollars to be spent on activities that fostered partnerships between educators and businesses within the first year of authorization (Paris, 1994). Students involved in School-To-Work programs are able to gain real world experience in professional settings. In theory, they are more able to see the connections between academics and career choices. This ability to understand the larger scope of the world can easily translate into more focused and motivated students. Pupils who can develop a new appreciation for education will be less likely to partake in behaviors that are disruptive. The ultimate goal of School-To-Work is to foster comprehensive career guidance and create a more adaptable worker (Scott & Sarkees-Wircenski, 2004). These initiatives also enable the student to make better and more educated decisions about their future career paths.

Educators, for the most part, can see this valuable connection. American high schools are implementing a wider array of CTE programs as well as learning that
promotes the School-To-Work strategies (Richardson, 2001). Job shadowing, work-based learning, guest speakers and programs such as Junior Achievement are integrated into many high school curriculum delivery methodologies. Additionally, there is an increasing consciousness to incorporate more contextual learning that is infused with the traditional academic areas.

Georgia Institute of Technology, in Atlanta, is actively responding to the globalization paradigm shift. According to University President Wayne Clough, “it is becoming increasingly important that mathematics and science education be expanded with strong hands-on programs that pique children’s curiosity about how science and technology work.” (2008, p. 2). The work at this university is evidence that contextual learning is not just limited to CTE. Clough (2008) argues that to remain competitive against countries like China and India educators need to consider job-readiness skills including technical areas. Analytical acumen is crucial in the workplace, however the ability to apply knowledge and adapt to situations is imperative. The aforementioned post-secondary institution has integrated problem-solving into multidisciplinary programs in order to create a more flexible workforce. Their success has translated into an increase in graduation rates “from 66 percent to 78 percent” (Clough, 2008, p. 7).

Data on how this model translates into the workplace is currently limited to post-graduation placement. Completers of Georgia Tech programs are highly sought after. How this directly impacts the economic situation is yet to be determined. However, the model has been replicated at the secondary level. Georgia Tech’s outreach program assists high schools in implementing more rigorous science and math curricula while infusing more technology. This hands-on approach “emphasizes problem-based learning
and student research, and integrates application with theory" (Clough, 2008, p. 7).

Students at the Rockdale Magnet School for Science and Technology, a high school that is collaborating with Georgia Tech, are immersed in long-standing interdisciplinary research projects. Their contextual learning experiences are further enhanced by university-level mentors, summer institutes, competitive events, and other enrichment activities. This approach is different from a traditional liberal arts curriculum because it focuses on the application, of academics, that is enriched by extra-curricular activities that compliment and support lifelong learning. Schools like Georgia Tech may provide feasible solutions to the changing landscape of industry and education.

**CTE and the United States Economy**

Global economics and paradigm shifts in business practices naturally lead to innovative academic approaches in CTE. While workplace skills are imperative, it is crucial to examine the role of education as it connects to both present and future applications. Clough suggests, “the bottom line is preparing our students not for a particular job – they are likely to hold many in their careers – but for life in a rapidly changing global economy” (2008, p. 8). CTE is an integral part of the American economy in the sense that it provides students with the opportunity to become skilled in various disciplines as they relate to technology. By learning specific trades, young job-seekers can more rapidly advance their careers while saving their respective companies money on training. Students who are involved in some form of vocational training are more aware of the job market, can usually see the connection between school and work and are exposed to the key employability skills that will make them adaptable in most work environments (Chalofsky, 2003). However, the new model of CTE should incorporate a
strong academic and technical foundation as a base for higher-order thinking and problem solving (2004). These workable knowledge and skill sets may help to better prepare students to adapt in an environment where they can transition more easily from one career to another as well as adapt to changes in the workplace. According to Jan Bray, (personal communication, February, 11, 2008) “Students today have to think and analyze to be successful in the workplace.”.

For the past 50 years, only 20% of the workforce requires a four-year professional degree (Johnson, 2002). CTE programs prepare students for careers in highly skilled areas that generally translate into higher wages than their untrained high school graduate counterparts. In many cases, individuals with CTE training and certifications may even realize a higher income potential than a person who has obtained a liberal arts degree in a non-technical area (Center for Occupational Research and Development, 1999). When citizens become gainfully employed, they positively impact the economy in several ways. Higher salaries translate into increased spending which in turn creates more jobs. Additionally, when citizens are employed they are not a burden to society because they do not require public assistance. This means that more funding can be earmarked for programs that may help the economy in more meaningful ways. CTE students who are successful may become working parents who then may be more likely to instill a sound work ethic in their offspring. These children may be more likely to become working consumers as well. Finally, people who are employed in an area that matches their interests and aptitude are generally known to be healthier and more emotionally stable (Chalofsky, 2003; Gould, 1979; Christenson, Sinclair, Lehr, & Godber, 2001; Rosenthal, 1998). Conversely, work ethic may be a result of internal values but points out that there
is little evidence to support there is any evidence of correlation between “social and ethnic minority status,” (Engles, 2003, p. 3).

Benefits of CTE for All Students

The number of positions available for those with traditional four-year degrees has not changed since the 1950’s (Johnson, 2002). Only 20% of professional jobs require a Bachelor’s degree, however current trends indicate that 70% of careers are in trade and industry areas requiring some post-secondary training but less than a bachelor degree. This means that most young people could become gainfully employed with a certification in a CTE area provided that they are adaptable. According to the American Association for Career and Technical Education association (ACTE), “More than 80 percent of respondents in the 2005 Skills GAP Report indicated that they are experiencing a shortage of qualified workers.” (Bray, 2008, p. 11). The declining skilled labor force requires specialized training in multiple occupational areas. Bray elaborates, “Nearly 1/3 of the fastest growing occupations will require an associate’s degree or a post secondary occupational certificate.” (Bray, 2008, p. 11) CTE can provide many of these students with the necessary foundation to continue their education beyond the secondary level. Bray (2008) advocates that CTE students need to be taught more rigorous content that is articulated to post-secondary institutions. She stresses that students are more career-focused and are more inclined to achieve higher success rates in college because they are more aware of how skills and education relate to employment success.

The Perkins IV Law requires an increase in rigor, relevance and relationships in CTE delivery systems (Bray, 2008). One major shift from the Perkins III to Perkins IV legislation is noticed through the addition of the term “concentrator” into the language.
The Michigan Department of Education defines a concentrator as a student who has successfully completed 50% of the CTE program segments and is enrolled in the next level of courses. These courses could be offered either through a secondary or post-secondary CTE institution (Michigan Center for Career and Technical Education, 2008). The benefits to students, who are identified as concentrators, pertain to the level of instruction and expertise to which they are exposed. This translates into higher levels of achievement in both technical and academic skill attainment. "CTE concentrators participated in more rigorous academic coursework and are taking more and higher level math and science." (Bray, 2008, p. 15). Additionally, Perkins IV requires a greater focus on current and projected business and industry standards.

**CTE Instructional Delivery**

CTE instruction delivers academics in a real-world or hands-on environment. Students learn through application instead of theory and memorization. For example, a student may learn and practice the principles of Geometry through first reading blueprints and then measuring and building trusses for a house. Planning, methods and skill are measured by the successful completion of a project instead of through the successful completion of a written homework assignment.

The new Perkins IV legislation supports the logical conclusion that CTE instructors should always remain current in contemporary industry trends and practices. Perkins IV allows for an increase in professional development for educators (Bray, 2008). The ACTE recommendations for No Child Left Behind (NCLB) specifically address the integration of both academic and technical education in order to more effectively prepare students for career pathways (Bray, 2008). Comprehensive career guidance and
development programs are also included as support services that enable students to make educated choices concerning their future in the workforce. Understanding how each area is evolving on a global scale as well as how each specialization is directly linked to changes in other areas gives the educator a better indication of the skills students will require to be successful in the future. Zhao (2008) argues, “Schools should at least equip students with the attitudes, perspectives, skills and knowledge that will help them find and keep a job, interact with their co-workers and neighbors and understand as well as make informed decisions about issues affecting society.” (p. 2).

Experts agree (Bray, 2008; Daggett & Pedinotti, 2005; Michigan Career and Technical Education, 2007; Zhao, 2008) that not only should the educator have the acumen to foresee these trends, but he/she needs to be immersed in the continuing education process. Aside from staying current, CTE professionals need to understand how to work with students on their level in order to help guide them towards careers that best suit their personal and professional goals. Many pupils who enroll in the CTE track are considered to be special populations. Logically, the CTE teacher needs to better understand how to effectively work with these students and their deficits. Therefore, believing that every young person has the potential to become a successful member of society is imperative. Global citizenry is another layer that should be considered in a well-rounded education (Zhao, 2008).

Previously, occupations involving manufacturing technology required workers to be highly skilled, but not necessarily literate. As previously stated, the skilled workforce in the late 1800’s and early 1900’s were, in fact, illiterate as were their offspring (Scott & Sarkees-Wircenski, 2004). This became a social problem which was a key factor in
educational reform. As machinery became more complex and as technology advanced, workers needed to be more highly-skilled. This meant placing literacy as a priority in training. Today, employees need to have aptitude in their vocations as well as the ability to locate information, read to extrapolate facts and math literacy.

The Information Age has uncovered vast possibilities for vocation and economic success. However, the United States is being directly impacted by a more global marketplace. Students of today must have critical thinking skills, problem-solving ability and a greater understanding of their potential. In contrast to vocational education practices of the past, the contemporary CTE delivery needs to provide opportunities for students to draw conclusions from a broad skill set. To train for a specific vocation would be career suicide in this technological age. “Globalization, the multitude of forces that have made our world smaller and more integrated,” (Zhao, 2008, p. 2). He further explains that human capital is not limited to geographic areas. Employees can telecommute, relocate, or have the opportunity to collaborate in a global forum. Businesses find adaptable employees more appealing because it enables them to “maximize their profits and stay commercially competitive” (Zhao, 2008, p. 2).

Some scholars liken globalization to the dramatic changes that occurred in the Industrial Revolution. During that time frame, the United States was able to move forward in areas of manufacturing (Clough, 2008). The ability to mass produce goods at a more inexpensive per unit cost was unprecedented. Clough (2008) argues that there is more urgency to stay competitive. Manufacturing goods at the cheapest price is no longer attributed to the United States. Countries including China and India have the present corner on that market. Trends in the literature suggest that educators need to address the
methods of learning rather than the content. In other words, students need to be able to apply critical thinking skills in order to make inventive leaps (Clough, 2008). Problem-solving includes reasoning and analytical skills. Clough also recommends that understanding the framework of the human condition as it applies to present global cultures is imperative.

Learning adaptability, as outlined in the Dewey model, is far more practical. Dewey embraced the notion that students should be actively engaged in the educational practice (Dewey, 1916). Self-directed learning that is driven by one’s environment is a pivotal idea in the Dewey method. Dewey (1916) believed that learners needed to utilize their environmental and cultural resources in order to immerse themselves in the learning process. In keeping with the Dewey methodology, students learning to adapt to their environment will create a stronger economic base and keep the United States in the global lead. As globalization creates a shift in industry, economics, politics, and education, classroom training should foster Dewey ideals that will create engaged and politically aware citizens.

A society which makes provision for participation in its good of all its members in equal terms and which secures flexible readjustment of its institutions through interaction of the different forms of associated life is in so far democratic. Such a society must have a type of education which gives individuals a personal interest in social relationships and control, and the habits of mind which secure social changes without introducing disorder, (p. 115)

Politically and economically aware students mature into employees who may be more likely to utilize critical thinking skills that facilitate change. In other words, the workforce needs to have skills that will perpetuate creativity and the ability to solve problems that may not yet exist (Altman, 2006). Without this kind of training, some
experts foresee America falling into the ranks of other third-world countries because the
types of work that will generate sustainability involve problem-solving and creativity
(Stuckart & Glanz 2007).

Business Practices in a Global Environment

Business and industry are in a constant state of flux. Historical and present trends
support the notion that business practices are evolutionary. Several factors come into
play. These have created a paradigm shift in CTE delivery programs from a high demand
for job-specific skills to a shift towards placing an emphasis on people-focused abilities.
More importantly, companies require employees to be able to exhibit higher-order
thinking abilities as well as customer service skills (Altman, 2006; Sontag & Hiller,
2005). Educators and human resource managers need to be aware of the changing
requirements. In order to be an effective employee there are certain essential foundational
skills an individual must attain. CTE is an integral factor in assisting students to be
prepared for the next level which includes additional education and ultimately the
required to meet that goal extend beyond performance on standardized tests to include the
ability to work with others toward common goals, effective communication skills, and the
capacity for innovative problem-solving.” (p. 17).

Studies have examined the role of effective work ethic (Engels, 2003; Bronson,
2007; Brauchle & Azam, 2004) and their relationship to job performance and employer
satisfaction (Hollingsworth, Brewer, & Petty 1995; McCortney & Engles, 2003; & Petty
& Hill, 2005). Understanding how an employer or supervisor’s interpretation of work
ethic influences the perception of those employers in regards to the employees they
supervise. Petty and Hill (2005) examine these perceptions through a quantitative approach. The subjects \( n = 2,234 \), who responded to the survey, were given the Occupational Work Ethic Inventory (OWEI) that is comprised of 50 questions that are designed for subjects to interpret their occupational behaviors on a "Likert-type scale for self scoring" (Petty & Hill, 2005, p.6). Interpersonal skills, initiative, and dependability were measured. Subjects “were selected based on the Standard Occupational Classification (SOC)”, (2005, p.8) and represented various job classifications and industries. Differences between supervisors and employees were calculated using analysis of variance (ANOVA), with the significance level set at \( p < .05 \). The results indicated that an individual’s interpretation of work ethic was dependent of the type of work and job classification. Supervisor’s ranked themselves higher in initiative than their workers and lower in dependability (Petty & Hill, 2005). The authors speculated that the kinds of job duties may influence the types of individuals who seek management positions and these qualities may have a direct correlation on the items the individual ranks as important. Petty and Hill (2005) advise, “Knowledge of these differences could guide career and technical educators in their development of instructional content designed to prepare people for work.” (p. 17).

Further studies of the reliability of the OWEI as an instrument to test work ethic traits of manufacturing employees have been conducted (Brauchle & Azam, 2004). Having a reliable instrument gives educators and researchers a framework to test work ethic. Brauchle and Azam (2004) suggest that it is crucial to understand the level at which work ethic attitudes exist so they can be improved through instruction. It was determined, through factorial invariance analysis, that the OWEI was a reliable instrument and that
duplication of studies could be achieved with congruence, although results did not produce identical Coefficients of Congruence.

Initiative and dependability are considered to be relevant qualities for an employee to exhibit. In addition to these skills companies that sustain growth in a global economy must also consider on-going training and lifelong learning opportunities for their employees (Goodnight, 1996). As the work environment evolves, so does the equipment, software, and technology. In machine trades, the advances made in new computer-based equipment, such as Computer Numerical Controlled (CNC) mills and lathes, require employees to have the updated skills required to operate such complex precision machinery. Again, these skills directly pertain to problem-solving skills as well as an aptitude for higher-level mathematics.

In addition to math and higher-level thinking strategies, the contemporary entry-level business employee must possess knowledge of various cultures, have the ability to adapt to multiple environments, and be able to multi-task with accuracy. Daggett and Pedinotti (2005) discuss the rationale and urgency of addressing globalization in workforce education, “Since Americans cannot afford to work for the same wages as their counterparts in many other countries, the only way to sustain a U.S. middle class would be to increase the skill level of all Americans.” (Daggett & Pedinotti, p.2).

Technology and intrapersonal communication skills are imperative to job success. Increasingly, jobs are being outsourced to workers in other countries. For example, “India is playing an increasingly important role in information technology innovation. Motorola, Hewlett-Packard, Cisco Systems, and other technology giants rely on their Indian
employees to design software platforms and futuristic multimedia features for next-generation devices.” (Engardio, p.53).

Friedman (2005) has extensively researched global economics which lead him to uncover training practices in India. Not every person in that country has the opportunity to pursue education like their American counterparts. Logically, it would seem that American students would be more likely to succeed. However, countries such as India are producing highly skilled workers. The new and emerging foreign labor force is growing at an enormous rate.

Friedman suggests that many people from India are driven to perform well in school because there is such a great division between upper and lower classes due to the Caste System which has been in place for thousands of years (Friedman, 2004). Modern India is converging with the world and the Caste System is beginning to crumble. Young Indians are able to establish careers and climb the international corporate ladder. Additional research uncovered that India has an extensive higher educational system that includes a strong emphasis on math, science and technology (India Info.com, October 20, 2005). Globalization and advancements in science and technology have played an integral part in the evolving world (Altman, 2006). This idea was echoed in several Indian education websites including India Info.com (India Info.com, October, 20, 2005) and The Public Forum Institute (The Public Forum Institute, 2005). In Bangalore, for example, apprenticeship programs are an accepted practice to train the growing workforce. Students acquire training through academics as well as practical application. This process can take several years. This practice helps provide a cheap workforce while training effective employees for their future.
Changes translate into business practices on an international level. Educators need to be aware of the paradigm shifts in both education and workforce development so they can adequately prepare students. Companies that survive in this era must hire effective employees who are well-versed in a myriad of competencies. Not only does the contemporary professional need to be adaptable, but (s)he must have a basic understanding of customer service and quality. These individuals need to have problem-solving abilities on many levels. “As manufacturing plants shrink and disappear across the American Midwest, one thing is clear: The next generation of workers will need a new set of skills. With their eye on globalization, states in the region are mandating foreign languages, science and mathematics. But they are also trying to give their students a new way of looking at the world.” (Altman, 2006, p. 1).

New global dynamics make it increasingly more difficult to keep skilled labor jobs in the United States. Because doctors and business managers can e-mail digital files to Bangalore and have electronic clerical work completed accurately and cheaply (Friedman, 2005), it means that local employers may require more from their employees. Understanding how each area is evolving on a global scale as well as how each specialization is directly linked to changes in other areas gives the educator a better indication of the skills students will require to be successful in the future. Not only should the educator foresee these trends, but he/she needs to be immersed in the continuing education process. Aside from staying current, CTE professionals need to understand how to work with students on their level in order to help guide them towards careers that best suit their personal and professional goals.
The Association for Career and Technical Education and the National Career Pathways Network (NCPN) has enlisted the voice of Daggett (2007) to motivate educators in globalization issues. “There are four major trends impacting the U.S., in general, and our students, in particular, which must be addressed to assure that our nation and our students are prepared to meet the challenges of the near and distant future” (2007, Daggett, 2007, p. 2). Daggett explains, “These four challenges are globalization, changing demographics, technology, and changing values and attitudes.” (2007, p. 2).

It is imperative that educators and human resource managers understand the changing climates of both education and industry in order to produce effective and productive employees. Business and industry require a well-versed workforce that has the skills and strong work ethic required to compete in a global economy. Schools need to provide more connections between school and work in order to supply the specialized employees businesses require. Technology, effective communication, problem-solving, mathematics, adaptability, dependability, and lifelong learning are some of the key elements for success that employees can provide in order for companies to sustain growth.

School Responsiveness to a Global Environment

In the contemporary educational setting, it is imperative to prove relevance and rigor within curriculum. Incorporating academics into a technical course may give the program more credibility. In the past, vocational education has not been viewed as a step towards higher education (Bray, 2006). Parents, students, community members and legislators had a negatively skewed perception of courses geared towards a technical
track. By showing the presence of academic rigor in these areas, these views are more likely to change.

Throughout the history of vocational training, applied academics have been infused in the curriculum. For example, a student taking a machine trades class needs to understand trigonometry concepts in order to properly draft and machine complex shapes and angles to extremely precise measurements. Students learn math through a modeling approach rather than through theory alone. Conversely, students who learn applied mathematics may not be cognizant that they are learning trigonometry, whereas a student who is enrolled in an advanced placement math course is aware of the mathematical components of the course he/she is taking.

Instructional collaboration between academic and vocational teachers can help bridge the gap between false perceptions and factual information. Additionally, both college preparatory and technical educators can share teaching methodologies to create a more diverse curriculum. This insures that all students will be exposed to a variety of useable information. The minority of students who learn concepts through theory, reading and lecture can gain insight into careers while the majority of students who learn in a contextual format are able to benefit from math, science and English in a more concrete application.

CTE is an important answer for workforce training, school and job retention and academic rigor. Throughout American history education methods, and particularly CTE delivery, have adapted to meet the demands of cultural and economic shifts. It appears as if education is on the cusp of another movement. Globalization is driving evolution in CTE once again. “America has evolved from an industrial economy, and workers must be
prepared to apply increasing knowledge and skills that can be quickly upgraded and adapted to meet the rapidly changing conditions of the 21st century.” (Bray, 2008, p. 3). The aforementioned expert also notes that it is imperative that educators no longer work within the confines of silos or educational boundaries. Bray (2008) recommends that lines between CTE and academic courses need to be blurred in order to meet the needs of all students. The United States is facing a shortage of qualified workers. Moreover, the requirements for qualified workers are changing.

Politicians have looked to school reform initiatives such as No Child Left Behind (NCLB) as a solution to the rising crisis of globalization and the need to train a more qualified workforce (Paige, 2006). The stipulations of No Child Left Behind (NCLB) (Paige, 2006; Whitehurst, 2003) include increasing aptitudes in mathematics, science, reading, and technology. The State of Michigan is responding to NCLB in several ways. Michigan’s Lieutenant Governor, John D. Cherry Jr. created a taskforce, The Cherry Commission, to assist in implementing the requirements of NCLB and increase standards in the Michigan Public Schools curriculum. The four areas are: 1) Improving preparation, 2) expanding participation, 3) increasing degree completion, and 4) maximizing economic benefits (Cherry, 2004). Economic benefits ties in specifically to preparing youth to successfully step into the workforce in Michigan. This report addresses the gap between workplace readiness, college success and secondary education.

This breach is the direct result of the transformation of Michigan’s local economic status as it pertains to a global economy. The Cherry Report specifically addresses these global issues, “Today, the foundations of Michigan’s economy have changed in response to a worldwide knowledge revolution” (Cherry, 2004, p. 6). Continuing professional
development and adapting to this transformation are imperative for viability of Michigan’s economic sustainability.

In Michigan (Cherry, 2004) each member of the graduating class of 2011, must have at least one course that is delivered through an online approach. While it is imperative to incorporate technology into the general high school curriculum, it is more crucial for educators to teach subject matter that enables students to utilize higher-order thinking strategies that are relevant to a changing workplace. The impact of the new Michigan Merit Curriculum (MMC) preparatory curriculum will not be fully realized until the class of 2011 graduates. These students will be the first to traverse this new curriculum model.

Curriculum Delivery

Curriculum delivery related to courses in CTE is constantly evolving. Several studies have been published that discuss the importance of continuing changes to instructional delivery. According to Petrova and Claxton (2006), "In discipline areas such as information technology and eBusiness, technology advances so rapidly that the issue of developing student skills and capabilities adequate to the demands of the industry becomes a moving target." (p. 1). Present day practices are no exception. The Office of Career and Technical Preparation (OCTP) has been preparing for the new MMC requirements as well. Task Force teams have been created as a response to increased standards. CTE curriculum will now include standardized outcomes (Office of Career and Technical Preparation, 2007).

Career and Technical Education needs to stay ahead of the trends in business and industry. According to Scott and Sarkees-Wircenski (2004), nearly half of all high school
students enroll in some form of vocational course. Within the past decade, the United States Department of Education has streamlined the CTE structures by incorporating 16 Career Clusters. From these areas of study, the State of Michigan collaborated with this author's Leadership Development (LDP) class, at Western Michigan University, to align these national clusters at the state level. By increasing awareness and streamlining curriculum, this process adds to the growing credibility of CTE instructional delivery. Additionally, the Michigan Department of Education contracted Dr. Kitty Manley, a professor at Ferris State University, to collaborate with Michigan's CTE experts to create a uniform set of instructional standards for all state-approved CTE programs. (Michigan Center for Career and Technical Education, 2008) This endeavor involved creating several task forces through the use of e-focus groups in each discipline. CTE instructors and OCTE Consultants researched curriculum standards that were already in place in other states. These standards, and in some cases assessments, were collected and adopted by the e-focus groups. Comprehensive lists of standards and skills were then compiled and adopted by OCTE.

The next phase entailed sectioning the standards into four areas. These included: 1) Employability Skills, 2) Technical Skills, 3) Pathway Skills, and 4) Academic Skills. (Michigan Center for Career and Technical Education, 2008). 1). In order to abide by Perkins IV regulations there must be common standards and assessments for all approved CTE programs. The most prevalent change is the concept of moving all four skill areas (employability skills, technical skills, pathway skills, and academic skills) into a comprehensive curriculum. These standards were divided into 12 segments. In order to report students as "concentrators" (meaning those we are able to collect added cost and
Perkins dollars from) they must successfully complete a minimum of 50% of the segments and be enrolled in the next sequence. The remaining segments may be delivered through CTE programs or at the post-secondary level (Michigan Center for Career and Technical Education, 2008).

Five of the overlapping components found in all areas of CTE programs include: 1) Articulation, 2) Workforce preparation, 3) Contextual Learning, 4) Broad-based scope of the industry, and 5) Advisory Committees. In other words, all effective CTE programs should align their curriculum to work into a 2+2 college articulation program (Michigan Center for Career and Technical Education, 2008). Experiences in vocational education are centered on employability and future success in the world of work. For many individuals, the next step in career preparation may include an Associate’s degree or higher. Academic preparation and employability skills training are combined with hands-on learning practices in order to make the students more adaptable to the changing workplace. Additionally, advisory committees can give invaluable insight into curriculum development and complex industry standards. By increasing awareness and streamlining curriculum, this process adds to the growing credibility of CTE instructional delivery.

Daggett (2005) states, “The challenges facing America are numerous. If we truly value our children as our greatest national resource, we must invest in their future.” (p. 5)

Work-Based Learning

In addition to classroom instruction, CTE engages students through a contextual approach. Work-based learning (WBL) is an activity that enables the student to better understand theory by applying it in the workplace. Experiences can range from a short unpaid work exploration to a capstone experience or Co-operative (Co-Op) placement.
The latter pertains to a student receiving both monetary compensation and a letter grade for his/her performance on the job. This type of contextual application is said to leave a large impact on the learner (Scott & Sarkes-Wircenski, 2004). He/she may be more likely to retain usable information and apply it to later professional experiences.

Cooperative Education enables students to apply the skills they have learned in the classroom in a professional environment. An individual who is in a business course may have the opportunity to interview for a work-based learning opportunity as a receptionist in a law office. This student could attend class two days per week and then use the remaining class periods in the workplace. His/her employer would assess this young person and he/she would receive pay, credit and a grade for his/her job performance. In order for the position to be a legitimate Co-op position, it must specifically correlate to the area of study. Therefore, the business student could not work as a server in a local restaurant and receive school credit for that employment (Bailey, 2007).

Career and technical centers may not be the only educational training institutions that need to address contextual learning in a global environment. Universities, while not the focus of this study, could take cues from business and industry as well. Petrova and Claxton (2005) argued that, “Another concern addressed in the literature is that undergraduate academic programmes [sic] are often too theoretical and out of date” (p. 27). They further state, “As a result they do not produce graduates equipped with the skills and capabilities which industry values and requires” (p. 27). Petrova and Claxton suggest that employers are stakeholders who should have input into the curriculum development because it ultimately impacts their businesses. The team conducted a study
of undergraduates who participated in cooperative education as well as their employers. This, Co-Op, is a working partnership between schools and employers. Students are hired to perform work in their fields of study while earning credit. Perceptions and feedback was collected from both groups and then coded.

According to Petrova and Claxton, their research was conducted using Grounded Theory (Petrova & Claxton, 2005). Their research framework was conducted in two stages: 1) Identifying IT/eBusiness Skills and Capabilities, and 2) Identify Industry and Job Market Requirements, (pp. 27-35). This process yielded three relationships: “1) Industry/Employer’s needs translate into Job Market Requirements; 2) Academic programmes [sic] prepare students to enter the job market, and 3) Employer’s expectations inform and contribute to the academic outcomes and determine skills and capabilities developed by a student” (p. 35).

Cooperative education is a powerful way for students to get a direct and accurate perspective on skills they need to exhibit in the workplace. McCarthy and McCarthy (2006) concur that this direct learning is crucial; however it is not always logistically feasible. Due to the sheer numbers of learners, it is highly improbable that every student will have an opportunity to engage in this kind of learning environment. Through their research, they uncovered the fact that many business colleges and universities use case studies to enhance curriculum delivery. Students are given scenarios and then they must utilize problem-solving strategies and higher-order thinking skills to find workable solutions. This may be an efficient tool, but McCarthy and McCarthy argue that students will not reach beyond their level of self-efficacy. This means that those who are high achievers and have self-confidence will work more diligently to stretch their intellect than
those who have lower self-esteem. The McCarthy study examines the role of cooperative education in increasing a student's self-image. Participating in internships enables students to be mentored and experience success through problem-solving and team dynamics.

McCarthy and McCarthy (2006) had each of their 68 subjects participate in a job shadowing experience and then write a detailed account of their experiences and how they were influenced by them. Their research papers were coded and then each subject was required to give an oration about their experiences. The results of this study concluded that students perceived Job Shadowing, or work-based learning, to be the most beneficial component of their learning. Perhaps the immediate and meaningful application of knowledge and skills enable students to make the connection between learning and life. These subjects reflected on their impressions of their WBL experiences and their collective perception suggests that these activities were highly significant in their training.

Other researchers suggest comparable perceptions in similar WBL exposure. Brown (2003) gives an overview of WBL including the components, challenges and benefits. Traditionally, cooperative education entailed sending trained students to a related career setting where he/she could earn credit and possibly a paycheck for his/her time in the workplace. The direct application of applying learned knowledge and skill sets can include more than monetary benefits to the students. While Co-Op is still a viable component of contextual learning, more extensive forms of WBL incorporate many facets of real-world application such as mentoring, job shadowing, service-learning
and internships (Brown, 2003). Again, it is the application of the skill set that engages the learner in real world problem-solving situations.

As previously mentioned, there are undoubtedly obstacles that must be navigated in order to provide opportunities for students. Finding employers and mentors who have insight into the educational process as well as the time to work with students can be challenging. WBL experiences need to be relevant and must be measured in order to insure meaningful connections for students. Measurability of the perceived connections between school and work may be accomplished through student follow-up surveys or interviews with students and employed graduates. Planning and the evaluation process may also be time consuming, however the benefits to both learner and site provider can far outweigh the constraints. Businesses can have a direct impact on the learning experience and expose future employees to the idiosyncrasies of their specific trade.

Teachers must share the burden of responsibility in work-based learning. They need to remain in constant contact with both the employer and the students. In addition to initially preparing the individual for the work place, educators need to lend support in maintaining guidance throughout this experience. Additionally, instructors need to be kept abreast of trends in business and industry. These components of work-based learning help build rapport between education and industry and insure the subject taught in the classroom contain dynamic and meaningful content.

**Work-Based Learning and Higher Education**

To better understand the effectiveness of work-based learning Swail and Kampits (2004) collected data from a cohort group of students who participated in one or more work-based learning opportunities. The hypothesis was to either prove or disprove that
career-related educational experiences had an impact on success in higher education. The findings predominately supported the null hypothesis in the manner that student success was not significant in several indicators.

However, according to Swail and Kampits, “the most conclusive finding of this survey is that students who participate in high school work-based learning activities achieve at the four-year postsecondary level as well as or better than students who do not participate in these activities” (Swail & Kampits, 2004, p. 29). The experiment conclusively found a link between work-based learning and higher grade point averages at the college level. It was also mentioned the subjects were career-focused individuals who aspired to obtain a four year degree where the typical vocational student may not necessarily continue his or her education beyond high school. There may be a direct correlation between students continuing their education beyond the secondary level and work-based education.

Career-focused students would be more likely to achieve in an academic environment because they can more readily grasp the connection between academics and the workplace. Understanding the environment, necessary skills and dynamics of a chosen profession can create meaning for these individuals. Because a majority of students learn through a hands-on approach, it is logical to conclude that work-based learning experiences like job shadowing, apprenticeships and cooperative education would have a positive impact on academic achievement.

Career and Technical Education is, and has been, an integral part of the American economy in the sense that it provides students with the opportunity to become skilled in various careers as these relate to technology. By learning specific trades, young job-
seekers can more rapidly advance their careers while saving their prospective companies money on training. Students who are involved in some form of vocational training are more aware of the job market, can usually see the connection between school and work and are exposed to the key employability skills that will make them adaptable in most work environments. “As global networks expand, countries in every corner of the Earth are affected. Major forces are driving change at an accelerated pace, creating new challenges for education systems worldwide.” (Stewart, 2005, p. 230).

In order to improve on the delivery of educational training, it is essential to continuously update curriculum in any applicable areas. One way to stay abreast of changes in business and industry is to compile information that is useable and pertinent.

Elements of Success for CTE in Globalization Context

Because many of the low-skilled manufacturing jobs are being outsourced to Japan, India and Ireland, educators need to increase training in high skills areas and create more careers that require higher-order thinking and adaptability (Friedman, 2005). This may be a crucial factor in keeping the United States’, and specifically Michigan’s, economy stimulated. Increasing the domestic youth’s earning power will retrospectively benefit the economy. Possible elements for success in both school and work-based CTE settings may include: 1) Problem solving, 2) higher-order thinking, and 3) customer service. Students who are effectively educated and trained for the workforce should not only exhibit technical knowledge, but more importantly, they should possess the ability to creatively find workable solutions for problems that may not presently exist. This translates into one’s capacity to adapt to his/her environment by meshing a myriad of
resources to achieve a desirable outcome. CTE also prepares students for the right jobs, those in demand by employers.

Just like the Industrial Revolution created conditions that sparked education reform (Scott, & Sarkees-Wircenski, 2004), so too are the trends in globalization shaping the learning paradigms of contemporary CTE practices. Economic factors are driving forces in education (Stewart, 2005) and it is imperative to incorporate present and projected future trends in the learning process by incorporating problem-solving and critical thinking skills (Miller, 1986). No longer does industry require compartmentalized task-oriented workers as its primary human resource (Daggett, 2005). Instead, the literature suggests that both business and education need to explore ways to incorporate creativity and diversity into the foundations of training practices (Altman, 2006; Clough, 2008; Sontag & Hiller, 2005; & Friedman, 2005).

Summary

This chapter provided support for the urgency to adapt to a global environment and some ways organizations can approach these issues. The component that ties reasoning to success in a globalization framework is customer service. Viable corporations are built and sustained through creativity and an acute sense of the client’s needs. Retail successes like Nordstrom’s infuse customer service models into their culture (Spector & McCarthy, 1995). Understanding internal and external customers can help businesses adapt to the rapidly changing marketplace. Likewise, being able to adapt to change in innovative ways keeps global competitors solvent.

Career and technical center programs can help articulate necessary skills to manufacturing technology business organizations settings. This can be accomplished
through curriculum delivery that combines technical skills and academic competencies. Advisory committees are, in some cases, used as a resource to insure a smooth and effective transition between academia and the workplace. However, these groups could be strengthened to encompass dynamic partnerships at both levels.

Secondary and postsecondary career and technical education training programs need to collaborate with business and industry in order to insure that elements of success are being taught. This chapter has examined various studies pertaining to critical thinking, problem-solving, and customer service as they pertain to CTE. The literature supports the idea that employers require employees who have a strong work ethic (Engels, 2003; Bronson, 2007; Brauchle & Azam, 2004) and that perceptions of work ethic are tied to similarities between employer and employee perception of work ethic (Hollingsworth, Brewer, & Petty 1995; McCortney & Engles, 2003; Petty & Hill, 2005). It also supports that employees should possess skills that will enable them to be adaptable and function in both logical and creative capacities (Dewey, 1916; Altman, 2006; Clough, 2008; Zhao, 2008; 2005; Stuckart & Glanz, 2007; Daggett & Pendrinotti, 2005) in order to facilitate corporate sustainability in a global economy (Freidman, 2005). This dissertation will explore perceptions of globalization and elements for success in CTE education and workplace training practices. Chapter three will explore the research methodologies used in this study.
CHAPTER III

METHODOLOGY

Research Methods and Procedures

Phenomena related to successful Michigan businesses, with a technical and manufacturing focus, that operate within the parameters of this design were explored in this study. A qualitative approach was applied using interviews, observations, artifacts, and document analysis, in order to ascertain similarities and differences between successful CTE centers and MT business organizations and the extent to which they responded to a global environment. Furthermore, the research examined ways businesses are able to train employees to insure survival in a global economy.

The purpose of this research was to begin to find solutions for preparing educators and students to operate in a global environment. Qualitative narrative and ethnographic designs were used (Creswell, 2003). This exploratory approach enabled the researcher to better understand and uncover similarities and differences between CTE schools and MT businesses by conducting semi-structured interviews with CTE Administrators and MT business CEOs or management-level trainers who were instrumental in implementing the company vision and mission in regards to globalization and sustainability. The researcher was looking for phenomena as it pertained to the perspectives of the participants (Creswell, 2003). Additionally, data was gathered through the use of observations of employees who implemented training and supervised students and employees in both business operations and machine tool production areas. Further analysis, of artifacts such as product brochures, websites, business cards, stakeholder communication tools, and blueprints, was used to create a more accurate and in-depth interpretation of the CTE schools and MT businesses.
Elements of Success were derived through this research design. There are some key factors the researcher predetermined to be elements of success for students and workers to exhibit. These elements may influence in contributing to corporate growth and sustainability. The ability for an individual to problem-solve and use higher-order thinking skills in academic and professional settings may enable them to adapt to the changing global environment (Friedman, 2005; Clough, 2008). Problem-solving and critical thinking skills can be learned through the study of mathematics, science and applied technology which are elements of success that were supported by the research (Paige, 2006; Bray, 2008; & Whitehurst, 2003). Similarly, the ability to interface and communicate with customers has been a factor for success in the business realm as well as an integral component of CTE curriculum delivery (Michigan Center for Career and Technical Education, 2007). The connection between learned and applied employability skills enables employees and companies to adapt to most work environments (Chalofsky, 2003; Pink, 2008). A correlation between these elements for success and a customer base that can be sustained over time has been critical for employers under typical business models and quality employees who are empowered to problem-solve are evident in certain companies that have sustained growth (Collins, 2001; Spector & McCarthy, 1995). Because successful companies adapt to the changing demands of their consumers, this researcher hypothesizes that these core elements for success are critical as they pertain to globalization.

Comparative case studies were the lens this researcher used in this design which entailed qualitative methods such as observations, interviews, and examination of artifacts (Figure 1). Points of comparison were: 1) How each setting successfully
operated in a global environment in regards to the impact of globalization, coherent strategies, and the qualities of successful students and employees; 2) Student and employee training in regards to problem-solving, higher-order thinking, customer service, and other elements of success; and 3) Congruency between subjects by examining results between Leaders and Trainers within each site, composite results of each site, results between Leaders and Trainers among all organizations, comparison of CTE site to CTE site, comparison of MT site to MT site and finally, comparison of CTE to MT (Figure 1). Through this process, the aforementioned elements were examined and additional elements began to emerge.

Differences and similarities between CTE and MT were examined to explore if there was articulation between CTE and MT settings (Figure 2). During the data collection and analysis phenomena within and between CTE and MT began to emerge (Figure 2). As previously mentioned, problem-solving, higher-order thinking, and customer service were predetermined elements of success. These elements were expanded, upon extensive examination of the data, to include other elements of success for CTE in the context of globalization.

Procedures

This project utilized Grounded Theory and Phenomenology (Schwandt, 2001) approaches to better understand the role educators and corporations play in preparing students and employees to be adaptive to the changing global environment. After Human Subjects Interview Review Board (HSIRB) approval, this researcher set out to conduct semi-structured interviews (Marshall & Rossman, 2006) with four individuals who are knowledgeable in aspects of school and corporate curriculum, training, and global issues.
The study compared two counties in northwestern lower Michigan that have sustained growth during these suppressed economic times (MEDC, 2007) in relationship to career and technical centers and manufacturing technology business-based organizations. In regards to the MT sites, sustained growth was defined as a company that employs over 20 employees, had a solid and consistent customer base, and had either maintained or increased their employee base over a minimum of 10 years. CTE sites were selected based on their relative proximity to the MT sites.

Additionally, one business-related classroom and one engineering-related classroom from each career and technical center were observed as well as one business-related department and one engineering-related department from each manufacturing technology business organization. Prior to the observations, each subject was contacted by the researcher. The purpose of the study was succinctly stated and verbal permission was granted to schedule the observation. These subjects were selected based on their role in the participating site.
Figure 1. Research Methodology

Contextual Learning in a Global Environment Research Design

**Lens**

Comparative Case Studies

**Points of Comparison**

1) Mission/Vision to successfully operate within a global environment
   - Impact of Globalization
   - Coherent Strategies
   - Qualities of Successful Students/Employees

2) Student/Employee Training
   - Problem-Solving
   - Higher-Order Thinking
   - Customer Service
   - Other Elements of Success

3) Congruency between subjects
   - Results between Leaders and Trainers within each site
   - Results between Trainers within each site
   - Composite results of each site
   - Results between Leaders among all sites
   - Results between Trainers among all organizations
   - Comparison of CTE sites to CTE sites
   - Comparison of MT sites to MT sites
   - Comprehensive comparison of CTE to MT

**Qualitative Methods**

Must Point to 5 to 6 Elements

1) Observations
   - CTE School-Based Setting
   - MT Business-Based Setting

2) Interviews
   - CTE Leaders
   - MT Business Leaders

3) Artifacts
   - Documents

Elements of Success
What are the differences and similarities between career and technical centers and manufacturing technology business organizations settings? Is there articulation between career and technical centers and manufacturing technology business organizations settings?
All 4 leadership interview subjects were asked a series of 20 questions pertaining to their elements of success in a global context (Appendix A). The researcher created the data collection instrument and pilot tested them with associates who were either employed in an educational setting or a business setting. None of the volunteers who were involved in the pilot testing were employed at any of the sites that were used for this study. These questions were created with the underpinnings for success in each organization as they related to globalization and sustaining growth. Predetermined elements for success, as previously discussed, were also written into the questions to elicit responses related to customer service, problem-solving, critical thinking and communication skills as elements for success. The open-ended semi-structured questions were also designed to draw out additional elements for success that were perceived by each of the leadership subjects.

Themes that emerged from each of the 4 leadership interviews \((n=4)\) were compared to their corresponding observations \((n=2)\) at each of the 4 sites \((n=8)\). Artifacts were also collected that served as raw data to lend support to, or dispute, emerging themes at each organization. Overarching themes were derived for each site. These overarching themes were used as an instrument to compare MT to MT, CTE to CTE, MT1 to CTE1, MT2 to CTE2, and MT to CTE (Figures 1 & 2).

“Generally, qualitative studies make greatest use of unstructured, open-ended, informal interviews because they allow the most flexibility and responsiveness to emerging issues for both respondents and interviewees” (Schwandt, 2001, p. 135). Subjects of this study were observed, recorded, and compared. Similarities and differences were compared using the SWOT Analysis tool based on the participants’
interpretation of strengths, weaknesses, opportunities, and threats (Adams Associates, 2008; Houben, Lenie, & Vanhoof, August, 1999; Piercy, & Giles, 1989). Venn Diagrams were created to compare emerging themes as well as similarities and differences between the interviews and observations as well as between each group of subjects. It is important to note that this sample is not necessarily representative of all CTE programs or all MT businesses.

Research procedures for this project began with selecting subjects based on a set of criteria related to profession, status, and knowledge of business operations in a global context. The researcher gathered data through qualitative interviewing techniques and observations. Because there is a fair amount of published work available on this subject, existing research and artifacts were utilized as a foundation. Successful completion of this study required obtaining a recording device and carefully considering the goals of the study in order to formulate the questions (Appendix A). These questions were pilot tested and later the researcher discussed the approach with the proposed subjects and obtained their permission for the interviews (Appendix B) as well as the observations (Appendix C). Interviews and observations were scheduled within a reasonable timeframe and the researched remained within the time constraints set for both the interviews (30 minutes) and the observations (40 – 60 minutes). Observations of the training environments were conducted and the researcher took detailed field notes based on a predetermined format that was designed by the researcher (Appendix D). Data from the field notes was transcribed the day of each site visit and the recordings from the interviews were listened to the same day and later transcribed into documents. The transcripts for MT1a (Appendix E), MT2a (Appendix F), CTE1a (Appendix G), CTE2a (Appendix H) were
reviewed for content and themes. Observation field notes for both office and production subjects for MT1b (Appendix I), MT1c (Appendix J), MT2b (Appendix K), MT2c (Appendix L), CTE1b (Appendix M), CTE1c (Appendix N), CTE2b (Appendix O), and CTE2c (Appendix P) were coded. The raw data from the observation field notes was used within this study to support emerging themes. All coded interview data was placed in a SWOT analysis grid that was designed by the researcher to capture trends and themes for leadership subjects MT1a (Appendix Q), MT2a (Appendix R), CTE1a (Appendix S), and CTE2a (Appendix T). The researcher has obtained SWOT analyses from each of the 4 leadership subject interviews according to HSIRB protocol. Artifacts were analyzed and digitally scanned but were not be included in the appendices due to the sensitive information that would have violated HSIRB protocols. Artifacts gave insight into the products, services, verbiage, as well as CTE and MT trends. Venn Diagrams were created based on themes that emerged from the analysis. Commonalities and differences between each subject’s replies were noted. Inductive inferences were drawn based on the results using Venn Diagrams to display the results (Schwandt, 2001).

Initially, the design of this project incorporated the semi-structured interviews (Marshall & Rossman, 2006). The subjects were selected based on their personal level of expertise. Subjects were chosen by their business acumen, knowledge of global business dynamics, and willingness to participate in this study. The three core questions were addressed in the set of interview questions (APPENDIX A).

1. What are the philosophical underpinnings, or big picture frameworks, of successful CTE operations as they relate to manufacturing technology business organizations and career and technical centers in a globalization context? To what extent
do they have a coherent strategy to address or understand CTE in a global concept? What
are the differences and similarities between career and technical centers and MT
businesses? (GP – Global Philosophies)

2. What are the strategies career and technical centers and MT businesses
could implement to adapt to changes in a global context relative to their philosophy and
mission to address globalization change? (IT – Implementation/Training)

3. To what level is there articulation between career and technical centers
and MT businesses? Which aspects are weak? How can they improve collaborative
efforts? (AR – Articulation between CTE and workforce)

Transcripts were written based on digital electronic data collected at on-site
interviews. These transcripts have been broken down into initial coding and focus coding
(Lofland, & Lofland 1995). Prior to the initial coding, this researcher examined each line
of the transcripts and highlighted passages that were interpreted as significant. A trend of
positive and negative messages began to emerge. These were color-coded with green
highlighting to signify ideas the interviewee projected as positive and yellow highlights
to represent ideas the interviewee projected as negatively impacting the organization.
Further inspection of the positive and negative impacts to the organization revealed that
there were both internal and external influences. Positive internal factors were coded with
an “S” representing the organization’s strengths. Negative internal factors were coded
with a “W” representing the organization’s weaknesses. Positive external factors were
coded with an “O” representing opportunities outside of the organization. Negative
external factors were coded with a “T” representing external threats to the organization.
The SWOT analysis format was chosen as a way to organize the data because it is a tool companies may use for strategic planning (Huben, Lennie, & Vanhoof, 1999). The SWOT analysis assists business managers and financial planners with discovering internal and external factors that may contribute to the success of the organization (Piercy & Giles, 1989). Using the SWOT analysis in this context placed both CTE and MT leadership subjects in the same frame in order to compare their responses with a similar lens.

Highlighted passages were transferred to a spreadsheet and corresponding code numbering lines were indicated. Initial coding entailed assigning a phrase to each passage that was representative of the main idea the interviewee articulated (Lofland, & Lofland 1995). Repeating ideas were organized into themes in the focus coding stage (Lofland, & Lofland 1995). Themes were sorted and concepts were organized according to Strengths, Weaknesses, Opportunities, and Threats.

*Risks and Costs to and Protections for Subject*

Due to the nature of this project, high school juniors and seniors were observed in the classroom settings. Video media and electronic devices were not used for this portion of the data collection. The identity of all students was unknown to this researcher; therefore all student subjects retained anonymity. Some subjects may have experienced slight discomfort typically associated with interviews and observations. It is possible that subjects may have experienced the Hawthorne effect (Cohen, Manion & Morrison, 2000). Students and workers may have responded differently as a direct result of the observations.
This research was conducted using the researcher as the primary instrument in collecting and interpreting the data. It should be acknowledged that there may have been biases and insights that the researcher could have contributed to this work as a researcher and educator who is close to this subject matter.

The subjects were expected to incur any costs as a result of this study. They were required to set aside time, as specified above, for the purpose of interviews and observations. Time is a cost of participating in this study. This may have resulted in a decrease of job productivity. Subjects were asked to provide artifacts or corporate materials that could add to the research. Artifacts provided insight into operations and culture. These were used as raw data to support or refute the findings. Therefore, relinquishing artifacts may have caused some subjects to experience discomfort. Some subjects may have been reluctant to do this particularly if artifacts contain proprietary information that could give their competitors an edge. Subjects were assured that their identity would be kept confidential, and their job performance would not be questioned.

Confidentiality of Data

Accepted protocol was followed concerning confidentiality of data. The original transcribed files remained secured upon completion of the study. Interviews (APPENDIX B) and observations (APPENDIX C) were scheduled and consent forms were signed by each of the intended subjects. HSIRB requirements were also followed for the interviews as well as observations of school-based and MT business settings.

As previously stated, the cities, organization/entity names, and names of individuals were not disclosed. They were simply referred to as Northwestern Lower Michigan City NMCA and NMCB. The entities and subjects were referred to as CTE1
and CTE2 for the CTE centers, MT1 and MT2 for the MT businesses and the subjects will be labeled CTE1a, CTE1b, CTE1c, CTE2a, CTE2b, CTE2c, MT1a, MT1b, MT1c, MT2a, MT2b, and MT2c.

Procedures for Identifying and Accessing Subjects

Subjects were invited to participate in the study and were given full disclosure of the purpose of this project prior to their agreement. Teachers and human resource managers or employee supervisors were contacted personally via phone conversations. A follow-up letter was sent detailing the purpose of the research along with consent forms.

The study subjects were selected based on their corporate positions. Individuals chosen for this study must have had access to a business office environment and be able to identify which skills are identified as higher-order for success in a global context. Questions and the purpose of the study were distributed to each participant prior to the data collection. Responses were transcribed along with field notes collected at the locale. Research subjects were free to decline from the process at any time. Additionally, information pertaining to the corporate culture was included in this study.

Benefits of Research

Schools and businesses need to effectively adapt to global economic changes in order to sustain economic growth. Contextual learning and awareness may be pivotal factors for success in this context. Successful organizations are able to provide adequate training for the new global paradigm. However, schools may not be providing adequate contextual learning opportunities for students to become proficient in higher-order thinking and problem-solving skills in the classroom. Moreover, businesses and
organizations that are not able to compete in the new global economy may need to
examine alternate forms of training.

Research Design Employed

Self as Researcher

This research was conducted using the researcher as the primary instrument in
collecting and interpreting the data (Marshall & Rossman, 2006). The interview questions
and lens for the observations may have been affected by the researcher’s judgment,
attitudes, preconceived notions, misperceptions, and background (Cohen, Manion &
Morrison, 2000; Marshall & Rossman, 2006). Because the researcher is a practitioner
there were times during the study where other educators would press for information
regarding the CTE and MT sites. The current educational setting encompasses a best
practices approach to sharing ideas and practices for the purpose of improving the quality
of CTE educational delivery. This researcher kept the identity of all subjects and
respected confidentiality.

Population

This study population included two individuals who were aware of the
underpinnings of CTE in a global context from the career and technical center setting and
two similar individuals from the manufacturing technology business organizational
setting. Ideally the setting for the interviews should have been uniform for all
participants. However, each of the four organizations that were examined had unique
features. Data from the interviews was gathered using a digital data collection method
with supporting software.
The population for the second frame of questions was selected for their expertise in either business operations and education or engineering operations and education. While the first frame of questions addresses the global or big picture concepts within the organizations, the second frame expanded on the implementation of elements for success in both career and technical education and manufacturing environments. Subjects were business and engineering teachers as well as middle-level management employees who worked with either the business or engineering departments of the two manufacturing firms. Data pertaining to the implementation of operations and training practices were collected through field observation techniques. Due to the nature of this project, high school juniors and seniors were observed in the classroom settings. Video media and electronic devices were not be used for this portion of the data collection. The identity of all students was unknown to this researcher; therefore all student subjects retained anonymity.

**Informed Consent Process**

Each of the 4 entities was contacted via telephone in order to obtain preliminary consent. After both CTE centers and both MT businesses agreed to be a part of the study then appointments were made with each of the 8 individual subjects. Instructors and middle-level managers were also mailed an informed consent agreement prior to the interviews and observations. Subjects were informed that this researcher was available via telephone and e-mail if any of the participants had questions prior to the scheduled interviews and observations. At the agreed initial interview appointment all subjects who agreed to be interviewed signed an informed consent agreement.
Interviews consent forms (Appendix B) and observation consent forms (Appendix C) were be signed by each of the intended subjects. Interview questions (Appendix A) and implementation observation guidelines (Appendix D) were utilized to insure the direction of the data collection strictly adhered to the project design. HSIRB requirements were followed for the interviews as well as observations of school-based and manufacturing technology business organizations settings.

Setting

Two Career Technical Centers comprised the CTE school group. Both CTE sites included machine tool and business services programs. Two machine tool-related businesses, that conducted business transactions with international clients, were selected for the manufacturing technology business organizations settings. The corporate subjects were comprised of similar types of industry settings. Both are companies that successfully operate in a global context and work within the parameters of manufacturing technology. Additionally, both companies operate in the metallurgy field, specifically aluminum and steel. These aforementioned organizations were originally to be located in two specific cities. However, since the onset of this study one of the originally selected MT sites has closed several of its manufacturing facilities in Michigan to streamline their organization to better compete in a global market. This site moved its international corporate headquarters to Northville, Michigan which is located outside of the specified geographic location of this study. An alternate MT1 site was located north of the original MT1 site, but this company experienced layoffs and temporary reduction of production due to the fluctuation in the automotive industry. Therefore, the researcher replaced the original MT1 site with a third site that is located within the specified geographic area.
The location of MT1 has been omitted to protect the identity of the subjects and to ensure anonymity of subjects and compliance with HSIRB regulations.

Data Collection Process and Instruments

Data collection consisted of formal semi-structured interviewing techniques as well as formal observations of classrooms and training environments. Interviews and observations took place in the natural setting of each participant (Creswell, 2003). Multiple methods of data collection were used that were both interactive and humanistic in nature (Creswell, 2003; & Newton, 2007). Interviews of the CTE executive-level personnel and observations of implementation of specified training practices enabled the researcher to examine similarities and differences that may become prevalent from emerging themes (Creswell, 2003; Leedy, 1997). These themes were interpreted as either internal factors (strengths and weaknesses) or external factors (opportunities and threats).

Interviews were recorded on digital medium, while observations were recorded using field notes. Because the majority of the students in career and technical center settings were under the age of 18, field notes were selected as a data collection tool to insure anonymity of under-aged subjects. Interviews and observations were transcribed using the denaturalism method (Oliver, et al., 2005) as well as digital transcription software. This means that only the language was transcribed, and verbal pauses will be omitted from the written interpretation. In one case a subject used the word “okay” in nearly every sentence. At first the researcher thought the word was used to check for understanding. As the interview continued it became apparent that “okay” was used as a
component of the subject's natural speech pattern. These verbal pauses were omitted from the transcripts when it was used in this context.

In addition to the interviews and observations, qualitative data was also derived from artifacts that are collected from each of the participating CTE and MT sites. The interview questions examined the leadership practices and perceptions pertaining to their organization in a globalization frame.

Instrumentation

This instrument was used to ascertain the subjects' perceptions of elements of success in operating in a global frame. Observations examined the implementation of the leadership vision and training in regards to effectiveness, application, and skills needed in to operate within the constructs of globalization. Subject responses were compared within each organization as compared to leadership vision and actual implementation. The researcher examined congruency and differences between subjects within the organization.

Interviews that were conducted at the leadership level frame the mission and vision of the company in regards to globalization, employee work ethic, training and implementation, as well as the impressions of how well-prepared students and employees are to work in the context of manufacturing business in a global economy. Two observations were conducted in each CTE/MT site to discover how training was being implemented at the department levels (business and machine-tool manufacturing production). The observations were compared to each other within the organization.
Reliability and Validity

Data was collected using the same instrumentation for each of the subjects (N=12). Interviewees (n=4) were asked the same series of 20 questions (Appendix A), observations were conducted (n=8) using the same set of parameters (Appendix D), and artifacts were collected, scanned, and analyzed in the same context (Creswell, 2003; Leedy, 1997; Marshall & Rossman, 2006). Interview and observation schedules were tightly structured because the intent was to collect data with as little interference to the flow of normal routines of each site. Participants were given interview questions that were pilot tested on volunteers outside of the study to determine if the wording was clear (Appendix) as previously explained. The researcher compiled the data and discovered emerging themes using the lens of the SWOT analysis for all interviews (n=4).

Qualitative theory (Cohen, Manion, & Morrison, 2000) may suggest that the researcher may have contributed bias to the study and the respondents may have had misunderstood the questions that were being asked. However, with these safeguards in place one can conclude that the responses were reasonable, reliable and valid in this context. This was evident during the MT1 interview. The subject asked for clarification on several questions. Other respondents seemed to answer each question with fluidity. This discrepancy between subjects may have biased the researcher to view MT1 responses in a negative light (Cohen, Manion, & Morrison, 2000). Additionally, because this is a small focused study, the validity of this instrument could be measured by duplicating the research with a similar population advance (Marshall & Rossman, 2006).
Summary

The data collection took place over the course of a one year span. Design and implementation was discussed in this chapter. Interviews were compared, as a whole, to the leadership vision. A composite of each site was made and compared to the other sites within the context of this study. CTE schools were also compared to one another by department and as a whole. Likewise MT businesses were compared to each other by department and as a whole. Finally, CTE as a whole was compared to MT businesses as a whole. Results will be addressed in Chapter 4.
CHAPTER IV

RESULTS

Introduction

Analysis of the data, using Grounded Theory and Phenomenology (Schwandt, 2001), utilized comparative methods of semi-structured interviews with 20 open-ended questions, natural-setting observations, and artifacts (Creswell, 2003). Immersion of data included listening to and transcribing interviews, searching for words and phrases that held meaning in the context of the research, finding emerging themes, comparing these themes with the researcher’s interpretation of congruency between each site interview and site observations, and finally comparing artifacts that were provided by each of the sites (Newton, 2007). Categories and themes began to emerge from this process that related to contextual learning in a global environment. Additionally, other elements for success began to take shape. Upon initial coding of the interviews, the researcher began to interpret the subjects’ tendencies for relating to concepts and ideas in both negative and positive ways. These negative and positive responses were connected to both internal and external factors. For example, MT1a made references to the rising costs of steel (Appendix E, lines 41-42) this was categorized as an “external” because MT1 does not have direct control over the cost of raw materials needed to manufacture products. It was also considered a “threat” because higher prices for raw materials meant a lower profit margin and higher operational costs for the MT1 site. Conversely, utilizing family members to assist in the day-to-day operations was coded as an internal strength (Appendix E, lines 175-182). Human resources are “internal” assets over which the leadership had influence. These resources were classified as “strengths” because the
practice of utilizing family members helped MT1 keep costs down. Thus, themes were
categorized using a SWOT analysis approach (Adams Associates, 2008; Houben, Lenie,
& Vanhoof, August, 1999; & Piercy, & Giles, 1989).

This process included deconstructing and reconstructing of themes and
comparisons between each leadership interview. Initially each interview was coded as a
unit, phrases were identified and concepts were given to these phrases. Themes began to
emerge and were assigned to each concept. The researcher began highlighting positive
factors in green and negative factors in yellow (See examples, Appendices E, F, G, & H).
Some themes seemed to emerge like skills, critical thinking and problem solving, people,
economic factors, vision, reactive and proactive approaches, communication, research,
awareness, and education. Some subjects operated in the short term while other subjects
seemed much more aware of the circumstances surrounding globalization.

Both CTE sites made references to not having a choice in their raw products like
business and industry does. In this they mean that schools are required to educate all
students and employers can be selective on who they hire and fire.

Redundancies were eliminated. Themes were sorted and placed in a SWOT grid
based on the researcher’s interpretation of each theme. Once each interview was coded,
then the researcher compared both CTE sites to one another and then both MT sites to
one another using the raw data from the observations and artifacts. Similarities and
differences began to unfold. Venn Diagrams (Figures 3 – 13) were created to illustrate
these congruencies and disparities within each site as a unit and then between each CTE
site as well as between each MT site. Both CTE sites were then compared in a Venn
diagram with both MT sites. This chapter was organized into sections that discussed
review of the data in terms of global philosophies, leadership analysis and observations, implementation and training, articulation between CTE and the workforce, leadership comparisons, office comparisons, production comparisons, MT to MT comparisons, CTE to CTE comparisons, MT to CTE comparisons, and elements for success.

Review of the Data

GP – Global Philosophies

Upon review of all leadership subjects (MT1a, MT2a, CTE1a, and CTE2a) the researcher was able to construct an individual SWOT analysis for each subject (Appendices Q, R, S & T). These revealed themes that were both unique to each subject as well as themes that were common between subjects. In many cases there were also similarities and differences within each site when comparing leadership perceptions to both office and production managers.

MT 1 Leadership SWOT Analysis and Observations

The emergent leadership themes for MT1 were: 1) Articulation with CTE, 2) Cross training, 3) Customer service, 4) Economic shift related to inflation, 5) Employability skills and work ethic, 6) Highly effective and ineffective employees, 7) Impact of globalization, 8) Maximizing human resource potential, 9) Problem-solving, 10) Producing more for less revenue, 11) Reactive not proactive, 12) Team approach to quality control, 13) Teamwork, collaboration, critical thinking, and 14) Training options maximize resources but are limiting (Appendix Q). These themes were woven into the following analysis on MT1a.

MT1 operated in a reactive state. The impression of the site was that employees were always multi-tasking to the point where things became disorganized. The big
picture framework theme of producing more for less cost was prevalent throughout all aspects of the company. MT1 appeared to be surviving globalization. Employees were retained from other small to medium-sized businesses that had gone out of business.

Reactively producing more for less seemed to have begun to take its toll on MT1. The production area was dark and dingy. There were oil and metal shavings on the floors. The observer was given the impression that time had not been allocated to cleaning the production area because the workers were constantly moving, processing, and producing. The office area was a sharp contrast to the production area. Resources had been allocated to remodel the reception and office areas.

Economic shift related to inflation was a reoccurring theme in the MT1 interview. Rising costs associated with operations and production were prevalent in this interview (see examples in Appendix E, lines 16-17, 25-28, 41-42, 45, 354-358, 372-375, & 405-409). The researcher interpreted MT1 subject’s responses to the economic climate as a threat and not as an opportunity. Responses to the economic climate were also perceived to be reactionary. In order to maximize production and lower costs, MT1 relied heavily on each employee's level of work ethic. Several answers to the questions focused on the necessity of people within the organization who could multi-task and perform at a high level of production for many hours. Additionally, MT1 was willing to take risks in hiring employees if he believed the individual possessed a strong work ethic. MT1 commented that he did not hesitate in releasing employees from the organization if their performance was inadequate. This researcher perceived that MT1 did not seem to have a concept of specific technical or problem-solving skills that may be needed to proactively advance the organization. However, MT1 stressed that punctuality, regular attendance, and the
ability to multi-task were also valued. However, specificity of skills that were required for this industry were not communicated to the observer.

Globalization was primarily viewed as a threat to MT1. The organization has responded reactively instead of proactively to global competitors and their lower prices for comparable goods. MT1 was able to increase productivity and deliver goods within a shorter time frame thus finding a way to adapt to the customer's needs. The researcher perceived MT1 to respond reactively to globalization and seemed to have a limited knowledgebase regarding this concept. The responses reflected a reaction to competition from other countries rather than an opportunity to expand the client base.

MT 2 Leadership SWOT Analysis and Observations

The emergent leadership themes for MT2 were: 1) Adaptability, 2) Articulation with CTE, 3) Attention to corporate details, 4) Communication skills, 5) Critical thinking skills, 6) Customer service, 7) Diverse training options, 8) Employability skills and work ethic, 9) Employee incentive programs, 10) Impact of globalization, 11) Math skills, 12) Mission/vision communicated at all levels, 13) Proactive approach to globalization, 14) Problem-solving skills, and 15) Technical skills (Appendix R). MT2 viewed this company as being able to adapt quickly because of its smaller size. Other comments in this interview supported the opinion that this subject viewed complex organizational hierarchy as detrimental to adaptability and communication.

While the changing economic market was also perceived as a threat to MT2, the subject viewed globalization mainly as an opportunity. He utilized his resources to gain understanding of cultures in other countries. MT2a had representation in several countries and created a corporate culture based on global awareness. Photographs of
employees/subsidiaries in other countries were visibly posted in high employee traffic areas. World maps were present in various forms throughout the building. Employees were observed listening to National Public Radio (NPR) while working. At the time of the observation, the public radio station was featuring a discussion on the impact of globalization in China. The researcher surmised that globalization was communicated in a myriad of forms.

MT2 operated successfully in a global context through their proactive approach. Proactive measures included: Communication of mission/vision, communication of key information to stakeholders, employee empowerment to insure quality control, employee globalization awareness, obtaining the most efficient equipment and providing specialized training on the equipment, and increase efficiency of operations.

MT2 had many proactive globalization elements during this study. There were many visuals throughout the site that reinforced a global perspective. Additionally, it became apparent that MT2 placed most of their resources into the production area. The shop was neat and brightly lit with all of the appropriate state-of-the-art equipment. The office areas contained older metal desk units with no-frills office furniture. MT2a ran the company with a "lean and mean" approach (Appendix F, lines 48, 57-63, 81). There was reported daily scrutinization of the business office records. MT2a claimed that all accounting books were balanced out every month instead of quarterly.

**CTE 1 Leadership SWOT Analysis and Observations**

The emergent leadership themes for CTE1 were: 1) Adaptability, 2) Articulation with MT, 3) Articulation with post-secondary, 4) Communication skills, 5) Critical thinking skills, 6) CTE assessments, 7) Customer Service, 8) Driving forces of CTE, 9)
Employability skills and work ethic, 10) Financial management skills, 11) Highly qualified instructors, 12) Impact of Globalization, 13) Impact of NCLB, 14) Mission/vision communicated at all levels, 15) Proactive Approach to Globalization, 16) Problem-solving skills, 17) Technical skills, 18) Unique qualities of CTE, and 19) Use of resources (Appendix S). CTE1 had resources and utilized them to benefit students. CTE1 was perceived as being proactive and adaptive when it entailed making research-based decisions as well as improvement of instruction and technology.

Even though there were threats in the manufacturing industry, CTE1a viewed the impact of globalization as providing more opportunities than threats. CTE1 leadership communicated an understanding that CTE curriculum and delivery needed to adapt to the changing environment in regards to industry diversification (see examples, Appendix G, lines 83-8596-99). CTE1 leadership expressed that being proactive was the key to survival and companies as well as CTE sites that will sustain growth through diversification. CTE1a claimed that this site attempted to "mirror" the community to be responsive to their changing human resources needs (see example, Appendix G, lines 15-22). CTE1a viewed change as being an opportunity to improve and expand programs to better prepare students for globalization.

This researcher perceived that the school mission/vision was communicated at all levels. The corporate philosophy of service and leadership was reported to have been communicated with stakeholders but CTE1a admitted that the mission was not easily defined. CTE1a stated that the mission reflected the need to compete in a global economy. Observation results were mixed. CTE1b did not appear to have a sense of globalization and the urgency to incorporate these philosophies into the curriculum based
on the observations in both office and production areas. However CTE1c did seem to have an understanding of globalization and spoke of examples where former students were successfully working in foreign countries (see example, Appendix N, lines 110-115).

**CTE 2 Leadership SWOT Analysis and Observations**

The emergent leadership themes for CTE2 were: 1) Articulation with MT, 2) Critical thinking skills, 3) CTE Assessments, 4) Customer service skills, 5) Data-driven decisions, 6) Driving forces of CTE, 7) Employability skills and work ethic, 8) Highly qualified instructors, 9) Impact of globalization, 10) Impact of globalization, 11) Impact of NCLB, 12) Mission/vision communicated at all levels, 13) Proactive approach to globalization, 14) Problem-solving skills, 15) Technical skills, 16) Unique qualities of CTE, and 17) Use of resources (Appendix T). CT2a viewed this school as being able to proactively adapt in a global context. CTE2a appeared to be well versed in literature pertaining to economics and the impact of globalization (see examples, Appendix H, lines 14-16, 47-52, 122-125). Additionally, CTE2a stressed the importance of customer service skills. CTE2a reported that customer service skills were valued in all levels of the organization (see examples, Appendix H, lines 95-103).

CTE2 was reported to have a unique and active MT advisory committee that was mostly comprised of former CEOs who have held positions with major automotive manufacturers. According to CTE2a, this group provided specific suggestions for training and success strategies for a global economy. CTE2 also reported that this site collaborated with the local Chamber of Commerce and local businesses that operated on an international level. Additionally, the school leadership responded to questions in a
manner that led the researcher to believe that CTE2a was well-read in topics concerning globalization. Additionally, the school improvement team and ISD leadership have read Thomas Friedman and Daniel Pink and reported that they were in the process of applying these concepts to CTE training of “21st Century Skills” through their school vision (see examples in Appendix H lines 14-16, 27-28, 33-34, 40-41, 47-51, 121-125, & 257-261). The researcher perceived that CTE2 was taking an extremely proactive approach to globalization and articulation with MT.

The impact of globalization was clear at the CTE2 site. The works of Daniel Pink and Thomas Friedman dominated CTE2a’s view of globalization. Research and reading relevant works were a part of the proactive approach to globalization. CTE2a viewed the impact of globalization as an opportunity to encourage students to think of their futures as well as expose them to state of the art or cutting edge technology. Globalization seemed to be a driving force in including 21st Century Skills in the curriculum. Students were observed being encouraged to think on a global scale in the CTE2b observation. Visual images and messages were posted throughout the center to foster a sense of belonging and encourage success in a global context. Globalization seemed to have had a significant impact on this organization and was viewed as a tremendous opportunity that appeared to have been embraced by CTE2a leadership.

The researcher perceived that CTE2 definitely had taken a proactive approach to globalization by encouraging students to prepare to think, act, and work in a global economy. Globalization issues were observed as being a part of the activities, and/or classroom cultures in both CTE2b and CTE2c observations. Students were encouraged to develop interpersonal communication skills, work in teams, and apply 21st Century
Skills. Curriculum seemed to be aligned to the CTE state and national standards and were reported to be regulated by active advisory committees. CTE2 also valued creative thinking and innovation as was evident in both observations. CTE2a indicated that this contradicted the new MME, NCLB and CTE standardized testing movements. CTE2a responded that standardized testing was perceived as a definite threat that may quell innovation and the creative thought process. During the interview CTE2a discussed innovation, creativity, and design as the “savior of American industry” (Appendix H, line 124. The subject further stated that standardized testing was forcing his school to adjust in a way that may stifle that creative process (see examples in Appendix H lines 124-133).

IT – Implementation/Training

MT1

In reference to Articulation with CTE, MT1 stated that he utilized students with CTE training and was willing to give students an opportunity for employment based upon a CTE instructor's recommendation. MT1 has had a positive rapport with CTE. However, the quality of the employee's technical and employability skill level depends on the individual, not necessarily the specific training.

Cross training is present in all aspects of this MT site. Cross training was apparent in both the interviews and the observations. Being able to operate multiple types of equipment and software programs were essential components for success for MT1. This researcher deduced that the limitations of cross training are that the organization is dependent upon the skill level of the most effective employee.
It was perceived that MT 1’s awareness of customer service was limited to literal interpretation of face-to-face interaction with customers. When asked what extent customer service skills were utilized on a daily basis the subject discussed the process of production and repair orders in response to customer orders (see examples, Appendix E, lines 226-232). Customer service also pertained to shorter intervals of time between order and delivery in comparison to MT1’s competitors (see examples, Appendix E, lines 230-233). Customer service training was limited to “hands-on” training and the ability of an employee to work to meet the needs of the consumer (see examples, Appendix E, lines 239-249). Observations and discussions with leadership showed a deficiency in customer service awareness and training in this area. Production employees were not observed engaged in customer service activities other than their observed diligence to meet production deadlines (Appendix J, lines 122-125). The researcher surmised that the customer service skills could be improved in the office setting (see examples, Appendix I, lines 60-63, 76, 85-90). MT1b subjects were observed answering questions and speaking directly to employees when they approached the office area (see examples, Appendix I, lines 142-150, & 157-163). However, the researcher was not greeted promptly and was ignored even after approaching the receptionist’s desk and extending a verbal greeting to the receptionist. When the researcher inquired how employees were trained in customer service skills, MT1b replied “They [employees] do not really need customer service skills because we don’t get many people coming into the business” (see example, Appendix I, lines 142-150). It was observed that clients did call MT1 during the observation. The researcher perceived that the Office Manager did not perceive
communication and assistance given to other employees within the organization as a form of customer service.

Highly effective employees, ineffective employees, and maximizing human resource potential are three themes that related to human resources. Employees who could multitask were valued in the organization. The ability to perform at a high level of production lowers the operational costs and maximizes the production output. This was another reoccurring theme in this interview. The employer relied mainly on the employee's ability to show up for work and remain productive throughout the shift. According to MT1, skill level determined if the employee was to cross-train other employees. MT1 also emphasized that employees must be able to multi-task to increase production output. Employees who were trained in highly specialized areas may not have been able to work in multiple areas. In regards to maximizing human resource potential, initial wages may not have been competitive, but an employee could have quickly earned higher compensation based on skill level and work ethic. MT1 indicated that employee skill level and work ethic traits were valued and ultimately rewarded.

Problem-solving was ingrained in employees as a result of cross-training (Figure 1). Formal training in problem-solving was not observed. Cross training was the primary type of training provided to the MT1 employees. The researcher perceived MT1's training options as limiting. In-house training was viewed as strength, but was also a weakness because other forms of training should be applied in order to give the company a more diverse perspective. Outside resources and varied training opportunities were not provided to the majority of employees as this would slow production. A small group of employees who worked in the CAD/Drafting department were able to obtain training
outside of the organization. MT1 revealed that all the focus appeared to be on production. Employees self-managed in terms of quality control; however there was always some form of supervision either by management or higher skilled employees. Employees who were not at the skill level of their supervisors did not seem to be empowered to improve or assess product quality on their own.

In the MT1 framework, critical thinking refers to improving production and improving methods of production in regards to specific products. Outside of cross training, teamwork was limited to the family members/management team. This group was involved in the collaborative critical thinking process on a daily basis as a component of a morning corporate ritual. MT1 indicated that the team would gather to discuss orders, customer needs, and problems that needed to be addressed. The main focus of these meetings was to quickly address any issues in order to facilitate increased production. Additionally, mission/vision does not seem to be clearly communicated to employees outside of the management/family circle.

Increased production and lower product pricing were the main element for success for MT1 (Figure 3). This reactive approach to globalization and economic trends has given MT1 the ability to sustain growth and expand their customer base. This approach was viewed to be detrimental in terms of shop cleanliness, employee safety, and the ability to provide a variety of training to the employees. As previously mentioned, cross-training worked in this environment because workers were training while they were producing. There was no formal time that was set aside for employees to obtain training with the exception of the CAD/CAM department. Observations also lent support to this finding (see example, Appendix J, lines 70-75).
Because of its reactive nature MT1 was able to sustain growth and stay competitive at a time where local competitors were shutting down. As previously stated, the reactive approach to sustaining the company was prevalent. Resources outside of the employees, family and the local community were not utilized. The researcher perceived MT1’s reactive approach to globalization may not be able to be sustained indefinitely. MT1 was perceived as being reactive and task-oriented. Employees used multitasking as a method that resulted in higher production and lower operational costs. Work ethic and employability skills were valued within the organization.

Figure 3. MT1 Site Comparison Venn Diagram
Globalization was perceived as a threat to MT1a and MT1b and MT1c had limited to no awareness of globalization.

MT2

MT2 was proactive in management areas pertaining to accounting and daily checks and balances of the corporate finances. This subject seemed to possess a working knowledge of operational details. MT2a valued communication skills (Figure 4) in employees and practices personal communication skills particularly listening skills. The employer noted that he travels extensively where he communicates with clients and associates from around the globe. Employees were observed asking questions for clarification and communicating problems and ideas they were encountering in their work. Additionally, the data supported that the corporate mission and vision were communicated at all levels. MT2a responses suggested valued transparency in management style.

MT2a empowered staff to be creative and think on their own. MT2a was perceived to support innovation in regards to manufacturing and design. MT2a mentioned creative thinking in several instances. This was linked to critical thinking skills by the observer who interpreted the phraseology to have a similar meaning. In addition to critical/creative thinking, problem-solving was evident in daily operations as it related to: Accuracy of geometric construction and programming of CAD/CAM/CNC equipment, adaptive thinking, multi-tasking, mathematics, reading for information, and the ability to read blueprints (Figure 4).

Customer service was interpreted as the ability to listen, communicate effectively, project a positive first impression, and interact with customers. MT2a valued customer
service practices; however no formal customer service training was noted. According to
MT2a, employees who lacked customer service skills were dissuaded from working with
clients instead of encouraged to receive training to improve on those skills.

The researcher perceived MT2 to have diverse training options which included:
Outsourcing with professional trainers, cross-training, employee mentoring, frequent
communication regarding production, continuing education, nationally accredited
training programs, and industry standard training techniques. Training even took place on
a global scale. MT2a responded that he extensively researched training options and
placed resources behind training in terms of time and financing. Training pertaining to
specific machines, industry trade tools, software, and quality process appeared to be
highly valued as a proactive approach to the corporate process.

Successful employees needed to have the ability to exhibit math, reading and
technical skills. These skills were also included in employability skills and work ethic
theme category because of the context of MT2a’s response. MT2a looked for the ability
to combine all of these skills to most effectively perform one's job. Additionally, MT2a
was perceived to value creative thinking and problem solving as employability skills.
Math skills were viewed as an element for success for both the employees and the
organization. Employees needed to understand measurement and accuracy as well as
mathematics related to geometric construction and trigonometry. Technical skills were
perceived as the ability to perform computer-related tasks, CAD/CAM/CNC
programming, and other computer software programming skills. Technical skills were
essential and MT2a indicated that employee retention was determined by the level or lack
of technical skills an employee possessed. Employees were expected to utilize these skills
on a daily basis and employee incentive programs were created to foster empowerment to improve the quality of the process, product, and obtain further education and training (Figure 4).

The researcher perceived that there were opportunities to improve areas of CTE such as work-based learning. MT2a was encouraged by intensive work-based learning programs in countries like Germany but did not believe smaller companies have the financial resources to participate.

*Figure 4. MT2 Site Comparison Venn Diagram*
Articulation with CTE was viewed as a weakness in this organization. However, after reviewing the data from the other sites, MT2 shared many areas of congruency that will be discussed in later sections.

**CTE1**

CTE1a indicated that there was collaboration with community partners, stakeholders, and advisory committees. Additionally, training for specific program areas were designed to prepare students for the next level and are relevant in their training areas of business services and manufacturing production technology. This center emphasized manufacturing trades despite state trends as the CTE1 leadership perceived these trades would remain viable career choices in the area. This center was perceived as having several strengths articulating student training with MT industry standards (Figure 5). Post secondary articulation and linkages were communicated as opportunities. These areas needed to be expanded to offer more opportunities for students to prepare for higher education in CTE area. The community that surrounds CTE1 offered both a community college and private business college option for post-secondary training.

In reference to relevant skills and elements for success, CTE1a understood communication skills to be the ability to greet and interact with others. CTE1 also perceived employers desired an employee who was animated, asked questions and had the ability to appropriately interact with the employer and other stakeholders. Additionally, CTE1a also reported that employability skills were highly valued as elements of success (Figure 5). CTE1a perceived career awareness and program curriculum as being integral to career success. CTE1a expressed concerns that CTE1 students were not being adequately trained in "Soft Skills". These included:
Understanding and ability to carry out job expectations, a positive attitude, people skills, teamwork, and communication. As an adjunct to employability skills, preparation for the world of work included financial management skills. CTE1a perceived that a student training needed to include money management skills. Lack of money management skills may have been a barrier in obtaining and retaining gainful employment. Per CTE1a’s responses, this area was lacking in curriculum delivery. Specific technical skills were not addressed. The subject categorized technical skills as being essential to career success along with soft skills.

CTE1a responded that customer service training was individualized to the student and met the needs of each specific industry/program area (see example, Appendix G, lines 219-221). Customer service skill training was perceived as a “strength” to CTE1. CTE1a reported that customer service was “a big part of everything” they did (Appendix G, lines 213-214). Customer service was also apparent in the CTE1c observations (Appendix N CTE1c, lines 95-99). Both CTE1b and CTE1c greeted the researcher and modeled customer service by promptly responding to students’ questions (see examples, Appendix M, lines 75-84, 86-87, 110-111; Appendix N(1a), lines 33-34, 73-75; Appendix N (2a), lines 64-67, 88-89). The staff seemed enthusiastic towards all stakeholders who were present. Students were given immediate feedback, visitors and other staff members were greeted in a friendly manner.

According to CTE1a, all students were taught to problem-solve within their program areas. CTE1 employees are perceived as using critical thinking skills but not on a daily basis. CTE1 leadership was not certain how critical thinking skills were used by employees but was certain that students were taught critical thinking skills (Figure 5).
This response seemed contradictory in nature. Perhaps the operational definition of critical thinking was not entirely known to the subject. Problem-solving was reported to be embraced by instructors and practiced in all CTE programs, particularly in applied mathematics. Instructors were reported to have collaborated on ways to include problem-solving in the curriculum. Additionally, CTE1a reported that staff also collaborated to solve problems within this CTE site.

CTE1a indicated that this site utilized assessments such as: ACT Work Keys, the National Career Readiness Certificate, and student Educational development plans (EDPs). These were reported to have provided individualized data pertaining to student placement and student achievement. The center also has established a Work Keys Training Center that was managed by a certified Work Keys Profiler who served a dual role as the CTE Placement Coordinator for work-based learning. CTE1a explained that one of the local post-secondary institutions also operated a Work Keys Training Center. This may have caused some redundancy of services in the area even though the CTE1 site only specialized in high school age population clients.

CTE1 leadership had proactive ideas that could be implemented in the event of economic and academic trends and shifts. CTE1a made references to having a highly qualified faculty. The researcher interpreted that CTE1a valued his employees and was particularly enthusiastic about the highly qualified status of each instructor (Figure 5). All instructors were reported to have experience in their program areas and CTE1a indicated that many possessed master's degrees or some form of higher education and training.

NCLB has created many new challenges for CTE1 specifically in areas related to curriculum and assessment. CTE1a perceived these changes as strengths and
opportunities to improve CTE delivery and accountability. CTE1 was working with local schools to provide career awareness opportunities in the 7th grade instead of the 8th grade. The researcher surmised that this may help students be better informed of requirements in high school. Being prepared may assist the students in being proactive about their school schedule. New MMC requirements are feared to leave little to no time in a student's schedule for electives such as CTE programs.

There were some elements that were unique to CTE1. Because CTE1 is a training site for high school students CTE1a strongly indicated that there were some apparent differences between schools and businesses. CTE1a pointed out that business and industry, particularly manufacturing, was driven by the bottom line. In other words, employees can be fired if they are not adequately producing quality products and working up to capacity. In education the students are the raw material and cannot be discarded through a quality control process. Students cannot be "fired" or dropped for adequate or inadequate performance. However, the CTE1a did indicate that the site needed to work to improve their human capital because they could not simply remove the ineffective human capital in contrast to business and industry.

Compared to other centers in the state of Michigan, this facility was fairly new. Intensive research and collaboration were reported to be the key in designing this structure. The facility was created with "green" eco-friendly features in mind. Even with the extensive planning, the CTE1 did not have adequate storage space and in some area the training space could be larger. CTE1a reported that the facilities were not optimum despite the intensive research (see examples, Appendix S, lines 109-110, 119-121).
Figure 5. CTE1 Site Comparison Venn Diagram

CTE_1 Site Comparison Venn Diagram

CTE A
- Adaptable
- Communication
- Critical Thinking
- Problem Solving

CTE B
- Ability to Deliver Course Content
- Highly Qualified Instructors
- Emphasis on Real World Application
- Program Area Well Maintained

CTE C
- Multi-Tasking
- Teamwork
- Blue Print Reading Skills
- Project-based Assignments
- Reading for Information and Locating Information Skills

Artifact Support
- State-of-the-Art of Equipment
- Program areas and machines look well-maintained
- Program areas are well lit and clean
- Full-Color Process Professionally designed full color literature supports emphasis on Communication Skills
- Post-Secondary Articulation
- Articulation with MT
- Community Partnerships
- Emphasis on Facilities and Resources
- No references to globalization
- Technical Skills

Artifact Incongruence
- No Perceived Incongruence
CTE2

CTE2 seemed to value critical thinking skills as opportunities for students to troubleshoot problems (Figure 6). The process was apparent in all programs and was perceived to be integral to CTE. Critical thinking skills were observed in both CTE2 b and CTE2c subject observations. CTE2a responded that problem-solving included the use of mathematics and original thought instead of the regurgitation of memorized facts. CTE2a also commented that 50% of CTE programs had a strong emphasis on problem-solving as part of the daily routine. These programs have specifically targeted problem-solving activities, and daily warm-ups. All programs were reported to have used applied and/or contextual math that was integrated into the established curriculum. CTE2b did have students performing warm-up problem-solving activities as observed by the researcher. CTE2c was observed having students gather at the beginning of the session to discuss the objectives for the day. Both CTE2b and CTE2c were observed participating in problem-solving activities. In the CTE2b observation problem-solving included working on projects independently, assessing work personality profiles, discussing various work-related scenarios in terms of cause and effect, and connecting ideas (see examples, Appendix O, lines 97-112). CTE2c problem-solving activities included independent student projects, reverse engineering, conducting research, calculating coordinates, and use of procedures to read blueprints and implement a design (see examples, Appendix P, lines 58-67, 104-107, 124-129, 158-169).

Both CTE2b and CTE2c were observed incorporating technical skills as integral components of the classroom structure (Figure 6). According to CTE2a, the new CTE Michigan Technical Standards were perceived as a threat. These new standards were
reported as not being as comprehensive as the current curriculum that is being addressed
the CTE2 site. CTE2a reported that the new state standards included skill areas that were
vague and not specific to this region. It was feared that these new standards would be
detrimental to the overall success of students when they completed their training.
Furthermore, CTE2a suggested that these standards were not created with local advisory
committee suggestions in mind.

CTE2a made several references to the importance of customer service skills. This
was an area where CTE2a related that the site needed to improve. The researcher had a
favorable impression of the customer service atmosphere that was noted during the site
visit. CTE2a staff was cordial and responsive to staff, students, and visitors. During the
interview, CTE2a gave several specific examples of customer service. It appeared that the
operational definition of customer service has been established at this site. Staff was
expected to exhibit internal customer service skills. Internal customer service skills were
reported to include: Creating positive first impressions, being personable and respectful
to all callers, establishing positive customer relations, promise to follow through and
research problems, follow through with contact, and treat all stakeholders as customers.
CTE2a shared that customer service was not just for the building, it was for the entire
organization. As previously noted, CTE2a viewed this as a critical area for improvement
to the point where leadership indicated that customer service skills may be more
important than technical skills for both staff and students (see examples, Appendix H,
lines 170-194, 196-198, 204-208). Students observed in CTEb, and CTEc activities were
perceived to have exhibited appropriate customer service and communication skills
(Figure 6).
CTE2a responded that the site used a Customer Service Satisfaction survey to assess student work ethic. This also served as a tool to communicate the relevance and importance of employability skills training. CTE2a indicated that he had taken cues from industry and the need for employees to possess "soft skills". CTE2a also responded that students needed to be able to work well with others, be dependable, enthusiastic, punctual, work on innovative products, and have a positive attitude. This was in line with the MT sites that were included in this study as well. CTE2a viewed employability skills as an extremely important component of the training process and should include both customer service and technical skills.

In order to make data-driven decisions regarding student achievement and improvement of instruction, CTE2a reported that they utilized assessments such as ACT Work Keys and curriculum alignment to the MMC, and ACT Math. CTE2a stated that they had aligned their program curriculum to high school content expectations as well as the ACT Work Keys (see examples, Appendix H, lines 138-145). Student lessons include drills and practice in math-related problems that are used in the aforementioned assessments. CTE2a perceived MMC and new CTE standards and segmenting as threats to the delivery of technical skills. New standards were feared to take additional class time thus squeezing out time that could be spent teaching industry-specific skills. Data-driven decisions were also reported to be imperative to program offerings. Programs were updated based on employment data. Employees were reported to be retained or reassigned based on program success. Unlike other schools, this CTE2a responded that they operated more like a business in the respect that teachers were not entitled to remain
in their positions. If a program had low numbers or low achievement scores then the program was reevaluated based on that data. CTE2a stated that the data-driven decision-making process could have been improved in terms of technology and access to data. This was a perceived area of weakness and a priority for CTE2 leadership.

Driving forces of CTE were considered to be positive in nature. The students appeared positive about their education and CTE2 was focused on making certain all students were employable in their program area. The school reported that they operated on a charter millage which means that they were not dependent upon student tuition. The site also had a fund balance that could support necessary changes that were needed to support contextual student learning. CTE2a reported that the community supported the center and the region was progressive in terms of industry and opportunities. Additionally, CTE2a also valued employees and was particularly enthusiastic about the highly qualified status of each instructor. Similar to CTE1, all instructors were reported to have had experience in their program areas and many possessed master's degrees or some form of higher education and training.

Other driving forces of CTE related to NCLB requirements. CTE2a reported that these mandates created a sense of urgency in CTE. CTE2a stated that there were academic areas that needed to be addressed in addition to technical skills. There was concern that incorporating more academic learning objectives might diminish the extent at which technical skills were delivered (see examples, Appendix H, lines 220-233). CTE2a also related that the teaching staff may not have agreed with the new requirements but they seemed understand that they were a required and integral component of CTE curriculum delivery. Teachers and leadership seemed to be willing to work around the
requirements of NCLB but may not have necessarily embraced them. This phenomenon may have been attributed to the mission/vision being communicated at all levels. Even though the climate of CTE was changing, the school mission had not changed. The organization had adhered to the focus of their mission and continued to evolve based on that mission (Figure 6). The staff collaborated to promote the center and the mission/vision appeared to be effectively communicated at all levels. This was also apparent in both CTE2b and CTE2c observations.

As was reported in the CTE1a interview, CTE2a commented that manufacturing was driven by the bottom line and schools were required to serve all students regardless of the bottom line. However, CTE2a expressed strong opinions concerning continuous improvement. CTE2a shared that schools needed to work to improve human capital, not remove human capital. CTE2 had set the student success standard at 80% in regards to the competency certificates. CTE2a reported that only 60%-70% of students actually achieved 80% of those standards.

CTE2 appeared to have a tremendous amount of resources at their disposal. CTE2a suggested that the largest resource related to the community. Four-hundred business partners were willing to collaborate with the center. MT2 also expressed an interest in wanting to be approached by CTE2 to collaborate in work-based learning opportunities. Perhaps other employers may have been enthusiastic about collaborating with CTE2. The supply of professionals who have the time and interest in collaborating with this CTE was reported to be more than adequate to fulfill the sites work-based learning placement and advisory committee needs. This did align with the perception that this CTE needed to improve community collaboration. This site did not seem content
with keeping the status quo. They appeared to have always been looking for new opportunities to expand options for students in terms of service learning, post-secondary partnerships, national events, and international experiences.

Figure 6. CTE2 Site Comparison Venn Diagram
During this study there were several areas of articulation between each of the subject groups, particularly between MT2, CTE1, and CTE2. Leadership subjects were compared through the use of semi-structured interviews. The 20 questions (Appendix A) were developed to open discussion with the subject related to the underpinnings of the organization in a global context. The questions were also designed to gauge the level of articulation between CTE and MT settings. The results were reported in the following sections pertaining to leadership, office, and production areas. Leadership subjects indicated that there was articulation between CTE and MT in terms of technical and employability skills. All elements for success were discovered throughout the study, however not all elements were present in interviews and observations of all subjects. Additional elements for success were also uncovered. This suggested that there is some articulation between CTE and MT in areas of customer service, problem-solving, higher-order thinking, and data-driven results. Similar skill sets were observed in the MT sites in both office and production areas. Accounting and financial management was observed in the MT and CTE office programs. CNC Mills, Lathes, and CAD software were being taught in the CTE production settings and workers were observed using similar machinery and software in the CTE programs.

Leadership Comparisons

Similarities between MT leadership (Figure 7) denote that both sites had articulation with CTE. MT1 utilized CTE students and MT2 related that the site had hired CTE students and that they had been adequately trained. Both leaders valued employability skills and work ethic. Customer service skills were reported to be valued at
both sites, however only MT2 was observed putting these skills into action. Additionally, both MT sites required Problem-solving on a daily basis.

CTE leadership results showed that there were more common themes between the leaders (Figure 7). This may be attributed to the structure and organization of CTE centers. As previously mentioned, CTE is governed by the Michigan Office of Career and Technical Education. There are a set of standard curriculums as well as Perkins IV legislation that guides some of the decision-making in CTE settings. Both CTE leadership subjects made reference to the importance of employability skills and customer service. Problem-solving and critical thinking skills were also valued. Both leaders mentioned highly qualified teaching staff, NCLB, and other driving forces of CTE. Both CTE leaders seemed to have different, yet proactive approaches to globalization. In this respect, CTE1 reported that they take cues from the community and try to stay adaptive. This is more of a reactionary approach compared to CTE2. The latter site utilizes their advisory boards in a more highly organized and productive manner. There are more frequent meetings and the members work more closely within the global context. CTE2 seemed to have a better grasp on the larger scheme of globalization where CTE1 seemed to respond to local industry and the needs of the automotive industry.

From the leadership perspective, there was articulation from all subjects between CTE and MT (Figure 7). All leaders perceived that they were responding proactively to globalization. However, it is important to note that only MT2 and CTE2 executed this concept throughout the organization. Both MT1 and CTE1 had more reactive approaches to globalization which may be correlated with the location of these sites. This was noted in CTE1a’s comments pertaining to how globalization had impacted this organization.
CTE1a stated that they attempted "to mirror what" their community needs were (Appendix G, Lines 15-22). Further statements pertained to preparing students for the workforce in a community that is closely connected the automotive industry (see examples, Appendix G, lines 43-47, 69-73, 167-170, 177-179).

Similarly, all leaders responded that they valued attention to details in regards to business management. However, a structured operations style was only observed at MT2, CTE1, and CTE2.

All four leadership subjects valued customer service and communication, and problem-solving skills. Employability skills seemed to be integral both to daily operations and in regards to training. Finally, all leaders valued technical skills and responded that training often revolved around teaching specific technical skills. MT1 used cross training to assist employees with becoming proficient on several types of equipment. MT1 also valued the technical training some employees obtained prior to employment. MT2 provided a myriad of technical training options for employees including sending workers to various parts of the world where they could receive the benefit of specialized training focused on proprietary equipment.
Leadership SWOT Comparisons

MT1 Leadership
Cross Training
Economic Shift Related to Inflation
Highly Effective Employees
Impact of Globalization is perceived as a Threat
Ineffective Employees
Maximize Human Resource Potential
Produce More for Less Revenue
Reactive Not Proactive
Team Approach to Quality Control
Training Options Maximize Resources But Are Limiting

MT2 Similarities
Articulation with PTE
Customer Service
Employee Skills & Work
Team
Problem Solving Skills

MT2 Leadership
Adaptability
Attention to Corporate Details
Communication Skills
Critical Thinking Skills
Diverse Training Options
Employee Incentive Programs
Math Skills
Mission/Mission Communicated
At All Levels
Proactive Approach to Globalization
Technical Skills

MT1 Leadership
Adaptability
Attention to Corporate Details
Communication Skills
Critical Thinking Skills
Diverse Training Options
Employee Incentive Programs
Math Skills
Mission/Mission Communicated
At All Levels
Proactive Approach to Globalization
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Math Skills
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At All Levels
Proactive Approach to Globalization
Technical Skills
Office Observation Comparisons

MT1 and MT2 were observed as friendly environments (Figure 8). However, the observer perceived that MT1 was extremely casual and not all office personnel seemed enthusiastic about greeting customers. MT1 was observed being responsive to the employees who approached the receptionist with questions. In contrast MT2 greeted all customers and employees quickly and responsively. Both MT sites were observed utilizing financial management and/or accounting, as well as math skills (Appendices I & K). Similarities between both sites also included the use of technical and computer skills as related to an office environment (Figure 8). Similar technical and computer skills were being taught in the CTE office programs (Appendices M & O).

CTE office program settings were simulated office environments with state-of-the-art equipment. Both CTE trainers/instructors were personable and the program areas were neat and well-maintained. Students in both CTE1 and CTE2 sought clarification from the instructor (Appendix I & K). While the intent seemed to be to have students work independently and self-manage, some students in CTE1 seemed to require more assistance compared to CTE2. In CTE2 students were observed in various higher-order thinking activities including utilizing multiple productivity software programs, project-driven assignments, and linking academics and technical skills in creative writing assignments (Appendix O, lines 75-81, 98-112, 115-129). CTE2 problem-solving activities engaged students in higher levels of reasoning and learning compared to more task-oriented lessons in the CTE1 program such as cash proofs, balance sheets, text book problems, calculating sales tax, and worksheets (Appendix M, lines 36-37, 46-51, 72-79, 126-130). Additionally, both CTE sites were observed training students in math, reading
for information, technical, and computer skills. Financial and accounting skill training were also present. Finally CTE1 and CTE2 had incentive programs in place to motivate students in areas of production and academic achievement.

Collectively (n=4) subjects working in the office environment placed a high value on math, finance, and computer skills. Daily operations in the MT settings suggest that CTE is adequately preparing students for work in settings where accounting and financial management skills are utilized (Figure 8). At MT1, CTE1 and CTE2 equipment and contemporary custom furniture resources were placed in the office environment. All 3 sites had state-of-the-art office equipment and computers. MT2 had operational computers; however the office environments were lower in priority compared to the production areas. In addition to technical and math skills, all 4 sites included incentive programs.

When comparing MT1 and CTE1 there were some noted similarities in reference to a lack of focus and examples of quality customer service. There also appeared to be a reactive approach to daily operations as well as a limited awareness of globalization issues and understanding of specific job skills at both MT1 and CTE1 sites. Conversely, both MT2 and CTE2 office settings were perceived to be proactive with awareness of globalization issues (Figure 8). Communication skills and the ability to problem-solve in daily tasks were also observed in these two settings as indicated in italicized print. Additionally, both MT2 and CTE2 seemed to have an excellent rapport with their trainer. The MT2 and CTE2 subjects seemed comfortable seeking clarification on a frequent basis.
Figure 8. Office Observation Comparisons

<table>
<thead>
<tr>
<th>MTL Office</th>
<th>MTL Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive</td>
<td>Reactive</td>
</tr>
<tr>
<td>Limited Awareness of Globalization</td>
<td>Awareness of Globalization</td>
</tr>
<tr>
<td>Relaxed Environment</td>
<td>Customer Service Skills</td>
</tr>
<tr>
<td>Produce More for Less Cost</td>
<td>Business-Oriented Environment</td>
</tr>
<tr>
<td>Lack of Focus</td>
<td>Quality &amp; Efficiency</td>
</tr>
<tr>
<td>Lack of Customer Service</td>
<td>Attention to Corporate Detail</td>
</tr>
<tr>
<td>State-of-the-Art Equipment</td>
<td>Varied &amp; Specialized Training</td>
</tr>
<tr>
<td>Interaction with Staff</td>
<td>Education Training Valued</td>
</tr>
<tr>
<td>Limited Time for Training</td>
<td>Communication Skills</td>
</tr>
<tr>
<td>Task-Oriented</td>
<td>Problem-Solving Skills</td>
</tr>
<tr>
<td>Employees Multitask</td>
<td>Self-Certification Sought</td>
</tr>
<tr>
<td>Cross Training</td>
<td>Mission Communication at All Levels</td>
</tr>
<tr>
<td>Clutter/Sense of Disorganization</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CTEU Office</th>
<th>CTEU Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proactive</td>
<td>Proactive</td>
</tr>
<tr>
<td>Awareness of Globalization</td>
<td>Awareness of Globalization</td>
</tr>
<tr>
<td>Attention Paid to Work Flow</td>
<td>Attention Paid to Work Flow</td>
</tr>
<tr>
<td>Articulation with MT</td>
<td>Articulation with MT</td>
</tr>
<tr>
<td>Communication Skills</td>
<td>Communication Skills</td>
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<tr>
<td>Customer Service Skills</td>
<td>Customer Service Skills</td>
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<tr>
<td>Training</td>
<td>Training</td>
</tr>
<tr>
<td>Work-Based Learning</td>
<td>Work-Based Learning</td>
</tr>
<tr>
<td>Sense of Pride in Organization</td>
<td>Sense of Pride in Organization</td>
</tr>
<tr>
<td>Efficient Use of Time</td>
<td>Efficient Use of Time</td>
</tr>
</tbody>
</table>
Production Observation Comparisons

The environments for MT1 and MT2 in regards to production were vastly different. As previously mentioned, MT1 operated in a reactive manner that showed in the condition of the production area (Figure 9). MT2 appeared to be more proactive and workers seemed to be able to take time to process data pertaining to production tasks and maintain a clean working environment. Both production sites valued work ethic and employability skills and were given additional compensation or promotions based on performance in that area. Both sites had state-of-the-art equipment. However MT1 had not maintained the equipment so it appeared to be older than it may have actually been. Examination of artifacts exhibited clean and contemporary equipment that was present during the observation, just not in the same state it was presented in the brochures. Both MT production areas utilized problem-solving, math and technical skills.

Articulation with CTE was not noted through the MT production observations. However, it is important to mention that employees were being trained in many of the same skills at the CTE settings. Similar equipment was used and basic technical skills were taught in the CTE settings. MT sites had more sophisticated machinery and equipment; however both CTE sites did utilize CAD/CAM and CNC mills and lathes that were present in the MT settings. CTE sites related that they utilized advisory board input to make decisions on equipment purchasing and curriculum giving CTE articulation with MT settings. Critical thinking, problem-solving, and employability skills were also prevalent (Figure 9).

In some instances there was congruence between MT2, CTE1, and CTE2 but these commonalities were not indicated at the MT1 setting. Elements that were present in
MT2 and both CTE settings italicized in (Figure 9) included critical thinking, communication skills, and well-maintained production environments. Between the MT1 and CTE1 setting there was a limited awareness of globalization issues in contrast to the awareness of globalization that was present in CTE2 and MT2. Again, the correlation between the location of the MT site and the CTE site may be a factor. MT2, CTE1, and CTE2 had ample lighting and were well-maintained.

All 4 production sites were observed to have similarities in elements of success related to state-of-the-art equipment, employability skills and work ethic, problem-solving skills, math and technical skills, as well as the ability to read blueprints. Employability skills and work ethic were apparent in all production sites (n=4). Employees and students were always on tasks and seemed to have a sense of pride in their work particularly in the CNC Mill and CAD/CAM areas.

MT to MT Comparison

Two very diverse themes, or modes of operation, emerged when both MT sites were compared with each other. These emerged as: 1) Reactive, globalization as a threat, and produce more for less cost, and 2) Proactive, globalization as an opportunity, and quality and efficiency (Figure 10). MT1 was categorized as reactive and MT2 was perceived as proactive in this study. MT1 and MT2 seemed to be polar opposites of each other in terms of leadership, office procedures, and production. MT1 was interpreted as being reactive in terms of their perception of globalization and in their on-going quest to produce high quantities of products while responding to the demand for lower prices. The products MT1 produced were vast. This site adapted to the types of orders that were placed with the site. These products varied from repairs to new molds for plastic, rubber,
and metals. The global extent of the customer base was limited to three other countries besides the United States. MT1 operated in a more task-oriented environment.

Figure 9. Production Observation Comparisons

<table>
<thead>
<tr>
<th>MT1 Production</th>
<th>MT Similarities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive</td>
<td>Compensation Based on</td>
</tr>
<tr>
<td>Task-Oriented</td>
<td>Employability Skills &amp; Work Ethics</td>
</tr>
<tr>
<td>Employees Multitask</td>
<td>Work Ethics</td>
</tr>
<tr>
<td>Cross Training</td>
<td>Blue Print Reading Skills</td>
</tr>
<tr>
<td>Produce More for Less Cost</td>
<td>State-of-the-Art Equipment</td>
</tr>
<tr>
<td>Clutter/Sense of Disorganization</td>
<td>Problem-Solving Skills</td>
</tr>
<tr>
<td>Limited Time for Training</td>
<td>Math Skills</td>
</tr>
<tr>
<td>Limited Awareness of Globalization</td>
<td>Technical Skills</td>
</tr>
<tr>
<td>Shop/Production Area Neglected</td>
<td></td>
</tr>
<tr>
<td>Understanding of Specific Job Skills</td>
<td></td>
</tr>
<tr>
<td>Limited Interaction with Staff</td>
<td></td>
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</table>
Survival was based on each employee’s ability to multi-task to the point where the production and office environments were in a state of disarray. Cross training was the predominant form of training because it was inexpensive and did not take employees away from their duties.

In sharp contrast MT2 was interpreted as being proactive and welcoming globalization issues as an opportunity for growth and expansion. MT2 focused their products for a niche market so their goal was to produce high quality proprietary ball screws for a vast global customer base. Training also took place in global settings and photographs of employees participating in global training sessions were displayed in the production setting. Employees appeared to be comfortable communicating with their trainers and the MT2 leadership. The corporate mission and vision were communicated in several different forms. Additionally, employees were empowered to problem solve and utilize critical thinking skills in both office and production settings.

MT1 and MT2 were similar in their attitudes towards work ethics and employability skills. Both sites were not hesitant to dismiss employees who had high absenteeism and who failed to work up to capacity. Both MT1 and MT2 indicated that they had incentive programs in place for employees who demonstrated quality in their technical skills and who exemplified a strong work ethic (Figure 10). Additionally, both sites had some level of interaction with their staff and were observed taking time to carefully answer questions employees may have had.
Figure 10. MT to MT Comparison
CTE to CTE Comparison

Analysis of CTE settings also resulted in two themes, or modes of operation; 1) Reactive, globalization as an opportunity, and use of resources; and 2) Proactive, globalization as an opportunity, and customer service-driven (Figure 11). While globalization as an opportunity appears in both CTE1 and CTE2 results they are driven by different themes. The reactive site, CTE1, looked for ways to adapt to the global environment by examining local trends in employment. While the auto industry was declining, CTE1 placed more resources into manufacturing and technical programs related to the automotive industry. This was a response to the local employers who served on CTE1 advisory boards. CTE2 used a proactive approach to globalization and still viewed the changing economic structure as an opportunity. CTE2 researched ways to enable students to be competitive globally and utilized CTE2 advisory committees that had experts who were employed in global capacities.

CTE1 was adaptable to the local environment as well as to changes in CTE curriculum as directed by the state of Michigan and Perkins IV. CTE1 utilized advisory committees and hired instructors who could teach industry-specific skills. Data-driven decisions were made through the use of CTE assessments that were analyzed and managed by a designated expert. Students were observed multi-tasking in all CTE1 observations. CTE1a and CTEc stressed the importance of students and faculty to enjoy their work (Figure 11).

CTE2 appeared to have congruency between departments in relationship to trends in globalization. Research in MT trends, academics, and global issues were prevalent at this site. Customer service was highly valued at the CTE2 setting. Students and staff were
Figure 11. CTE to CTE Comparison

CTE1
Adaptability
CTE Assessments
Lack of Focus in Business Program
Lifelong Learning
Financial Management Skills
Trainer in Industry-Specific Attire
Multi-Tasking Skills
Enjoyment of Work

CTE2
Proactive
Data-Driven Decisions/Research
Understanding of Specific Job Skills
Work-Based Learning opportunities
Highly aware of issues pertaining to Globalization
Proactive Approach to Globalization
Research and Comprehension of Globalization Concepts and Current Literature
Trainer & Students Appropriately Attired

Reactive
Globalization as an Opportunity
Use of Resources

Driving Forces of CTE, Impact of NCLB, Unique Qualities of CTE, Highly Qualified Instructors
Articulation with MT
Employability Skills & Work Ethic
Problem-Solving Skills
Critical Thinking Skills
Communication Skills
Technical Skills
Teamwork Skills
Math Skills
Reading for Information
Locating Information Skills
Blue Print Reading Skills

Personable Trainer/Interaction with Trainer
Project-based assignments
Incentive Programs for Work Ethic
Students are self-directed, self-reliant
Students properly attired with safety equipment
Use of Resources
Program areas are neat, organized and well-maintained
State-of-the-Art Equipment
Mission/Vision Communicated at all Levels

Proactive
Globalization as an Opportunity
Customer-Service Driven

Customer Service Skills Highly Valued
Post-Secondary Articulation
approachable and engaged people in appropriate interaction. Students in the CTE2b and CTE2c observations asked the instructor for clarification and understanding. Both CTE2b and CTE2c were properly attired in industry standard dress. Work-based learning and post-secondary opportunities were also present (Figure 11).

CTE1 and CTE2 shared many common elements. State and federally-led curriculum initiatives and best practices seminars may contribute to this intersection. Both CTE1 and CTE2 demonstrated articulation with MT particularly in areas that addressed employability skills and work ethic. Collectively, CTE 1 and CTE2 emphasized the following skills needed in MT settings 1) Problem-solving, 2) Critical thinking, 3) Communication, 4) Technical, 5) Teamwork, 6) Math, 7) Reading for information, 8) Locating information, and 9) Blue print reading. Additionally, both CTE 1 and CTE2 demonstrated a sense of pride in their organizations, and both sites discussed the driving forces of CTE in relationship to globalization, NCLB, unique qualities of CTE, and highly qualified instructors (Figure 11).

MT to CTE Comparison

Similarities and differences between MT and CTE were constructed and analyzed by comparing the following groups: 1) MT leadership with CTE leadership, 2) MT office with CTE office, and 3) MT production with CTE production. The intersection of squares displays areas where both MT and CTE areas were similar. This method assisted the researcher to determine where there was congruence between MT and CTE settings. Findings from interviews, observations, and artifacts were used to construct the MT and CTE Comparison matrix (Figure 12).
MT and CTE were similar in leadership perceptions pertaining to articulation with MT/CTE settings. Articulation included the presence of similar skill sets through
leadership responses. The skills included: 1) Critical thinking, 2) Customer service, 3) Employability, 4) Problem-solving, 5) Communication, 6) Attention to corporate details, 7) Financial management, and 8) Technical skills (Figure 19). Employability and technical skills were emphasized in both MT and CTE leadership.

Comparison between MT office and CTE office results indicate congruency in the following areas: 1) Math and financial management skills, 2) Computer skills, 3) Technical skills, and 4) Incentive programs for work ethic (Figure 19). Similarly, MT and CTE production areas showed similarities in: 1) State-of-the-art equipment, 2) Employability skills and work ethic, 3) Problem-solving skills, 4) Math skills, 5) Technical skills, and 6) Blue print reading skills (Figure 19). In both office and production areas math and technical skill areas are prevalent. Both office settings have incentive programs to promote work ethic. Similarly, the importance of employability skills and work ethic were present in both MT and CTE production areas.

*Elements for Success*

Analysis of the total subjects \( N = 12 \) revealed that there were several areas of congruence in each stage of comparison. Overall results from each of the groups \( n=3 \) derived from both MT and CTE settings were then filtered once again to discover specific elements for success that were common between leadership, office, and production. These findings show areas that are specific to each group as well as elements that are visible in the intersection (Figure 13). The primary elements for success were determined by the intersection of all three groups. These were: 1) Technical skills, 2) Employability
Figure 13. Elements for Success in a Global Environment Venn Diagram
skills and work ethic, 3) Incentive programs for work ethic, 4) Problem-solving skills, 5) Math skills, 6) Computer skills, and 7) State-of-the-art equipment.

Secondary elements were those areas of congruency for each group as a whole. Leadership congruency, as determined between two or more subjects, was evident in: 1) Articulation with MT/CTE, 2) Proactive approach to globalization, 3) Critical thinking skills, 4) Communication skills, and 5) Attention to corporate details and financial management skills. Financial management skills were the only element for success that was present in all \((n=4)\) office observations in addition to the aforementioned primary elements for success. Likewise, all production observations \((n=4)\) were found to have blueprint reading skills as imperative secondary elements for success (Figure 13).

Summary

Chapter 4 results found there were two distinctly separate themes, or modes of operation, for each MT and CTE site. MT1 was observed as being reactive, perceiving globalization as a threat, and producing more for less cost. MT2 was proactive, perceived globalization as an opportunity, and seemed to promote quality and efficiency. CTE1, like MT1 was reactive, but seemed to view globalization as an opportunity. CTE1 promoted their use of resources. CTE2, like MT2, was proactive. As with MT2 and CTE1, CTE2 viewed globalization as an opportunity, and promoted a customer-service driven culture. All 4 sites promoted the importance of employees to be able to demonstrate technical, math, and computer skills. Employability skills and work ethics were also important elements for success in each of the sites.
CHAPTER V

DISCUSSION

Overview of the Significance and Findings

This study indicates that there is some degree of articulation between MT and CTE settings pertaining to the primary and secondary elements for success that were discussed in the previous chapter. Collectively, all subjects ($N=12$) revealed the overarching importance of work ethic and employability skills. These "soft skills" are integrated into the curriculum in the CTE settings and both MT and CTE settings offered incentive programs to reward work ethic. MT sites were clear in the necessity to eliminate people who were not working up to standards including lack of consistent attendance and a poor attitude towards work and colleagues. Both CTE leaders indicated that schools were unique from MT settings because they were not permitted to "fire" students. CTE settings were required to work with all students to help them achieve success at the prescribed standards. Time is certainly a factor when adding more opportunities to incorporate employability skills lessons. CTE2 indicated that work ethic and employability skills training were perhaps more important than technical skills training. Both MT leaders indicated similar notions and while technical skills were valued, they could be taught to employees who exhibited work ethic behaviors.

To reiterate, the purpose of this project was to find solutions for preparing educators and students to operate in a global environment. While the study did uncover curriculum development, training practices, and implementation of two modes of operation for both the MT and CTE sites, it did not clearly establish any solutions. Rather, this work may contribute to the larger body of research in order to assist
academicians and educational practitioners to discover and uncover feasible ways to help prepare students for a global economy.

More specifically, this study attempted to find answers to the following questions:

1) What are some key issues relating to curriculum development, training, and implementation for Michigan's Career and Technical Education (CTE) system in both school-based and business-based settings? 2) How are curriculum models developed through professional learning communities? 3) To what extent was there articulation between Michigan schools' and employers' needs within a global context?, and 4) Are Michigan CTE centers effectively preparing students to work within a global environment?

Curriculum Development, Training, and Implementation

Curriculum Models Developed Through Professional Learning Communities

The researcher set out to discover how curriculum models were developed through professional learning communities (PLCs). This is a concept that is typically applied to school settings but in the case of this study PLCs relate to ways organizations sustain in a global context through effective use of human resources. MT1 utilized PLCs through cross training. Employees who were identified as highly skilled were expected to assist others in learning how to operate new equipment or work with newer software. The highly skilled employees, in a sense, became pseudo supervisors. This was determined to be a very limiting option for MT1. A constant quest to increase the level of production and accept any type of order dominated this environment.

In contrast, MT2 applied various training and teaching constructs. Employees specialized in equipment and they were cross trained in a few areas. Visual images were
placed around the site to communicate training on and off site as well as training and teams who were working in other locations around the world. The PLC for MT2 had a prevalent global theme throughout the organization. Quality was the overarching corporate goal and all employees appeared to be engaged in this pursuit.

CTE1 indicated that there was a level of problem-solving and collaboration among the staff. The availability and use of state-of-the-art equipment and facilities were apparent. An overall sense of working in a global context and preparing students to be successful in that environment was found at the leadership level but seemed to be absent at the classroom level. PLCs in relationship to MT needs seemed to be fractured and isolated to each specific instructional area.

CTE2 demonstrated a common understanding of globalization and the importance of customer service skills. These ideals seemed to be communicated at all levels. Additionally, CTE2a indicated that awareness of global issues was created through literature reviews at both middle and upper leadership levels continuing up to the Office of the Superintendent and the ISD Administration Team. Articulation between CTE and MT was created through the use of program specific advisory committees as a specialized MT advisory board that held frequent meetings and looked for ways to create opportunities for students locally and globally. The uses of PLCs were very similar between MT2 and CTE2. As noted in the previous chapter, this may be correlated with the location of both sites.

Articulation between Michigan CTE and MT within a Global Context

Articulation between CTE and MT was present in this study. All subjects (N=12) indicated that employability skills were imperative for survival and success. Additionally,
technical, math and computer skills were indicated to be important elements for success in a global context. Both MT and CTE sites were shown to have a strong correlation in those areas in terms of perceptions and demonstration of those skills. Student in CTE settings were exposed to state-of-the-art equipment and seemed to be able to attain basic to intermediate technical skills necessary for operating the equipment. Both MT sites indicated that CTE students were prepared appropriately for entry-level jobs. However, MT1 and MT2 interviews concluded that employees who had CTE training prior to employment may not necessarily exhibit employability skills and work ethic to the level that was desired by MT employers.

Math skills were stressed as elements for success in the MT settings. All CTE subjects \( n=6 \), either via interview or observation, included math skills as elements for success. MT2 indicated that entry-level employees did not have adequate math skills. In MT settings math skills are essential in blue print reading, CAD/CAM design, and CNC milling processes. Employees who work in office settings need to be able to accurately account for business transactions. Additionally, some financial forecasting may also be utilized in office-related jobs. CTE could better prepare students by increasing the depth of understanding of mathematical concepts.

Communication skills were valued among MT and CTE subjects. In the MT2, CTE1, and CTE2 employees used effective communication skills to check for understanding on a frequent basis. MT1 subjects communicated with their employees on a limited basis when comparing all three groups. Production leadership, MT1b, had little to no communication with employees. However, MT1a and MT1c did demonstrate limited to frequent communication with employees.
Critical thinking and problem-solving were identified as elements for success. All subjects \((N=12)\) noted that problem-solving was evident and necessary. Critical and creative thinking were congruent only between leadership subjects \((n=4)\). MT1 indicated that critical thinking skills were only important for the management team.

Collaborative teamwork and an understanding of globalization in conjunction with employability skills, work ethic, communication and math skills were determined to be elements for success. Additionally, reading for information, locating information, customer service skills, and the ability to operate industry standard equipment and computer programs were determined to be other elements of importance among both MT and CTE sites. These aforementioned skills may be able to prepare students to work in a global environment.

Findings and Research Studies

An in-depth understanding of the relationship between CTE and MT has provided insight into the different ways Michigan-based businesses are combating dynamic changes in a global economy. In reference to successful trends in business and industry, it is crucial to be able to understand, or at least identify, how successful international/multinational companies train employees to interface in a global economy. For several decades, Michigan has developed and thrived on businesses that are founded in manufacturing. With the growing presence of globalization, many Michigan-based businesses are shutting down (Altman, 2006; Walsh, 2007).

New initiatives have been created in Michigan that focus on education and training in technology (Chalofsky, 2003; Cherry, 2004; Fortune, Shifflett & Sibley, 2006; Dangar, 1997; Michigan Center for Career and Technical Education, 2007; Petrova &
Claxon, 2005). While these ideas may have some validity they may not be delving into the core of the problem. It is also crucial to note that there are existing Michigan-based companies that are continuing to succeed in the global frame. This study provides insights into areas that previous research studies have not addressed. In other words, this study contributes to the research literature about what is known about training workers in companies that operate in a global environment.

Initially, the researcher sought to study MT businesses that operated successfully within a global context. MT2 confirmed the elements for success the researcher speculated would be present in such organizations. MT1 seemed to thrive in spite of its deficiencies. The research uncovered two distinct types of successful MT companies. MT2 operated proactively and embraced globalization while MT1 existed at the opposite end of the spectrum. Further research may conclude that there are more than two distinct types of MT business practices or it may confirm that both proactive and reactive approaches are functionally effective (Figure 14). In both cases, effective employees were the driving force for success in a global context. Workers need to be trained to be adaptable, exhibit employability skills, work ethic, problem-solving abilities and be able to effectively communicate with others. This researcher speculates that the more proactive companies, like MT2, are more likely to continue sustained growth over time.
Figure 14. Distinct Types of MT Businesses

Limitations of the Study

This study was conducted using a small population. Two types of MT ( Reactive: Globalization as a threat, produce more for less cost and; Proactive: Globalization as an opportunity, quality and efficiency) and two types of CTE ( Reactive: Globalization as an opportunity, use of resources and; Proactive: Globalization as an opportunity, customer-service driven) modes of operation were discovered (Figure 15). The study did not conclusively find that these were due to number of subjects or if these phenomena could be repeated in another study. Additionally, this study was limited to a specific geographic location. Phenomena pertaining to this study may or may not be specific to MT and CTE, or other locations.
The observations were limited to time frames that fit into each subjects’ availability. MT2a made references to training that took place at locations around the world as well as specialized training that was facilitated by an outside agency. These activities were not observed. Also, due to the nature of the study and the demands that were placed on each subject in their natural settings, the luxury of multiple visits and the ability to observe various training practices were not permitted.

Interviews, observations, and artifacts helped to create a well-balanced picture of MT and CTE settings pertaining to globalization and elements of success. Comparing three diverse methods of qualitative data collection was problematic at times. The researcher was able to extract insight from all three methods, however comparative analysis would have been more easily conducted if all subjects were interviewed using the same semi-structured open-ended interview questions.
Recommendations for Further Research

Further research may entail repeating this study with other MT and CTE sites to determine if there is congruency between the sites in this study and other sites. The number of sites could be expanded to include a greater number of MT and CTE sites. This type of research could be conducted within the area of this study or it could be conducted in other geographic areas in Michigan or states that have sustained growth in MT areas.

The elements for success that were determined through this research could be used to create a quantitative tool such as a survey. Elements for success could be measured in terms of importance by MT leadership, office and production settings. Further instruments could be developed to establish correlations between and among each of those groups. Further studies using these quantitative instruments could be used for either strictly quantitative or mixed methods studies. A third recommendation for further research would examine the level to which these elements are addressed in the new CTE curriculum standards. Additionally, it would be interesting to see if those new standards will assist students in becoming successful in a global context.

Implications for Applied Settings

There are underlying clues educators can extract from successful business practices in order to bridge the gaps between CTE completers and entry-level employees that meet the needs of employers. Moreover, schools could take cues from MT in order to adapt the corporate/business approach to professional development in CTE business courses as well as other frames of study. The CTE professional needs to be able to analyze and disseminate a vast array of information. Content areas and specializations are
always changing because technology is constantly advancing. Exhibiting adaptive
customer service skills, having the ability to problem-solve, as well as the ability to use
higher-order thinking skills to predict industry trends and learn in non-traditional
academic areas are crucial (Association for Career and Technical Education, 2005). This
project focused on a sample of the business professional population which has clear
insights into the skills that are required for daily operations which career and technical
education curriculum should address.
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APPENDIX A
Interview Questions

Interview Questions for Contextual Learning for a Global Economy

Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Student Investigator: Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be asked to respond as candidly and accurately to the following questions.

1) How do you view globalization as impacting your organization?

2) To what extent has your organization changed focus as a result of globalization trends?

3) Does your organization have a coherent strategy to address or understand career and technical education/employee training in a global context?

4) Discuss your corporate philosophy, or big picture frameworks, of successful operations as they relate to career and technical centers/manufacturing technology business organizations in a globalization context?

5) In your opinion, what are some unique qualities that set your organization apart from others?

6) What are some of the elements for success (ES) that your students/employees should possess in order to be prepared for the workforce?

7) What skills and abilities do an effective an efficient employee exhibit?
8) To what extent are these skills utilized within a manufacturing/technology setting?

9) To what extent is problem-solving (PS) utilized in daily operations of your school/business? If so, how?

10) To what extent are your students/employees trained to problem-solve (PS)?

11) To what extent are higher-order thinking (HT) skills utilized in daily operations of your school/business? If so, how?

12) To what extent are your students/employees trained to use higher-order thinking skills (HT)?

13) To what extent are customer services skills utilized in daily operations of your school/business? If so, how?

14) How are you students/employees trained to use customer service (CS) skills?

15) What other areas (ES) do you feel are crucial in regards to student/employee training?

16) In your opinion, are career and technical centers providing adequate training for the future workforce?

17) In regards to your organization, what are the strengths in training students/employees for a global economy?

18) In regards to your student/employee training prior to attending/working at your organization, what are the strengths in training employees/students for a global economy?

19) In regards to your organization, what are the areas that require improvement in training students/employees for a global economy?

20) To the best of your knowledge, what are the differences and similarities between career and technical centers and manufacturing technology business organizational settings?
APPENDIX B
Interview Consent Form

Consent Form for Career and Technical Centers and Manufacturing Technology Business Organizations Participants

Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Doctoral Candidate Investigator: Jennifer L. Harrison

I am invited to participate in Jennifer Harrison's dissertation research project entitled "Contextual Learning for a Global Economy". This research is intended to study the opinions of individuals who oversee professional development and training in Career and Technical (CTE) school-based and business-based environments.

I will be asked to participate in at least one (but no more than two) thirty to forty-minute interview(s) pertaining to employees training processes and insights related to the operation of the company where I am employed. My responses will be recorded on a digital recording device and later transcribed. As in all research, there may be unforeseen risks to the participant(s). My participation in this study will enable me to gain insight into area related to contextual learning for a global economic areas.

All of the information collected from me is confidential. This means that my name will not appear on any papers on which this information is recorded. The transcripts and forms will all be coded; the student investigator will keep a separate master list with the names of participants and corresponding code numbers. Once the data are collected and analyzed, the master list will be stored in a secured location for up to five years. All other forms and documentation will be retained for the duration of the project, in a locked metal container located in the investigator's home office. Once the project is completed, all data will be stored in a secured location for up to five years.

I may refuse to answer a question or to participate, and I may quit at any time during the study. I may contact Richard Zinser (269) 387-3007, or Jennifer Harrison (231) 592-9608.

This project has been registered as a dissertation project with the Human Subjects Institutional Review Board.

My signature indicates that I have read and/or had explained to me the purpose and requirements of the study and agree to participate.

________________________________________  ____________________
Signature                                      Date

Consent obtained by: ___________________________________________  ____________________
Researcher's Initials                                      Date
APPENDIX C
Observation Consent Form

Consent Form for Contextual Learning for a Global Economy Participants
Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Doctoral Candidate Investigator: Jennifer L. Harrison

I am invited to participate in Jennifer Harrison’s dissertation research project entitled “Contextual Learning for a Global Economy”. This research is intended to study the opinions of individuals who oversee professional development and training in career and technical education (CTE) and business-based environments.

I will be asked to participate in at least one (but no more than two) forty-five to eighty minute observation(s). These will take place within a typical work location that is designated for company training. My responses and activities will be recorded by the researcher who will take field notes on paper or a laptop device. As in all research, there may be unforeseen risks to the participant(s). I may experience mild discomfort from being observed. My participation in this study will enable me to gain insight into areas related to contextual learning for a global economic areas.

All of the information collected from me is confidential. This means that my name will not appear on any papers on which this information is recorded. The transcripts and forms will all be coded; the student investigator will keep a separate master list with the names of participants and corresponding code numbers. Once the data are collected and analyzed, the master list will be stored in a secured location for up to five years. All other forms and documentation will be retained for the duration of the project, in a locked metal container located in the investigator’s home office. Once the project is completed, all data will be stored in a secured location for up to five years.

I may refuse to answer a question or to participate, and I may quit at any time during the study, I may contact Richard Zinser (269) 387-3007, or Jennifer Harrison (231) 592-9608.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right hand corner. Do not participate in this study if the stamped date is older than one year.

My signature indicates that I have read and/or had explained to me the purpose and requirements of the study and agree to participate.

____________________________  __________________________
Signature                  Date

Consent obtained by: __________________________
APPENDIX D
Observation Format

Researcher Observation Questions for Contextual Learning for a Global Economy

Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Student Investigator: Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date:
Starting Time:
Ending Time:

Describe the setting.

Describe the impressions of the trainer.

Number of students/employees present.

Describe the activity that is taking place.

What is the objective of the training session?

How do the participants respond to the trainer?

Are the participants engaged in the training session?

Are employees/students trained in problem-solving (PS)? If so, how?

Are employees/students trained in higher-order thinking (HT)? If so, how?

Are employees/students trained in customer service (CS)? If so, how?

What other elements for success (ES) appear to be present in the training session?

Does the training session incorporate aspects of globalization or economics? If so, how?
Interview Questions for Contextual Learning for a Global Economy

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be asked to respond as candidly and accurately to the following questions.

1) How do you view globalization as impacting your organization?

I think it’s hurting us because a lot of jobs have been lost. In the last ten years, two of my jobs are gone; they just really can’t compete. And with me, I’ve got to do it quicker, faster, cheaper or else I’m going to be the next guy in trouble. I think it’s hurt a lot. That free-trade thing they did; when they did that and I’ve got to compete against Mexico who pays $1.00 an hour or China who pays $2-3 an hour now and that definitely has hurt things.

All my competitors they can get somebody to build that, one [unintelligible] I’m talking about if they can get [unintelligible] That’s what has helped me. Yeah, the over seas stuff hasn’t helped my industry at all, but, what do you do, I have to deal with it or I’ll be the next guy out.

2) To what extent has your organization changed focus as a result of globalization trends?

Well, [unintelligible]...Like I say, that mold ten years ago went for twice that amount [unintelligible], now the steel price is about four times higher than it was ten years ago. You know, fuel...all my expenses are higher and I’m getting half for that mold today than what I did ten years ago. That’s [unintelligible] That’s what you gotta do to survive.

3) Does your organization have a coherent strategy to address or understand career and technical education/employee training in a global context?

I got half a dozen [omitted], And we sent [omitted]. When I hire, I look at an application, if I’m hiring a kid out of vocational he’s got a big jump on somebody who has no experience because he knows how to run the bridgeport and lathes maybe not CNC’s but he knows the machining aspect.

4) Discuss your corporate philosophy, or big picture frameworks, of successful operations as they relate to career and technical centers/manufacturing technology business organizations in a globalization context?

I know the prices are going to go up on the steel more. All my costs are going up, so, I just gotta try to...when we design this tool, [unintelligible] I know what that goes for in a couple of years is going to be less than what it’s going for right now, so
5) In your opinion, what are some unique qualities that set your organization apart from others? Our biggest thing is price and delivery. So, by doing that, if I can run and that’s what we try to do. Just [And you’re growing, aren’t you?] [unintelligible] and [unintelligible].

6) What are some of the elements for success (ES) that your students/employees should possess in order to be prepared for the workforce? You get somebody in here that don’t look at the parameters and they punch in the wrong number or something and you have to scratch the part out or you have to [unintelligible]. Just some people just ain’t CNC, some people ain’t good at working with numbers, but it just ain’t never going to be a CNC person. But a floor person out there with the polish and the molds and all that stuff. [How do you determine that?] I’ve hired a couple of young kids here a while ago and we put one of them on the floor and one on the CNC’s. The do they pay attention? What can they do? If I’ve had 20 year machinists I’ve hired and they’ll spend an hour and a half-two hours doing that. It just makes sense.

7) What skills and abilities do an effective an efficient employee exhibit? The [unintelligible], if I’ve probably got 10 guys that can pretty much do anything out there. The
they can do is run CNC or if all they do is floor work when they get slow, I can’t move
them somewhere’s else. But if a floor [unintelligible], the floor’s a little slow right
now and the CNC is real busy so [unintelligible], I can’t pull... there’s some guys that
and they’re just never going to be a CNC guy, so

8) To what extent are these skills utilized within a manufacturing/technology
setting? Utilize them. The better value that runs CNC and the better you
[unintelligible]. I’ve got [omitted] back in the design room, back
in the tool [unintelligible] I’ll put him out there and
[unintelligible] The average person that I’ve found
you give them three and it usually keeps them busy. The
That’s the guys... the ones that brought the
That’s kind of what I do there. But what it did is... it might be one of my best
guys... [unintelligible] was one of my best guys, but
so then [unintelligible], but then I’m losing some of my best
people out there, so then I got to put maybe a couple of people on to do the job that this
one did, but I need somebody in the office that’s really good, too. Same thing in the
office, [omitted] will do

So, if I pull him out of there, then I’m putting two or three guys in there, so I’m losing somewhere either I’m losing on
the machines because he’s really good at it or I’m losing on there so I just gotta... but if I
don’t have a good tool press guy then you have problems with the programs then there’s
problems on the floor there’s problems all the way through. I
[omitted] one of them kind of

He [unintelligible] and [unintelligible]. I’ve had people in here, if they
make a mistake, they just won’t even tell you. You get ready to put the job together and
you see this is wrong and you gotta fix the [unintelligible] and that’s the kind

9) To what extent is problem-solving (PS) utilized in daily operations of your
school/business? If so, how? Well, it’s used right from [name omitted] or [omitted]
doing the designing.

O.K. this is a problem area. How do we gotta
So, the
[omitted] and then it goes to the... [omitted] does the tool pass and then he will look at the tool pass and
and it goes from there to the
CNC people.

...[omitted] will be cutting something you know
he’ll be cutting something and they’ll be like, geez, this
so then they’ll go and say, “[omitted], hey,
” So the

? And then when
it gets to the
When they’re
Find that
[There's quality control all the way through.] Yeah, we'll give the print to the operator, they may cut the shut off on this and that's where the core shuts off and we'll give them the number and they...

10) To what extent are your students/employees trained to problem-solve (PS)? [skipped question]
11) To what extent are higher-order thinking (HT) skills utilized in daily operations of your school/business? If so, how? [with explanation] What I do is every morning, I call, my one son's a partner and, [omitted], the other one's just under him and then I got a lead guy in Florida, every morning we go down and here's some jobs that we have to do, so every morning we go down and say... And,..., too. [unintelligible] So, we'll get together and say... And then we'll... And what I have is, every morning we print this out. This is just the new stuff I got in here right now. And then we have new tools that we're working on. And this sheet are our repair jobs; stuff that's been in for something broke or something's wore down. So, we... when we quote [loud scraping; unintelligible] Here's a sample of a quote. They'll send a picture of the part and they tell us they want a one and two cavity injection mold in each of these. And, on the quoting me and my two sons sit down and go, O.K., where are we at on this? Whether we think it would be... And then we'll just say, O.K., you were thinking this much, you were thinking this, O.K., why are you more? Where do we need to be to get this job? We try to get every job we can, but when you're competing against China and some of this stuff, at some point, you just got to say, hey, there's no sense in working for nothing. We... And, the majority of how this place gets run is when me and my two boys get down here and... And, down the road, my boys are 23 and 26 or 24 and 27, down the road, when I want to get out of here someday...they're running it right now, so the employees don't have to worry about, O.K., when [omitted] retires then what's going to happen. I have a friend of mine that owns a shop in [omitted], he's 70 years old. No boys, nobody working there. So, what's his employees going to think? It used to be a 25 guy shop and now he's down to, I think, two-three guys in the tool room and they can see the writing on the wall that someday he's not going to be there and then what? But,... [There's that continuity, too, when it's your family.] Yeah. My boys are... and I ain't just saying that because they're my boys, they're two of my... They... up in [omitted]. There's not a job that they didn't... They didn't get hired in where they're at, they... I think if you asked [omitted] the front manager and I think you could ask anybody out... you could call every
employee in, “Does anybody want [omitted] job?” [He did go to the Career Center.] Yeah, [omitted] and [omitted]; both of them went there.

That ain’t every time. I’ve had kids in here that and, I hate to say it, but don’t want to work either. They want the money, but they don’t want to work. The perfect example is I got, I had one kid in here that had a couple of years of Machine Trades. I hired him and two other ones that had no experience at the same time. We slowed up a little bit and the one with Machine Trades was out of here. Not because the Machine Trades is a bad thing, usually it’s good, but this particular kid missed a lot of time, you know, he just didn’t want to work. But then, hey, [omitted] went through there, [omitted] went through there, [omitted] went through there, [omitted] went through there; a lot of the guys. So, it’s

12) To what extent are your students/employees trained to use higher-order thinking skills (HT)? You could train them to use... [omitted] I got a couple guys that oversee them. They say, “Hey, did you check this dimension? Is this block set up right?” So I can’t just turn them all loose. Some of them I can, but, if I turn everybody loose we’re going to have a lot more mistakes, so I’ve got [omitted] when [omitted] does a tool print he’ll send a program up to them, they’ve got to write on that program what speed and feed they run to what RPM’s and initial it, so that, if we do have an issue we can go back and track and say, hey, you put the wrong [unintelligible] in. Here’s your sheet where you did it, how you gonna prevent that from happening again? It’d be nice if all employees, you could just send them out there, but that’s not the case. [You do training for higher order thinking skills? You mentioned problem solving.] Yeah, our [omitted] and the kids come in here and I go, hey, what issues did we have yesterday? What went good? What didn’t? You know, we get jobs that come in here and, boy, that job went...everything went good on it. And then we’ve had jobs in here and we go, what the hell...something as simple as a guy putting the wrong [unintelligible] in. We get that now and then. You put too big a [unintelligible] in there and then they’re wobbling and they’re making a new [unintelligible] and that makes a lot of work. I’d say, basically, when [omitted] and [omitted]. [omitted] then I get a couple of the lead guys in and then we add Darrin and what can we do to better on the next job. There’s [omitted]. You can always cut and glow faster, save a little money.

13) To what extent are customer services skills utilized in daily operations of your school/business? If so, how? [omitted] not only do them. And [omitted]. I got a customer in Indiana. They’re four hours away from me.
want it fixed, they’ll call me. It takes four hours to get down there, four hours to get back, then we run... So we get it in and... on a daily basis I send a truck to... two of my bigger customers are in [omitted], and I send a truck there every day and they stop in and pick up stuff to repair and yesterday I think he brought six or eight [unintelligible] in yesterday just for repair stuff. And most of them don’t touch the CNC [unintelligible]... the pins or bushings are wore out or whatever.

So...

14) How are your students/employees trained to use customer service (CS) skills? You know it’s just kind of [unintelligible]. The guy that’s repaired a tool [unintelligible] guys that [unintelligible] and he’ll [unintelligible]. So we, basically, just take the better guys and give the work to them and they divide it... and I don’t want to say better or not better employees. The [unintelligible]. If I had all top people here, I’d be out of business. I can’t afford to pay everybody top pay here. And some people are never going to be top pay because they just ain’t qualified for that, you know?

15) What other areas (ES) do you feel are crucial in regards to student/employee training? Pretty much [unintelligible]. I mean, we have room for improvement in every area we got. If [omitted] designs this [unintelligible] he designs it he’d probably do it in four hours. Well, if he can [unintelligible], then I can give my customer a better price or I could make it a little bit better on the tool. So [unintelligible]... any place we can save like this is gonna save us money. So, I’d say, from the [unintelligible].

16) In your opinion, are career and technical centers providing adequate training for the future workforce? [unintelligible]. I’ve got kids out of the [City omitted] and the [City omitted] ones that have worked really well. And, like I say, [unintelligible]. You’ve got some kids that are gonna take that class and say, well, geez, maybe it’ll be an easy class. So, I’ve [unintelligible]. But, no, I think the vocational... I’ve been in both of them. I’ve been up to [City omitted] and I’ve been in [City omitted] and I think they’re doing real good. And I’ll ask the teacher, I’ll say, hey, hey... and I know both the teachers [omitted] being one of them, and I’ll say, hey, do you got anybody available or who do you got? And [unintelligible]. Oh, yeah, this kid he’s really good but he’s working over here. This kid is going to college. This kid here, he’s really good. And I’ve got this other kid here, he’s got some issues. He has trouble making it to school. I had one kid I hired awhile ago out of the [City omitted] one and [omitted] said, “We’ve had some issues with him, but he’s kind of come up from a hard life, but the kid could use a break.” So I hired him and tried him for awhile and when we slowed up I laid him off. He just... I [unintelligible]. I had a talk with him.
Some of the guys I’ve hired, some of my lead guys out here I hired, they didn’t know anything and they come from a bad background. I always give the kid a break. When I hear that...my lead guy on second shift grew up with nothing, had nothing, had a rough childhood. He’s my lead man on second shift. He’s one of my highest paid guys. He just does a good job. Did you see the little skinny guy out in design? [Yeah] He’s disabled. He’s got muscular dystrophy. When he was born his muscles never grew. And, he [unintelligible] weighs about 90 lbs. and his dad’s a friend of mine. And I talked to him a couple of years ago and he said, “I don’t know what [omitted] going to do. I mean he can’t...he has trouble opening up a pop bottle.” You know, I mean, and I know there’s been times I’ve been back there and he can’t get it open and he won’t ask anybody and I’ll go back and I’ll sit and I’ll unloosen it for him. But his dad told me he said he’s got two year’s of training and nobody will hire him. He’s been to a lot of places and he walks in and they can see. He has trouble walking. I mean he can walk, but he’s just disabled and he may never be able to work 40 hours, but I wanted to give the kid a try, give him a break and he’s a [And he’s got that work ethic that we were talking about.] Yeah, he’s a good kid. He just got dealt a bad hand. He never walked until he was like three years old, he couldn’t hold his head...he just has no muscle, but you get him on the computer and he’s awesome. He’s doing really good.

17) In regards to your organization, what are the strengths in training students/employees for a global economy? As far as what they’re doing in here? I just...you, hopefully, if you...you, hopefully, I mean, I just...he...he...he. And I’ve hired guys that have been CNC machinists for 20 years and you give them one and they’re buried. I had a guy here that worked here a while and he told me one day, “You know where I used to work at we only had to run one machine and we could pull the stool up next to the machine.” I go, “How
come you ain't there?” “Well, they went out of business.” O.K. I said, “Where did you work before that?” “Well, I worked at another place.” “How many machines did you run?” “One.” “Could you sit on a stool?” “Oh, yeah, you could sit on a stool.” “Where are they?” “Oh, they went out of business.” I said, “Where’d you work before that?” “Well, I worked at another place. We couldn’t sit on a stool, but we only had to run one machine.” I said, “O.K. And where are they?” The guy was from [City omitted] and he said, “Well, they’re out of business, too.” And I said, “Well, you’re going to be out of business. You’re more than capable; you gave them an inch they’re going to run a mile with it. Some [unintelligible] that wouldn’t want to, but there’s some [unintelligible] that you give them an inch they’re going to run a mile with it. Some [unintelligible], you know. And we’ve [unintelligible]. And the same thing, if you’re sitting there watching one machine, you’re going to be pretty bored. And when you’re running more than one you’re going from machine to machine staying busy and the time goes a lot better. My wages are all up, of course. The steel is about four times as much. What was gas or diesel 11 years ago? It’s probably doubled; it’s doubled. Everything has gone up, but because we’ve gotta compete with China and everybody we gotta keep our rate down. That’s part of the reason why I’ve competed. I had a competitor in [unintelligible] that [omitted] and [omitted]. I’ve [unintelligible]. And some of them I got before he went out of business and [unintelligible]. I bumped into him up to one of my customers one day and he said, “You built them two drill bits; you built them two tools?” I said, “Yeah.” He said, “Can I ask how much you got for that?” I go, “Sure. I got $90,000 a piece.” He says, “They’re gonna let you work for nothing until you go out of business.” He says, “I built, five years ago, I built the replacements for that. I got $150,000 a piece. Ten years ago [unintelligible] built replacement. They got $200,000 a piece. They’re going to let you work for nothing until you go broke.” I said, “[omitted], I hope I’m working for nothing for a lot of years. And, I checked with them and I said, “Can I ask what the original… these two tools… the two went for five years ago and the two went for ten years ago?” And he said, “Yeah.” I didn’t give him the numbers that [omitted] had given me and he said, “Yeah, [unintelligible] built
the two for $200 each and [unintelligible] built the other two for $150 each.”

[unintelligible] is out of business today. [unintelligible] is out of business today, and
So, if I’d had that attitude that ‘to hell with it I’m going to get
$150 or else I ain’t going to do it’ then I would be in trouble. I’m hoping that the prices
are down for the bottom right now and something else we are seeing in plastic,
especially, China really went after the plastic molds and when they first started out they
were like a third the price of what a mold was here. And from what we’ve seen, I quoted
two awhile ago, we were $56,000 on a plastic mold. China, by the time they built it and
got it over here they were $50,000 end production. So, they’re getting real close. On
plastic we do more prototypes because they need them quicker and they just can’t make
the delivery, so we typically do the prototypes and then they still build…and we do some
of the production. The prices are getting close enough to [unintelligible] some of the
productions, but

as their wage goes up to $3/hr. which ain’t much, but as it goes to $4 and $5 and by the
time they ship it and stuff. The software, like I told you, I paid $46,000 for two
[unintelligible], when my one customer moved to Mexico, and they’re in southern
Mexico, they said, “Terry, would you go down there and start a shop?” And I go, “I
really don’t have any interest in that.” I said, “I have enough headache in [City omitted]
let alone without being in southern Mexico.” And they said, “Well, can we fly you down
and just show you the shop?” So I went down there and you know what I told them? I
said, “I’ve got enough [unintelligible] up here, I’ve got enough headache up here, but if
you want me to start a shop down there and you guys front me the money. You guys buy
the machinery, you guys put the money up, I’ll send somebody down and I’ll help them
learn to run it or I’ll do whatever to help you.” They

They’re looking for somebody that

A new tool, five
days ain’t that big a deal, usually, but on a repair job it is and they didn’t want to put any
money up. I said, hey, I’d like to help you, but I’m not risking what I have up here for
something 3000 miles apart where they don’t even speak
English. [That makes sense. Two more questions…]

18) In regards to your student/employee training prior to attending/working at your
organization, what are the strengths in training employees/students for a global economy?
[skipped question]

19) In regards to your organization, what are the areas that require improvement in
training students/employees for a global economy? I think
are real well. It’s just that some of the people you hire, it’s just hard to get it through
their head that if they make a mistake how much that costs us. Last year, not last year,
but the year before last, in overtime just in overtime pay and when I’m talking overtime
I’m not talking time and a half after 40 hours I’m just talking at half time and on Sunday
pay I’m not talking double time I’m just talking like straight time, we spent $750,000.
And, if we had no mistakes out there, I think we could get rid of half of that. But
but there's still mistakes out there and stuff and we just try to limit them and, if they make a mistake, we do a correction sheet and then we put it on their file; you know you did this, this is what you did wrong and now we're seeing it again. Why are we having these same mistakes? And I have some people I end up having to get rid of them because they just keep making mistakes and The ones that hardly make any are the ones that become . The wage for tool and die used to be here and the other factories and stuff used to be here, but now the factories are a lot closer than what it is, so especially starting tool and die and you can't pay anybody much to start. Once they start, I usually They but a person can go to just about any factory and start out at more money than what I can start them at here, but in the long run, You can go up to one of my customers, and, basically, start pulling these parts off and they start off at pretty good money; but it But they can start off at more money, so all the kids are going to go, geez, why do I want to start down to [City omitted] for $2/hr. less when I could start up here for...? But 20 years from now when they’re still making half what they’d be making here now or at another tool and die shop... When I got out of school, I went to work at a factory and I worked there for 7-7 1/2 years. My brother went to work for [unintelligible] Tool. Well, they’ve been closed and reopened and they’re struggling today. In his first four years, I always made more money than him at the factory, but If I was still where I was at I [unintelligible] in seven years. I quit there in ‘83. The person that’s doing my job ain’t making any more money today than what I was making back there in 1983. I was making like $10/hr. back then. So, if I’d stayed there I’d be making like $10/hr. on that particular job. When I quit there, I was driving from [City omitted] to [City omitted]. It’s like 25 miles. I was making $10/hr. I quit there and went to work at a place in [City omitted] at a tool and die shop for $5.50/hr., so I almost took a 50 percent pay cut. And then I went from driving 25 miles, which was far enough, to driving 96 miles one way and my shift was 5 in the afternoon until five in the morning. And I did that for a $5/hr. pay cut.[interruption] So, like I said, my shift was from five in the afternoon until five in the morning. Then I was driving 96 miles; the expressway never went through. I was home eight hours a day, so I had to shower, sleep, get up and head back there. And I did that for two years, but if I would of never did that, I probably would still be at [omitted] making $10/hr. and I don’t know what my kids...[omitted] would have went to school and been a teacher, I know that. I don’t know what [omitted] would have did. I’d like to hope that he’d been down there, but [omitted] was voted the quietest in the class. [omitted] was voted the most outgoing. So, I don’t know what [omitted]...I’m glad I did it. But there’s a couple years there that...and I was there for two years and I [unintelligible] $7.50 and then [unintelligible] in [City omitted] and [unintelligible] $6.50 again and I went from driving 96 miles to driving 20 miles and in but if I wouldn’t made that move I still could be down there making shoes. And I liked working there but it was piece work and the older you get you slow down and you make less money.
20) To the best of your knowledge, what are the differences and similarities between career and technical centers and manufacturing technology business organizational settings? So, you mean, like what they learn and what they do when they come down here? [Yeah] I don’t know what they do in [City omitted]...up there...[loud scraping; unintelligible] this is a [unintelligible]. They do this all on [unintelligible]. They got [unintelligible]. What they teach up there, pretty much [unintelligible] Now they don’t learn...you know [unintelligible]...you know they do a little bit of CNC; they just kind of get their feet wet a little bit, but as far as [unintelligible]...you know [unintelligible]. So, that definitely is a [unintelligible]. You know a kid that starts out knowing nothing and a kid that’s got a couple years up there you know there’s a [unintelligible] that did a good job up there and wants to learn stuff you [unintelligible]. But, the same thing, if you take a kid...[omitted], I hired, oh, he’s been here like 10 years; he’s one of my top wage guys. He started out at minimum wage 10 years ago and there’s another instance...[omitted] only got one leg. A lot of places wouldn’t hire him because he’s only got one leg. He was just born with one leg that never grew. Well, I don’t care. [unintelligible]. I don’t care if he’s only got one leg. He’s a good friend of my sons and that’s how we ended up getting him in here. What comes out of there it’s a big help. Like I say, some of [unintelligible] The [omitted] class actually [omitted] does too, but they didn’t do it this year. Yeah, They still [unintelligible]. I think You know, they couldn’t begin to do something like this from what they learn up there, but [unintelligible]. I’ve hired from both places and [unintelligible] and I’ve had some kids that just don’t show up for work. There’s nothing you can do there.
APPENDIX F
MT2 Interview Transcripts

Interview Questions for Contextual Learning for a Global Economy

Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Student Investigator: Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be asked to respond as candidly and accurately to the following questions.

1) How do you view globalization as impacting your organization?

2) To what extent has your organization changed focus as a result of globalization trends?

   , too, but we haven’t done anything over there yet.

3) Does your organization have a coherent strategy to address or understand career and technical education/employee training in a global context? [Redefined for interviewee]

   . We’re . They realize it and

   . A lot of it goes down to Texas

   All the equipment the ball screws we see coming in here for those

   [When we were on the shop floor you had some pictures on your bulletin board of your employee that was training in Germany and your reps from Mexico and your reps from China.] Yea, I keep

   [Where do you get ISO 9000 training? Who specializes in that?] There’s a number of companies; some of them are flakier than all get out, which is out of Ann Arbor; National Science Foundation or whatever it is I believe is the title. Yeah, we use those guys. I’d have to try to remember his name

   I’ve got it in my computer somewhere. He’s

   . At one time this Johnson Group and some of the others that are out there; they’re there to make a buck. They have
the wrong intentions. You’ve

4) Discuss your corporate philosophy, or big picture frameworks, of successful operations as they relate to career and technical centers/manufacturing technology business organizations in a globalization context?

Over in (unintelligible) that and so forth, off, we. We wrote down the name of the gauge and the company and

If you’re going to survive, you’ve got to have the quality. The Chinese want it cheap. Cheap, cheap, cheap, but also

5) In your opinion, what are some unique qualities that set your organization apart from others?

Let me give you a little bit of history about my background. I worked for [Company omitted] for six years in [City omitted] and I worked for a company called [omitted] which makes your motor homes, mini motor homes, travel trailers, and modular housing. Back at that time when I was working for them each plant was a separate corporation. They, at that time, 

And. The bonus basically

Consequently, the people have to be here two full quarters to be in the program and then they get a half a share for the next two quarters and then they get full shares. And, everybody, basically, has the same amount of money coming.

[Back to lean and mean.]

6) What are some of the elements for success (ES) that your students/employees should possess in order to be prepared for the workforce?

as long as it’s not Basket Weaving 101. My financial officer, I

Some of the guys out here on the floor are going number one, number two, they got to be able to
they’ve got to be motivated. So, basically that’s it, if they don’t want to learn, they don’t want to work, they can go elsewhere.

7) What skills and abilities do an effective and efficient employee exhibit? 

Say that again. [Question repeated] Good question. Number one, to be responsible. Number two, to have a positive attitude. Number three, to be able to work in a team. [Could you define good math skills for me, please?] Anybody who has had to figure out a budget and so forth. If they’re scared of math and they can’t add or subtract or do anything like that, they’re not going to make it here. Just won’t. We have to teach some of these people how to use a calculator even and they won’t go any further than where they are. I have guys here that have no idea how to use a calculator. I’ve got one, two, three; at least three guys that started out that way. They need to know, too. That’s a big help. The old timers, basically, have taught them the ropes. And, if they don’t want to grow, they can’t go any further over at MiTec, that’s a big help, but they have to be good in math otherwise they’re just going to be lost out here. [That’s good to hear.] 

8) To what extent are these skills utilized within a manufacturing/technology setting?

You see everything we did out there – that’s 100 percent. They have to have the skills that they learned, they have to have the motivation, they have to be motivated. If they want to work, they need to be motivated. So everything I said is true. You know, one of the things that people like about here is that there’s not much repetition, so it’s not repetitive at all; it really isn’t.

9) To what extent is problem-solving (PS) utilized in daily operations of your school/business? If so, how?

Basically, just everything that I’ve said. They have to be trained to problem-solve (PS).

10) To what extent are your students/employees trained to problem-solve (PS)? That’s a good question. I saw it on your list here. The best way I can say that is, the thing that I keep telling people is ‘I don’t care how many times you ask a question, I don’t care how many times you ask them. It’s when you don’t ask questions that you’re going to get yourself in trouble. We try to guide them to solve their problems themselves. They have to be able to think, ‘well, hey, we can do this we can’t do that type of thing’. They’ll ask questions to learn. And, like I say, it takes six months minimum at least a year to get up where they’re really proficient and know what they’re doing. Back in thread binding, you’re looking anywhere from six months to a year easily, easily.

11) To what extent are higher-order thinking (HT) skills utilized in daily operations of your school/business? If so, how?

Well, one thing that I do here is try and get the kids related. I’ve got some guys in here that are related. Houseman is and Jim Mead and [omitted] Cook, my chief engineer. Man, if I was to listen to him, we’d be back over on Park Drive in that little hole in the wall and not with the new designs and so forth. You’ve got to
‘what can we do with the equipment that we’ve got where we can make a buck’ because the special products it’s very proprietary with some of those companies. That’s what you got to look for; look at. That’s the best way I have to say when you’re from the higher level. My guys right now have got every machine they’re just saying that ‘we hope you’re right, we hope you’re right’; because that’s a lot of money, but

12) To what extent are your students/employees trained to use higher-order thinking skills (HT)? (see question 14)
13) To what extent are customer services skills utilized in daily operations of your school/business? If so, how?

Oh, boy. That’s everyday. [omitted] on the phone; is the best way I can say it. She’s good. And the... Another thing that I learned a long time ago, and maybe it’s a fault of mine, but. And I’d rather... Whereas, you look at General Motors and that thing was so God darned top heavy that that’s what killed them. Nothing got from the floor to the top; there’s too many layers.

15) What other areas (ES) do you feel are crucial in regards to student/employee training?
I think it goes back to, number one; [omitted] or... The guys on the floor; Bob will... And,
Like I say,
16) In your opinion, are career and technical centers providing adequate training for the future workforce?
I think you have to go back a little bit further. You've in my opinion, of the of the and so forth before they go into the . If they don't have the mathematics ability and so forth then you can't really train them. You know, this is not a business here pushing buttons on a computer screen. These guys got to . You know, we bring people in, or we've tried in the past, to hire them from down state and so forth and they've worked at big shops and they say 'oh, yeah, we can run this machine and we can run that machine' and so forth. No, they can't. The only thing they know is how to press a button. I've got one guy out here right now that we brought in from here in town that was, supposedly, was real knowledgeable on machine. He can't handle five axis machines. We've had to move him to the side. They so forth will come a whole lot easier for them and that's where, I think, a weakness is, you know, having math skills. [O.K.]

17) In regards to your organization, what are the strengths in training students/employees for a global economy?
I'd say be able to is key. Any small company, you gotta You know, it's the big companies that got the problems; it's not the smaller ones. The . You've seen that.

18) In regards to your student/employee training prior to attending/working at your organization, what are the strengths in training employees/students for a global economy? I think it. [The same as the previous?] Yeah.

19) In regards to your organization, what are the areas that require improvement in training students/employees for a global economy?
I'd say . It used to be when some of the old regime was over here at MTec they'd bring the students over so the students could see different applications, different products, but, you know, at the same time, when I worked trade shows and, God knows, I worked enough of them all over the world, ‘Oh, God, it’s student day here. Let’s hide everything because they take stuff and brochures and so forth are expensive.’ That’s not the way to go. But if you bring them in and the kids are in and you can sit down with them and take them through and say ‘O.K. this is what’s going on here and this is what’s going on here’; that . It . Just to bring them in and sit them down at a bridge port and say ‘here, drill holes’. That’s not going to do it. You’ve got to , I think, is probably the best way to do it. Now I've gone into plants and I'll do about a . I'll get guys that have been around for 20-30 years and they'll say ‘oh, that's how that works’. They have no concept of assembly, no concept of alignment, back lash, or whatever and yet here they are trying to
maintain the equipment out there. Shoot, I’ve had some places I’ve been in three-four times over the years training their people. And, you get the young engineers, that’s classic. The smart ones will bring them down and make them go through it in class because they don’t have a concept. All they’ve been in is a classroom. They don’t know how things work, how they should be (unintelligible) appropriately and so forth. I’ve had guys out of Purdue and so forth; they didn’t have a clue what they’re doing. So, you know, I think . And, you know, MTeC;

20) To the best of your knowledge, what are the differences and similarities between career and technical centers and manufacturing technology business organizational settings?

Good question. Let me say it from a small company point of view. A large company, you do the same thing day in day out; you don’t see overall picture; whereas, with a Back awhile ago, and I can’t say what’s going on over here now because I’ve been out of touch since they built the new place, you had kids coming in for working part-time. In And, it’s unfortunate that we can’t do it here. Germany, Lord, the government pays it all for the students everything. (unintelligible) does it because So, I think that’s key really. Co-op’ing to a point, if it’s done right, with work, but, you know, small companies can’t do that. You don’t have the time. You can’t afford it.
Interview Questions for Contextual Learning for a Global Economy

Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Student Investigator: Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be asked to respond as candidly and accurately to the following questions.

1) How do you view globalization as impacting your organization?
   Well, we [... in [City omitted] area, O.K.? And, especially in the but in [City omitted] everything else kind of follows that, although But And, then, likewise, the especially it’s something that we have to do to keep ? , O.K.?
   And, you know you get into other industries or other areas it is certainly evident in those areas, too [... , O.K.? so we are trying to, like I said, just keep...we ? we as well.

2) To what extent has your organization changed focus as a result of globalization trends?
   Well, I’m going to say this right now...this whole center here in some way, shape, or form (and remember this building’s only been open three years, just a little over three years [...] And, you know, when we were running the millage campaign that certainly was a topic that I hit on. In any number of my bazillion, of my presentations! (laughter) It is. [...]

3) Does your organization have a coherent strategy to address or understand career and technical education/employee training in a global context?
   The easy answer would be to say, well, first of all, what’s a coherent strategy, O.K.? In other words, something that people understand (laughter). And, then, I guess that depends on the individual.
Whether that be in one sort or another; Many places have that, O.K.? We also became a here, O.K.? And we’re really tuning that up and we’ll take that on tour once I get enough horses in the barn to take it on tour, O.K.? And what we

One of the things that we don’t do well in our license, if you will, our contract to become a Work Keys training center we can only work with high school kids. And not anybody and everybody off the street. But we didn’t really want to do that because the community college, which is just a half block away, does that there. So, in Mason County it is a revenue center and I’m not trying to make any money.

as well, O.K.? We’ve put a lot of work into this. And, hopefully, as we travel towards that bigger picture getting all that stuff and the elements that? we’ll see some sort of result from...

4) Discuss your corporate philosophy, or big picture frameworks, of successful operations as they relate to career and technical centers/manufacturing technology business organizations in a globalization context?

this pretty broad picture, if you will, O.K... because of the nature of an ISD and the things that...

And everything that we do as we so...I mean, we can discuss, I guess, our corporate philosophy, if you will, is in tune with what we’re doing right now, O.K.? It does drive us but it is so broad and can we, I mean, it is not... it’s not easily defined our corporate philosophy or our mission. It can include just about everything... there’s...the parameters are broad (laughter). So, but we use that to our advantage here. We have very, very

...the saying used to go “when Detroit catches cold, [City] gets pneumonia”. O.K.? Because we are tied so tight to the auto industry so people now here there’s nobody the basic philosophy here in [City omitted] with most of our manufacturers they’re not going to have...
know? Like they did in the past, so... [That’s brilliant.] Well, it’s a [omitted]. And, we have one guy here right now who does [omitted]; it’s the grey iron foundry. [Company Name] foundries have gone away in the United States and they’ve all gone off shore, O.K.? And his goal right now, and this is kind of scary, and his goal for his company, which is quite successful right now, is to be the last [omitted] foundry in the United States and he’s about my age and he thinks he’ll succeed, O.K? But that’s cool. I mean, I sat there right in a meeting with 45 people and he said our goal is to be the last [omitted] foundry in the United States and I believe that I will live to see it (laughter). So that doesn’t hold well for the rest of the industry that’s left.

5) In your opinion, what are some unique qualities that set your organization apart from others?

And by that I mean that we’ve been able...

I mean, they don’t issue crystal balls to us when we get these jobs (laughter). So

We did.

Hind sight is 20/20, of course, but if I could build this facility again, if I could do this program mix again I probably... I would change, well, first of all, the facility; change a lot of things. And the program mix, I would probably change as well, O.K.? But, [omitted] and so that, as you know, that has some varying as far as how we do our or set ourselves a part from others. Another thing that seems to set ourselves apart from others is, I think, If we have an additional focus here right now in addition to the manufacturing is, one, [omitted] I have already added our health services program. I’d also like to [omitted] as well. So, but I’m feeding that, O.K.?

As far as...

...et cetera. We’ve had great difficulty despite terrific programs here in getting the same kind of response in our health areas and probably it’s primarily arrogance on the part of the professional organizations of the post secondary institutions in these program areas. And I’ve said nothing here that
I haven’t said in front of those folks. [To expand on that question, you have mentioned that there are some things that you would change. Would you like to address those?] Well, is that we could go to the minimal size footprint in some of our laboratories as long as we made some of our equipment and furnishings et cetera mobile so we could move things out and move things in. That’s O.K. in some programs and it’s not in others. More space in some of our laboratories would have been sufficient, would have been, I would change. I would put more space in several of our programs. Number two is, as you know, vocational educators are “savers” (laughter) and, quite frankly, I wasn’t the worst one there, but I did my share of saving, as well. And, we purposely kept our storage, some of our storage areas, down and just said ‘this is how much storage you have; deal with it’. We shouldn’t have done that in some programs. We didn’t think through that well enough. So, we need some more storage in some of our areas, primarily in the restaurant and culinary area. We didn’t really think through that, so when we don’t have big groups, we have no where to put all of our tables and chairs. We don’t have places to keep all of our dishes and pots and pans and silverware ‘cause we didn’t build enough storage space. [So where do you keep them?] Oh, God. In places I’m not supposed to, that I’d get fined for if OSHA came through.

6) What are some of the elements for success (ES) that your students/employees should possess in order to be prepared for the workforce?

we’re not only doing the full Key Trains in ‘reading for information’, ‘locating information’, and ‘applied mathematics’, but we’re also doing it in the The majority of our students ‘get’ the content and where they fall short, we find, is they don’t have the career readiness skills. They don’t have what we used to call in my day, the soft skills. They don’t have the scan skills, if you will. And, we need to continue to cram these down their throats. We did a little study here and what we found is that It was all soft skills. So we need to do a better job of preparing our students on how to get a job and how to keep a job.

7) What skills and abilities do an effective and efficient employee exhibit? It’s a real good I’m not certain which is more important; I’m going to say that they’re 

8) To what extent are these skills utilized within a manufacturing/technology setting? We think more and more today. I think If they want that they could probably make a machine that will do that.

9) To what extent is problem-solving (PS) utilized in daily operations of your school/business? If so, how?
Usually when we run into...it could be something like one of our heat pumps isn’t running or the garage door isn’t working or we have maybe a human relations type of problem here, and I rarely, rarely, rarely have somebody after we go through those processes say ‘no, I’m not ? about this’.

10) To what extent are your students/employees trained to problem-solve (PS)?

11) To what extent are higher-order thinking (HT) skills utilized in daily operations of your school/business? If so, how?

12) To what extent are your students/employees trained to use higher-order thinking skills (HT)?

13) To what extent are customer services skills utilized in daily operations of your school/business? If so, how?

14) How are your students/employees trained to use customer service (CS) skills? Locking in to specific programs I would say that it’s probably...

15) What other areas (ES) do you feel are crucial in regards to student/employee training?

There are a number of things that I would do if they ever made me the Career Tech god. And I could say you have to do...certainly Other things that affect employment, if I had my way, I would make at least a unit, if not more, on they are out there mandatory for all
students because you know? And, I have, without getting into too many details, got something like that going on with an employee simply because they don’t have the personal finance skills that they should have.

16) In your opinion, are career and technical centers providing adequate training for the future workforce?
I want to answer ‘yes’ to that and that’s only because you said ‘adequate’ because there’s so much more that we could do; there’s so much more that we could be. And, so many of our kids by the time they’ve gotten through their whole school experience and they’re old enough to come to us, they’re already labeled and there’s no way that they could ever be anything other than what they’re labeled at that point until they come here and they’re given a fresh start. You see it everyday too at your place.

In some respects I see ourselves as being and even though we have a college that offers many of those same things, but, even though we’re serving the same age groups, we’re not serving the same people. People that would come to adult ed aren’t going to the college because they don’t have the confidence to go to the college…yet. So, it’s things that we work on, but there’s only so many hours in a day. So, yea, just not allowed to do it.

17) In regards to your organization, what are the strengths in training students/employees for a global economy?
I think That’s our strength. We’ll look at anything, another thing, is that. That’s kind of arrogant in this day and I’m not in business to say that, but that’s the truth, you know? And I don’t want to be arrogant and say, but if it’s the right thing to do and we...

18) In regards to your student/employee training prior to attending/working at your organization, what are the strengths in training employees/students for a global economy?
We had a that we had here in County through the We also... We asked that students, obviously now with the new high school graduation requirements that come with that and also with NCLB requiring some of the same things, that students continue to do career exploration so that they’re prepared to begin their EDP in the 7th (it used to be the 8th) but now begin it in the 7th grade and have it done by the end of the 8th grade and then update that on a regular basis. And we’ve given all our districts tools and we’ve given all our districts the in-service and training on that. And now we, actually I hate to say it, but
Come on. We will not take mid-year kids in or kids during the course of the year at trimester or at semester unless their career goal. That’s kind of... in some school districts that's made me kind of something of a pariah, and I wish they’d say, “Oh, God. They finally got it.” (laughter) You’re either a hero or not or you’re the opposite of it. You’ve got the tools. Why roll the dice with a kid’s life? We don’t want to do that. And we’re not going to be right all the time even if we follow the EDP. I already know that. I mean, I knew that going in, but we’re going to be a lot closer doing that that way than we are if we just take the... and say let's try this time, this time, this time. Case in point, I got a big kid that came in here one year and he said, “I want to be a pastry chef.” “Oh, that’s great.” He said, “They got me in auto body.” “How’d you get in auto body?” “I don’t know. Told ‘em I want to be a pastry chef.” Looked at his EDP, yeah, pastry chef would have been right there. Why’d they do that? I don’t know. We had the slot. Things like that happen, continue to happen, even though you have the tools and they have the training.

19) In regards to your organization, what are the areas that require improvement in training students/employees for a global economy?
Well, number one is we try to keep up, we have to, that’s a given, as best we can. And, number two, and most importantly, is that we need to... And we need to... Our kids that come in here...

They will be. There’s going to be some that will be anchors, but we always have those.

20) To the best of your knowledge, what are the differences and similarities between career and technical centers and manufacturing technology business organizational settings?
Well, the differences, in fact, is that we start at the bottom line, but, at the same time, we can’t control the variable of raw material or the product that we receive, so it takes a little bit longer to develop what we’re going to be doing. Manufacturing is just really bottom line driven and, in many instances, doesn’t seem to be as people driven although the most successful manufacturers are. The similarities are that, obviously, we’re...
and those items. And, they don't have time for that sometimes in manufacturing. [Thank you.]
APPENDIX H
CTE2 Interview Transcripts

Interview Questions for Contextual Learning for a Global Economy

Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Student Investigator: Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be asked to respond as candidly and accurately to the following questions.

1) How do you view globalization as impacting your organization?
   Well, you know that I

2) To what extent has your organization changed focus as a result of globalization trends?
   You know that I like to think. So, I think we’re perhaps we’re the biggest area that we’ve changed.
   That’s one of our [That’s on your wall? Is it a banner?]. Um-huh.
   [That’s a good place for it.]

3) Does your organization have a coherent strategy to address or understand career and technical education/employee training in a global context?
   Yea, absolutely. I think we do. We’re trying.
That’s a pretty important part of what we do. [You’ve mentioned 21st century skills three times. Could you clarify what those are?]

It would be

[O.K. Thank you.]

4) Discuss your corporate philosophy, or big picture frameworks, of successful operations as they relate to career and technical centers/manufacturing technology business organizations in a globalization context?
I hope that I’m understanding that question. You know I think what we try to do if we’re going to use manufacturing technology for an example.

They’re pretty demanding. And we

[So this is an advisory it’s not for each program. It’s a blog...] This is an advisory for one program that we’re talking about in the context of this question, but we have others that...we have the same conversations with our advisory group for our electrical occupations program, for our welding program.

[And they all meet once a month?] No, but the vast majority are meeting more than twice a year. [Great.] If we don’t need to meet, if there isn’t a reason to meet, then we don’t, but

[Thank you.]

5) In your opinion, what are some unique qualities that set your organization apart from others?

We’ve worked really, really hard as an organization to send a message that

In terms of having students have a positive and meaningful experience while they’re here. I think

And I think that we’ve done that and I think that

I don’t believe it’s been top down, I believe it’s
been across the board and that’s something that I can be proud of. Not that we don’t have a few that maybe aren’t in that place, but the vast majority are.

6) What are some of the elements for success (ES) that your students/employees should possess in order to be prepared for the workforce?

We have a ______________. Interesting because the idea actually started out in the early ‘90s at the center that you’re working at now and we grabbed onto that and ______________. They really have told us, So, I think those are elements of success for students. I think that that’s the foundation. I do believe that we’re doing some ______________. And ______________.

We ______________. [I saw your golf posters. Those are beautiful; very professional.] Done by students. [I might borrow that.] Do that! [omitted] will be able to take care of that. [Oh, absolutely.] He’s a great teacher. [I agree.]

7) What skills and abilities do an effective and efficient employee exhibit?

____________________________. Do you want me to say it again? [No, you don’t have to.] Will it screw up your processing of your data? [We could say that...] I could say ‘____________________________’ [laughter] [O.K. That’s good.]

8) To what extent are these skills utilized within a manufacturing/technology setting?

Well, you know, I think ______________. That you can get back to ______________. That belongs in there and along with this ______________. If you read his work and listen to the things that he has said is that ______________. Our ______________. That’s where it’s going to be in this country. It’s such a concern because ______________. It may be a dangerous place that we’re putting ourselves in. [Well, they’re starting to model that and teach that.]

9) To what extent is problem-solving (PS) utilized in daily operations of your school/business? If so, how?
Well, I think by the very nature of our programs it's used a lot. And I don't know that I could quantify that in terms of what percentage of the day, but

And that we have

We are

And one of the things that we're working on as a staff that we've learned very, very early was really

So, we're working on that. And, I'm excited about it because I think those scores will go through the roof once we implement this. And I think that we're approaching it from a

[That is exciting. I'd like to see that.] Yea, well we're excited about, too. Next year we'll formally begin and this year we're getting these problems put together and it will happen every day.

10) To what extent are your students/employees trained to problem-solve (PS)?

11) To what extent are higher-order thinking (HT) skills utilized in daily operations of your school/business? If so, how?

Same as previous question.

12) To what extent are your students/employees trained to use higher-order thinking skills (HT)?

I don't know that that's terminology that we use, but I think that that

13) To what extent are customer services skills utilized in daily operations of your school/business? If so, how?

We could do a better job on this. We are not specifically, save one or two programs, teaching customer service and, to be honest with you, that's something that's on my agenda not only for this building, but for our entire organization. It's really interesting that you mention that because I'm putting my plan together to share that at the next cabinet meeting. This is a weak area and we could do a whole lot better. We need some training for not only our students, but for our staff. [What does customer service look like to you?] Well, it's part of the broader school community relations program, [What does customer service look like to you?] I think often times we're probably a little bit lax about that.

That's some real basic customer relation skills that we may not always
be handling things that way when a teacher takes a phone call from a parent or somebody comes into the building and they’re upset and they see the receptionist.

Whole concept of an intermediate school district and what they’re supposed to be about; It’s huge and we need a formal customer service/customer relations program at all levels here and we don’t have it.

14) How are your students/employees trained to use customer service (CS) skills?

[O.K. Do you have the two programs or the couple of programs?] Yea, it’s written into the curriculum in a couple other programs.

15) What other areas (ES) do you feel are crucial in regards to student/employee training?

Well, that would be the big one because we’re not addressing it. [O.K. You mean customer service?] Yea, We need to include customer service as a part of that and then, obviously, up to date technical skills. We have the new Michigan Technical Standards. I’m not sure if that’s going to actually address all of those things, but we need to make sure that we have a good pulse not only on what’s needed locally and regionally, but what types of skills we’re going to need internationally.

That’s an area we do a pretty big job in. We could still do more, but that’s pretty important.

16) In your opinion, are career and technical centers providing adequate training for the future workforce?

Well, I can’t speak for anybody else’s because I’m not there. I think that we mentioned customer service. That’s an area that we’re weak in. There are some academic things that we need to deal with in terms of the Michigan Merit Curriculum, in terms of the requirements for our Carl Perkins Grant in demonstrating academic achievement. And those are really, really important things, but what happens is there’s a ? of the day and as we move to address these things perhaps we do less with technical skills. And I’m probably being really, really hard on us, but I definitely think that we need to do more. I think there’s a group of students that we’re not serving. We have about 1100 students in our building. We’re in the range of 60 or 70 percent doing work that’s less than a C- here
and that’s an issue. We’re not doing that with some students. We need to do a better job of student intervention. As the building principal, I’m the guy that’s ultimately responsible for that stuff.

17) In regards to your organization, what are the strengths in training students/employees for a global economy?

There’s several. One is the teaching staff. The second would be the teaching staff. Did a newsletter article on that a few years ago and it was & on & on. So, strength.

[City omitted] and & on & on. So, And the list goes on. We probably need to do it more.

18) In regards to your student/employee training prior to attending/working at your organization, what are the strengths in training employees/students for a global economy?

‘In regards to your student training’... so, in other words, what things are our students learning here that they’re bringing...[City omitted] and I think that I hope that they are.

19) In regards to your organization, what are the areas that require improvement in training students/employees for a global economy?

Well, one thing that’s huge is this idea of one to one computing and we’re not there yet. But, again, if you

? So I think one to one computing and access to technology and information is one area where we need some improvement. Quite honestly, we just need some more time during the day. We need to find a way to use our facility and use our staff or, excuse me,
make our facility and our staff available as a resource more than just Monday through Friday 8 to 3. And, obviously, many of them stay later than that in the afternoon, but that's an area where we can improve. We need a better relationship with our post-secondary partner locally. We can collaborate more. That's an area where there's a...definitely room for improvement. We need to use technology more so that students can have international experiences whether that's a virtual field trip whether that is collaborating skipping? via the internet or some other activity like that. We need to provide some more focus and more emphasis on those kinds of things. Perhaps we do a lot of community things and get involved with a lot of community problem solving, but we could always do more. Those are real experiences that prepare kids.

A pretty big deal.

Those types of

remember reading about that.] Yea, that was...

20) To the best of your knowledge, what are the differences and similarities between career and technical centers and manufacturing technology business organizational settings?

Well, I guess let's talk about differences. [O.K.] You

I think that traditionally, any business is motivated by profit and that's certainly not the case with us. I think that businesses tend to be more result orientated than school districts and I'm talking generally. I would say that that's a problem.

At some level

[Right.] So, there are probably lots of other things.

This building was a factory. That's about all I can think of right now. I'm glad this isn't going out for publication! I hope I helped you.
APPENDIX I
MT1b Implementation Observation Field Notes

Researcher Observation Questions for Contextual Learning for a Global Economy

MT 1 Observation 1        MT1b
Western Michigan University College of Education
Principal Investigator:  Dr. Richard Zinser
Student Investigator:    Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 6/19/2008
Starting Time: 8:40 a.m.
Ending Time: 9:05 a.m.

Starting Time: 10:31 a.m.
Ending Time: 10:45 a.m.

This observation was divided up into two segments. The first took place from 8:40 a.m. to 9:05 a.m. (25 minutes) and the second half was observed from 10:31 a.m. to 10:45 a.m. (19 minutes) for a total of 64 minutes. This choice was made at the MT1 leadership request due to MT1 daily scheduling/duties and to be less obtrusive in regards to the employees’ daily operations.

Describe the setting.
MT1 was located in a rural setting. The building is a pole construction with several additions that were added at different times. The interior of the office entrance appeared to be newly remodeled with knotty pine tongue and groove walls, and contemporary mauve/taupe ceramic tile floors. The office vestibule/reception area was warm and inviting with a rustic northern Michigan woods theme. There was a receptionist’s window located approximately 8 feet into the vestibule/reception area. The bottom of this window ledge was approximately five feet from the floor as the office area was two to three steps higher than the vestibule/reception area. Directly across from the window were rustic pine framed photographs of each new building addition as well as pictures of their products from GM and Ford and snow mobiles of their MT clients. These images showed the growth of their company and the MT industry. The photographs of the building appeared to be taken in different years. The outside of the building reflected the multiple phases of building additions over time.

The hallway adjacent to the office had a framed photograph of the State of Michigan from an aerial view. The office was to the immediate left of the hallway and the Office
Manager was located to the immediate right. There was ample natural lighting in the office area as well as ambient overhead lighting. The office had a U-shaped workspace configuration directly under the receptionist’s window that overlooked the vestibule/reception area. There was a rectangular workspace across the opposing wall of the office that covered the length of the wall. An exterior window was located at the far end of the office space which appeared to be approximately 8 x 10 feet. The office furniture appeared to be customized and in new condition. There were darker rolling chairs in the office area with lighter laminate work surfaces. Each work station had a computer and a telephone. Both work areas were cluttered with files, loose paperwork and personal items. This appeared to be a friendly casual atmosphere that wasn’t well organized.

Describe the impressions of the trainer.
The observer entered the vestibule/reception area and was present for approximately 10 minutes before being greeted by the receptionist who was working at the desk in front of the Receptionist’s window. The office manager/trainer seemed aloof. The Office Manager wore a casual plaid shirt jersey material with jeans.

Number of students/employees present.
There were 3 employees present for this observation including the Office Manager. There were two female employees who appeared to be in their early twenties. They wore jeans and t-shirts or hooded sweatshirts. Extremely causal, not even business casual. Employees seemed comfortable.

Describe the activity that is taking place.
There were 6 interruptions in the beginning of the observation. Office Workers would be doing several things all at once. Not necessarily focused on one thing or another. They appeared to be trained to multi-task and work in several areas and trained to do several things at a time but lacked focus.

They don’t greet right away, but they are nice enough. Divided they are nice enough working on their own stuff. Question on a bill that was lost at the beginning OM was called in. She was looking for it trying to tell the girls look in this file if it is not there you can look it up in the computer one complained that that was so much work and she did not want to do it. You are going to have to go back by the date and look at all of them till you find it we need to locate that invoices. There appeared to be some disorganization in the office. The workers were friendly with each, and appeared to be very relaxed with each other. They carried on causal conversations with each other concerning some personal issues as well as observations of other employees in the company.

At 8:50 a.m. one of the office workers had a question pertaining to a bill that had been lost. The Office Manager was called in. The Office Manager began looking for the misplaced invoice and began explaining to the employee who summoned her, “Look in this file if it is not there you can look it up in the computer.” The employee complained that that was so much work and she did not want to do it. The Office Manager replied, “You are going to have to go back by the date and look at all of them till you find it. We need to locate that invoice.” The second office worker continued was on her computer while this took place.
At 9:02 a.m. a male employee approached the Receptionist’s window and asked a question pertaining to payroll. The Receptionist greeted him promptly and spoke to him in a pleasant cheerful voice. She continued typing a document while addressing his payroll question. The phone rang and the Receptionist answered the phone. A second office worker continued working on her computer.

At 10:31 a.m. The office workers were observed at their work station. The Office Manager came in and asked for the payroll checks. These were handed to her by the Receptionist. An employee approached the Receptionist’s window to inquire about payroll checks. The Office Manager informed him that they would be in his mailbox after lunch.

At 10:35 the same employee returned to talk to the Receptionist. The phone rang and the Receptionist answered the phone. During the observation a formal corporate greeting was not recited when the phone was answered by the Receptionist. She would say, “Hello” or “Hello” and state the company name. There did not appear to be consistency in answering the phone but her voice did project a warm and friendly tone. The second employee returned to her work station and began working on her computer. The phone rang again and the receptionist answered the phone and was filing cards in a small plastic file box. She then rummaged through some papers on her desk and located a document which she filed in a file sorter located on her work surface area.

At 10:45 the Office Manager called the Receptionist back to her office. She stated that she needed her help with payroll so they could get it out on time. The observation ended as the second office worker continued typing on her computer.

**How do the participants respond to the trainer?**

The participants referred to the trainer when they had a question related to finding the lost invoice/billing statement. However, when suggestions were offered on the steps to locate the missing statement, the trainer was met with reluctance. The Receptionist seemed to be more dutiful than the second office worker.

**Are the participants engaged in the training session?**

It appeared that the Receptionist was responsible for the majority of duties in this office. The Receptionist was observed handling multiple tasks at a time during both the first and second half of the observation. The second worker was observed working at her computer and interacted on a limited basis with the Receptionist and Office Manager. During the first half of the observation the Receptionist and office worker were engaged in conversation. Some of it seemed to pertain to the company and other parts seemed more personal in nature.

**Are employees/students trained in problem-solving (PS)? If so, how?**

Problem-solving was observed in handling several tasks at a time and being able to manage several task-oriented problems simultaneously. Employees requested the assistance of the Office Manager and referred to her when questions arose that did not seem to be in their expertise to answer.

**Are employees/students trained in higher-order thinking (HT)? If so, how?**
Employees did not appear to be trained in higher-order thinking skills. They appeared to be managing tasks and problems in a reactive rather than in a proactive manner.

Are employees/students trained in customer service (CS)? If so, how?
Employees appeared to exhibit customer service skills with other employees when they approached the office area. The observer was not greeted promptly and was ignored even when she initially approached the Receptionist’s desk and verbally greeted the Receptionist. No outside customers we observed entering the office area.

The observer asked the Office Manager how the office employees were trained in customer service skills. She replied, “They do not really need customer service skills because we don’t get many people coming into the business.” However, it was observed that customers did call on the phone. Customer service within the organization was not perceived or interpreted as a form of customer service by the Office Manager.

At the second half of the observation the Receptionist seemed more comfortable around the observer. She asked the observer questions about the study. The observer informed the subject that she was just here to observe the business operations of the office.

What other elements for success (ES) appear to be present in the training session?
The employees seemed familiar and comfortable with each other. The environment is casual and relaxed. Employees were observed approaching the Receptionist and seemed comfortable asking questions or asking for assistance. All company management is related. This is a family-owned and operated business. The Office Manager is the mother of two of the executives and co-owns the company with her husband. The office workers are both nieces of the Office manager. Employees as shareholders/stakeholders add to the sense of connection to the history of the company.

Does the training session incorporate aspects of globalization or economics? If so, how?
The impact of globalization or working in a global context did not appear to be relevant to the office staff. This company conducts business with a few international customers but do not appear to have any training in that area.

The Receptionist and Office Manager both informed the observer that they needed help in the accounting department. The Office Manager would like to hire an accountant to manage the details so they (the office staff) can do the day to day operations and work with the employees. They both explained their concerns about not being able to get the maximum benefit out of the software program.

What is the objective of the training session?
The objective of this session was to keep up with the daily operations and tasks in a reactive manner. Directives were given to the employees pertaining to finding the invoice statement and assisting with payroll tasks. The Office manager stated that there was not enough time in the day to conduct training. Training was either not readily available or did not meet the budgetary constraints of that department.
APPENDIX J
MT1c Implementation Observation Field Notes

Researcher Observation Questions for Contextual Learning for a Global Economy

MT 1 Observation 2  MT1c

Western Michigan University College of Education
Principal Investigator:  Dr. Richard Zinser
Student Investigator:  Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date:
Starting Time: 9:07 a.m.
Ending Time: 9:49 a.m.

Describe the setting.
The executive office area was located down the hall from the main office area. There was a uniquely shaped custom conference table in a main meeting area and the executive offices were located to the left just off of the conference area. There was a customized work surface for two people with computers and a generous amount of work space.

The shop/production area entrance was located towards the back of the vestibule/reception area on the opposite end of the building from the executive offices. It appeared that there may be a door to the right of the conference area that may also lead into the shop/production area. The shop/production was poorly lit and noisy with sounds of machinery and metal surfaces being ground. The observer was not given safety glasses or ear plugs. Throughout the shop/production area there were metal shavings all over the floor. Parts were falling out of bins. A black haze hung in the air in what appeared to be the oldest part of the building. There was oil all over the floor next to machinery and the observer had to carefully watch her step as not to slip on the slick surface. The shop/production area seemed to wind around in catacombs as the entire structure was comprised of a series of pole buildings that had been added on during different years.

In sharp contrast the CAD/CAM offices and all other office areas were quiet and clean with new custom office furniture. The main CAD/CAM office had a large exterior window and each of the 4 designers had 3 to 4 computers with large monitors. An additional CAD/CAM room was located further down the shop/production area. It was smaller and did not have an exterior window but was clean and quiet.
Describe the impressions of the trainer.
The subject wore khaki slacks and a polo shirt. He did not have a very good command of the English language and grammar skills were poor. He was excited about the company and exuded a sense of pride in regards to the growth of the organization since he purchased it from his brother in 1988.

Number of students/employees present.
30 employees were present on the day shift. Total staff is 45 employees including both day and evening shift in production as well as office staff and management team. The owner was filling in for his oldest son who is currently the co-CEO with his younger brother. The trainer/owner stated that they were able to stay in business by employing each production worker 6-7 days per week. He also stated that the dynamics of the business have changed over time as they have grown from 7 employees in 1988 to 44-45 employees presently. He explained that pay the employees shift differentials since the changeover from one single shift to two 10 hour shifts. They are open 20 hours a day. He stated that the extra shift helps the company maintain and manage the orders.

Describe the activity that is taking place.
Shop/Production employees were observed in various different tasks. Some employees were working on manufacturing machine core and molds while others were either grinding or refining parts that had already been manufactured. Some of the machinery appeared to be older and/or refurbished. There were a few new pieces of equipment, CNC Lathes and Mills that 2 employees were operating. Two employees were working off of blue prints. One employee was observed trimming plastic mold injected parts. Several employees were observed running multiple (up to 3) machines.

CAD/CAM drafters were observed programming with Prospector software. This is a 3-D programming system for tool design. 1 CAD/CAM drafter was working in UG (Unigraphics). He is the only employee who has been sent to formal software training classes with UG Graphics. He has attended several training sessions in Grand Rapids, Boston, Chicago and Detroit. This employee is in the process of training the other CAD/CAM designers. This software program is similar to CATIA. The trainer commented that it cost the company $46,000 for 2 computer licenses and can cost up to $300,000 per license with the software add-ons.

How do the participants respond to the trainer?
The shop/production employees were observed moving from task to task, machine to machine and did not disengage or remove their concentration from their tasks when the trainer was present. In contrast, the CAD/CAM drafting employees looked up from their computers and greeted the trainer with smiles and verbal greetings when he entered their work area. One of the CAD/CAM drafters was enthusiastic about sharing his work with the trainer and the observer.

Are the participants engaged in the training session?
All employees appeared to be engaged in their work. The CAD/CAM employees were the only group that interacted with the trainer. All employees were observed multi-tasking.
Are employees/students trained in problem-solving (PS)? If so, how?

Employees appeared to be trained in problem-solving. The production workers were observed measuring and grinding parts with micrometers. They were also observed inspecting finished parts and moving between various tasks and different types of production jobs. CAD/CAM drafters in both areas were observed working on different projects simultaneously.

CAD/CAM drafters were also observed projecting flow analysis to measure the solidification of liquid fill. This process simulates time and direction of mold injection fill based on heat, geometric construction and materials used in the mold. CAD/CAM drafters were able to explain the process to the observer. They also explained that the plastic and die cast can be reused but rubber has a usability time window. Recycling of product depends on safety constraints and the reaction/response of materials to elements such as chemicals and heat.

In the second CAD/CAM area 1 employee was observed writing programs to simulate product cutting. He used a program similar to PowerMill which simulates the cutting and tool pass. Adjustments were made in the programming to get the maximum benefit from the equipment in regards to time and minimizing product waste.

Are employees/students trained in higher-order thinking (HT)? If so, how?

In CAD/CAM area drafters were working on 2-4 computers at a time. Not wait for processing. While one design was rendering, each CAD/CAM employee was observed working on a different problem. They were able to work on several computers at a time solving what appeared to be complex problems related to geometric construction, tolerancing, and material composition. It appeared that all employees utilized every minute with efficiency. The CAD/CAM drafters seemed to have the capacity to be able to store and process a great deal of information in their short-term memory and move from one thing to the other while working on 2-4 computers at a time with the designs in various stages.

Are employees/students trained in customer service (CS)? If so, how?

Shop/production employees were not observed engaged in customer service activities other than working diligently to meet production deadlines. CAD/CAM designers seemed to have people skills and were viewed as enthusiastic about having the trainer and observer present.

What other elements for success (ES) appear to be present in the training session?

Employees are able to multi-task and appear to be cross-trained on different processes, equipment, and software. High levels of production were apparent during this observation. However, it seems that the focus on production leaves little or no time to be proactive in terms of safety or equipment maintenance. Employees seem to be engrossed in their work. CAD/CAM drafters seem genuinely interested and excited about their jobs.
Does the training session incorporate aspects of globalization or economics?  
If so, how?
Customers are located in several parts of the United States, France, Mexico and Canada. The global context is present but does not dominate this company. The trainer views globalization as a barrier, or something he needs to work against. Employees seem to only be aware of production time and quantity. CAD/CAM drafters seem to be more aware of corporate issues but again they are working to improve quality, speed and cost effectiveness.

What is the objective of the training session?
The objective of the session was to operate at peak efficiency with maximum output.
APPENDIX K
MT2b Implementation Observation Field Notes

Researcher Observation Questions for Contextual Learning for a Global Economy
MT 2 Observation 1 MT2b
Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Student Investigator: Jennifer L. Harrison

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 4-12-2008
Starting Time: 8:36 a.m.
Ending Time: 9:56 a.m.

Describe the setting.
The company was located on the outskirts of the city just south of the airport. The building was a large pole building with very few windows. It was situated away from the road. The receptionists office was situated directly to the left of the entrance. The office space was approximately 5 x 7 feet. The receptionist was speaking on the phone and a middle-aged gentleman greeted the observer. He used eye-contact and smiled at the observer. He knew she was expected to arrive. The man stated that he would notify the CEO and immediately returned to escort the observer to the general manager/CEO’s office. There were two framed pictures on the wall in the main vestibule. The first was an aerial view of Michigan, and the second was a photograph of approximately fifteen to twenty people holding an extremely large screw. It was later learned that that picture was taken several years ago with a team of employees from this company holding a 36 foot custom machined screw. There was a conference room approximately five feet down the main entrance hallway to the left.

The trainer who is responsible for the office and management team is also the CEO/division manager for the company. In conversations on the phone and in person this subject repeatedly stated that their operation was “lean and mean”. The setting reflected the “no frills” concept. The setting seemed to be efficient but was not designed for aesthetics. The MT-1 observation subject’s office contained photographs of what appeared to be his scuba diving adventures. He also collected pottery coffee mugs with faces on them. These were on the far wall of his office on a hutch that was situated on a rectangular work station. The office consisted of a row 5 of cloth and metal guest chairs lined up against the wall across from the metal and laminate desk. There were 2 other guest chairs on the wall where the door to the office was. Several stacks of papers were on the edge of the desk. A computer sat to the left of the desk in front of a window.
After greeting the observer, the subject provided a pair of safety glasses to the observer and they exited the office turned left and passed through a short corridor before entering the shop area. There was a second smaller conference room directly across from the subject’s office. On the right of the corridor was a storage room with shelves and there was at least one small office to the left.

There was a sign on the steel door reminding individuals that safety glasses were required beyond this point. Once past the door there were two offices to the left of the doorway. There was a work room to the right that had several windows for observation both into the workroom and out into the shop area. This workroom was approximately 15 x 20 feet with tables, tools, chairs and large mounted magnifying glasses. Two employees were working in that room. As we walked through this work area the two employees were working while listening to NPR on the radio. There was a news commentary relating to the United States and adapting to Chinese culture.

The shop area had several areas for lathes, CNC Mills, Threaders, product finishing/cleaning, packaging, shipping and receiving, and a climate controlled room for precision quality control with lasers. The entire area was brightly lit with fluorescent lighting. The shop floor was made of cement and was clean. The subject walked through the shop and gave the observer a tour.

There were several large machines specific to the industry. Some of the equipment was proprietary. One of the threaders was a one of a kind machine that was built in England and sold to a Russian company. It became available on the market so the trainer traveled to Russia and then had the English manufacturers re-tool the machine to fit this company’s specifications. This particular threader can complete work that may take 10-20 days in 40 minutes.

It was pointed out that the entire wall on the north side of the building contained various air conditioning units to regulate the temperature of the machines as well as the oil lubricant that was used in some of the models. The threaders need to remain at 70 degrees at all times. The slightest variation in temperature can alter the dimensions of the part that has been machined.

The observer was taken to the back of the shop into a highly classified area. Specialty screws were being finished to transport to a client for manufacturing nuclear weapons. The entire shop floor appeared to be 170 feet long by at least 100 feet wide. Blue prints were not made available to the observer for security purposes. The observer was asked to confirm that she was a United States citizen before she could tour the shop area. That was due to the sensitive nature of the area that contained the components that were to be used for nuclear weapons.

The door exiting the shop had a sign posted to remind employees to keep their work areas clean. There were several brooms visible throughout the shop. Even areas that contained raw materials such as oil, were well-maintained.

Describe the impressions of the trainer.

The trainer wore a white dress shirt with navy stripes and no tie. He had blue dress slacks and rubber-soled black leather tie shoes. He wore metal rimmed rectangular glasses, had grey hair and was over six feet tall. He maintained eye contact with everyone who approached him. He greeted people as we walked through the space. He was friendly
and exhibited a great deal of pride in the efficiency of his company. He seemed to be enthusiastic about participating in this study.

**Number of students/employees present.** 22 total for the day. 17 in production and 5 in the business office setting (2 management and 3 office staff). 2 production workers were absent. One had a death in the family and the other was sent to see a doctor regarding continued soreness in her elbow. The subject discussed the nature of work that can cause such injuries. Apparently the detailed work involved in cleaning the large screws, which can take several days for each part, can place a great deal of strain on the joints in the hand and arm.

**Describe the activity that is taking place.**

2 employees were working in the work room with fine tools that would pick and/or carve details into the products. One employee was cutting and bending small tubes of pipe to fit into the side of a machined part. One female employee approached the trainer and discussed a problem she was having with the finish work on the part. She indicated that this was the same problem they saw at the beginning of this particular job. The trainer confirmed that they needed to keep a close eye on the process. He also gave her some ideas for other techniques she could try. She thanked him for his input and returned to work.

There were at least three employees working on the manual machines when we initially walked through the plant. Other employees were working on CNC Lathes and mills, and threading machines.

One male employee was working on machining specific job requests. Each work station had parts that were in various stages of completion. Specification sheets were located underneath each part. These sheets gave specific dimensions and specifications of the part that was to be manufactured. The trainer approached this employee and asked him to discuss what he was doing. The two discussed the procedures for creating threads on the outside of a screw shaft. They discussed the tolerance of the part and the employee had a question regarding the dimensioning. The two worked through the problem. The trainer handled the part and simulated the required angles using his hands in relationship to the part. The both referred to the job specification sheet and then we moved on.

An employee was programming five coordinated in a CNC mill. As we moved through the shop another employee was finishing machining a part on the one CNC mill that manufactured in Japan. This employee was gregarious towards the trainer. The trainer asked him to explain the process of creating a product using five axises. The employee explained how he used a cylinder of steel. He picked up the steel cylinder and then picked up the finished part to demonstrate the beginning and completed staged. Then he walked with the trainer to the computer panel of the CNC mill and discussed how he addressed the specifications. He worked through programming another part while we were watching. Things appeared to run smoothly so we moved on.

Another large CNC lath was threading a lead screw piece. The trainer asked this employee to address how he created the part to insure there was integrity in the fitting and strength in the joint where the two parts of the screw were joined together. He was able to explain the process. He picked up a finished piece and demonstrated how two parts were machined to precisely thread together. He then picked up the job specification blue print and began explaining how he programmed the coordinates into the CNC. When
asked how long the programming phase took the trainer joked “too long”. The employee smiled and replied “well, it usually takes about 15 minutes to program a run.”

The trainer moved on and explained the process for shipping and packaging. He watched an employee move 4 foot cylinders from the receiving pile and place them in slotted compartments that corresponded with the size of the cylinder in regards to length and circumference.

**How do the participants respond to the trainer?**

It was evident that employees did not hesitate to ask for guidance or assistance at any point of their project.

**Are the participants engaged in the training session?**

It was explained that training typically takes place in a Just In Time delivery system. Each piece is unique and problems occur daily. The trainer needs to be available to insure that the employee’s needs are being met. When the trainer was working one on one with the employees they seemed to listen and actively engage with their hands. Several moments were observed when employees were handling the products and simulating what was either accomplished or needed to be accomplished through contextual means. This particular observation was intended to be observing the office training. On two occasions there was interaction between the trainee and office staff. The majority to JIT training was observed in the MT setting or shop area.

The trainer stated that he and one employee flew to Germany last week to obtain hands-on training on a machine they had purchased in Germany. He also stated that he has hired students from the local Career Center and the local M-Tec center. When the situation calls for training he brings in experts to train in the shop and also sends people off site for training. Again, this is not a regularly scheduled occurrence.

In regards to his office personnel, he stated that he hires people who have a strong desire to learn and then he will pay for their training. The accountant obtained his Master’s degree through the corporate continuing education program. Some employees may take a class at the local college or through the M-Tech Center. Presently, there is no training scheduled for the office staff. They are required to keep up with their computer skills in regards to software updates.

All production employees are trained in ISO-9000. He sends his employees to Ann Arbor for training with follow-up that takes place throughout the year. The key, according to this trainer, is to find training programs that meet their needs and are concerned with the quality of their training programs beyond just making a profit.

**Are employees/students trained in problem-solving (PS)? If so, how?**

One employee was observed working on an accounting ledger sheet. Another employee was observed speaking with a customer on the phone to calculate the approximate ship date of an order.

**Are employees/students trained in higher-order thinking (HT)? If so, how?**

This was not observed.

**Are employees/students trained in customer service (CS)? If so, how?**

Employees did not interact with each other unless they were collaborating on a project or walked by in passing. They appeared to be cordial and smiled at each other when they communicated.

Office staff were friendly and greeted the observer. Each appeared to be entrenched in their work and remained in their offices. The receptionist was observed
speaking to a client on the phone for several minutes. It appeared that she was explaining a procedure to the person at the other end. She also appeared to be so focused on the client that she was oblivious to the other co-worker and observer. The receptionist approached the trainer once to ask for clarification on paperwork she was completing. Another employee approached the trainer and asked for his input on a thread configuration.

All employees who were approached by the trainer were eager to share how their projects were progressing. They also seemed to be concerned with absolute accuracy and the quality of the project/part/job. Additionally, they were all able to explain what they were doing and could relate the procedures involved to accomplish their work.

What other elements for success (ES) appear to be present in the training session?

Employees appeared to communicate freely with their supervisors. They were always engaged in their tasks. The work area was organized and well maintained. Employees seemed to have an in-depth understanding of their jobs. The trainer noted that he assigns at least two employees as experts in a given area. He does not cross-train but by having specialists who are trained in various stages of the process they are better able to problem-solve. He believes this also improves quality.

There were about four employees, three production and one office staff, who appeared to be in their twenties to early thirties. The rest of the employees have been with the company for twelve to twenty-three years. Apparently company loyalty is also a factor for success.

Does the training session incorporate aspects of globalization or economics?

If so, how?

As previously stated, employees were listening to an NPR story pertaining to globalization during the observation. The office setting contained posters of Michigan and one break room had a large map of the United States that was sectioned off into regions with a black marker. The main bulletin board in the shop posted pictures of International teams from Mexico and China. Also, there was a color printed photo of the employee who attended the training in Germany with his German trainer demonstrating how to use the equipment. The trainer discussed how his employees are encouraged to communicate with each other regarding skills, techniques, and ideas they have learned in their education.

What is the objective of the training session?

The training session was incorporated into the daily operations. The objective appeared to be insuring quality control and maintaining constant communications regarding all projects and facets of the daily operations. This was different from the CTE training sessions. It would be difficult to actually get in and observe training that takes place in a more traditional format. Trainings are customized for each person. Sometimes they attend ISO training, or take course work at the college or M-Tech level. When the demand calls for it experts are brought in to train employees on proprietary equipment.
Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 4-12-2008
Starting Time: 10:32 a.m.
Ending Time: 11:15 a.m.

Describe the setting.
The setting where the MT2c subject was within the shop area as previously described in the MT1a Observation. The MT2c subject's office the corner office located on the left of the shop just inside the entrance. It was the second office on the left. There were large windows which provided a panoramic view of the shop area. The second trainer's primary responsibility was to oversee the production crew and monitor quality control.

His office was smaller than the first subject's. This space was approximately 8 x 9 feet or perhaps smaller. There were metal and wood laminate work table along the back wall and a metal and wood laminate desk against the wall on the same side of the office as the entrance to this office. There was a computer, telephone, and several stacks of papers on this work surface. The walls were a neutral color with several poster and working papers posted on a bulletin board. Near the ceiling there was a wallpaper border that had pattern of repeating squares each containing different continents. Smaller squares bordered each continent and had unifying symbols that were difficult for the observer to discern at the distance.

The office overlooked the work room as well as half of the shop area. Half of the shop area was concealed by a dividing wall. Behind the dividing wall was the highly classified threading area, a large CNC Mill and lathe and the shipping and receiving areas. The laser quality control room was also concealed behind a door that was on the far side of the same wall as the work room. This laser quality control room was sealed with a steel door and measures had been taken to insure climate control. Used to insure threads are within 5 and 5/20\(^{th}\) of an inch. 250,000 data points can be checked in less than 10 minutes. 5/10,000\(^{th}\) (both positive and negative) of an inch per foot is the acceptable criteria (6 decimal places). Both ambient air and material probes so the laser reports the
correct distances based on environment in this room. This room was also shielded from the machining noises of the shop.

The subject further described the equipment in the shop as he made his supervisory rounds. CNC Mills, CNC Lathes, grinders, 4 manuals mills used for low volume production and modifications couple of CNC Fidel vertical machining centers, two Mori-Seiki MT 2500 SZ true five axis machining centers (Japanese) for turning. Used for front, back all turning milling complete, milling and various other tasks that helps to save a great deal of time....SMTW Plain cylindrical grinders, 2 OD Grinders and 1 ID grinder, Universal Kellingburg 1500 U Grinder, 2 Quaza CNC Lathes, 1 nasta and 1 triumph CNC lathe, special machine made by EXCEL and has a six inch board diameter that they rent to Budapest Hungary, proprietary equipment that is capable of doing 104" on a Z axis that can be used for specialized projects such as machining holes off-center, and has such precision that one could write his/her own name on the head of a screw. The shop also housed MIG and TIG welders as well as both 5 meter and 8 meter threading machines. 3 fully internal CNC thread grinders, grinding wheels, have the capability to profile the thread onto the wheel using CNC dressing software. External thread grinders, 3 meter and 5 meter manual fully CNC EXCEL 050 external thread grinders, and 4 manual machines, straightening press made specifically for shaft straightening used to straighten within ½ a 1,000th linear distance (about 50th of a strand of hair.

The back of the shop contained two large metal recycling containers property of Padnos. The second half of the shop, past the divider, contained finishing areas for the larger screws with large magnifying glasses and specialized hand tools for cleaning and finishing. There were a few other machines to mill 5 axes X Y Z C and E.

**Describe the impressions of the trainer.**

The trainer seemed enthusiastic about sharing his ideas and the activities that were taking place. He smiled frequently, laughed, and maintained eye contact with each person he communicated with. He was dressed in business casual attire with a subdued green dress shirt and coordinating dress pants. He wore glasses that doubled as safety glasses when he was in the shop area. He had been busy speaking with a client earlier that morning and had been observed, during the first training observation, interacting with employees. Even though the observer was told, by this trainer’s supervisor, that he had a lot of work to do, the trainer did not seem rushed. He made the observer feel as though this observation was important. This is reflective of his excellent customer service skills.

**Number of students/employees present.** 17 production employees were working in various stages in the shop.

**Describe the activity that is taking place.**

One employee was working with hand tools in the work room. She came out twice to grind angles onto a small (3 inch) bent piece of metal tubing. Two employees were observed in the front of the shop area working on the hand lathes. Employees were intermixed throughout the shop on various pieces of equipment. Some employees were observed using measuring devices such as micrometers. There was one employee still
working on the Japanese-made 5 axis CNC Mill. All 17 production employees were engaged at their workstations.

2 employees were observed referring to written procedure sheets as they machined parts on lathes. On the other side of the shop divider one employee was programming points for the X Y Z C and E axises.

**How do the participants respond to the trainer?**
The trainer made rounds in the shop to see the results of each employee’s work. He checked quality reports using software and visualizing/inspecting each part. The trainer expressed that he likes to use an “open management style but encourages continued focus.” He was observed approaching employees and being approached by employees to collaborate and problem-solve projects. The employees seemed to welcome input from their trainer. They maintained eye contact with this trainer. Employees and trainer used verbal and physical means of communication. For example, the trainer was observed holding a part and interacting with the part through hand gestures. The employees seemed to communicate in the same fashion. The trainer would check for understanding either by rephrasing the question/statement or by listening to the employee describe the issue. The trainer seemed to be genuinely interested in each employee.

**Are the participants engaged in the training session?**
Yes, all employees appeared to be on task for the entire observation session. Some employees responded to the trainer with questions and others continued to remain focused on their work.

**Are employees/students trained in problem-solving (PS)? If so, how?**
Procedures and various levels of training. Reasonable consistent focus to their work. The trainer explained that each repair to an assembly is unique there are several different steps involved in assessing the repairs and the actual repair of the ball screws that come into the factory. Some look good when they come in but may have larger problems once the part is re-tooled. Employees are faced with different challenges each day. According to the trainer they need to adapt to each new project and problem solve ways to get the job done effectively and efficiently.

Employees were observed approaching this trainer and asking questions pertaining to the job orders they were working on. Employees were also observed using tools like micrometers to check for tolerancing on parts. They would machine those parts according to the measurements they obtained from the micrometer. Employees were observed programming coordinates on 3 and 5 axis CNC Mills.

“**This company lives and dies by what each of us does... We all have our part to play and if one of us fails we all suffer.**” The trainer indicated that a lot of employees come to the company with a great deal of experience (1/3 of precision machinists started off on shipping). When they showed a good aptitude they were brought into on-the-job-training. They were also encouraged to train at the local CTE program. Ball screws are very accurate items and nearly every ball screw and repair is unique. Employees must constantly problem-solve through best guessing, collaboration and sometimes trial and error.
Are employees/students trained in higher-order thinking (HT)? If so, how?
The trainer was asked how employees were trained in higher-order thinking. He stated that the students were really trained to problem-solve on a case by case basis but the trainer indicated that employee ideas may enhance the product or increase efficiency. Engineers are the only employees who would come up with the design and use higher-order thinking to enhance the design.

Are employees/students trained in customer service (CS)? If so, how?
Yes, employees were courteous and friendly towards each other, their supervisor and the observer. They appeared to take quality seriously and took pride in the final outcome of each production project.
The trainer stated that all employees needed to have a strong work ethic. Each person needs to solve their own problems and collaborate if the solution wasn’t obvious. Employees were observed responding to problems in this manner.

What other elements for success (ES) appear to be present in the training session?
Training appears to be on-going and is assessed on a constant basis. Employees were constantly communicating with their trainer/supervisor. Employees kept the shop in immaculate condition. They appear to be trained to work diligently to meet the customer’s needs particularly in regards to the job orders and specification sheets. Employees seemed to take pride in their work and were able to fully explain how and why they were performing their duties. Employees were able to work on varied projects/job orders. They were able to move smoothly from one task to another with little supervision. All employees appeared to be on task for the entire length of this observation. Employees were observed wearing safety equipment and taking measures to safeguard the projects/job orders by careful handling and placing each part in protective wrapping after each job was completed.
Employees persevered at their tasks and were observed discussing/collaborating their problems and even to the end of scraping a part and re-working it from the beginning.
Mathematics were being utilized on a large scale during the observation. Employees seemed to exhibit skills in trigonometry and geometry to a great degree of precision.

Does the training session incorporate aspects of globalization or economics?
If so, how?
Many of the machines were from foreign countries: 2 Mori-Seiki MT 2500 SZ true five axis machining centers (Japanese) for turning, 5 meter manual thread grinder made originally by Churchill Matrix in England then sold to the Russians. They heard it was available so they flew to Russia and purchased the machine. The subject stated that the shipping/freight costs was just a little more that the purchase price. The shop also included a larger lathe purchased from Hungary.
This trainer also made reference to the employee who was sent to Germany for a training session last week. There were several visual references to the company’s connection to the international market. These are detailed in the previous observation of the same setting.
What is the objective of the training session?
The purpose of the session was to create and machine parts to the specific project requirement with as much precision as possible.
Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 2-13-08
Starting Time: 9:03 a.m.
Ending Time: 10:02 a.m.

Describe the setting.
Business office simulated classroom with 22 student work stations, 1 instructional computer with additional instructional work space in the front of the classroom. Overhead digital projector mounted on ceiling connected to instructor’s computer. 1 color laser printer, one monochromatic laser printer. Soft lighting large windows overlooking a wooded setting and parking lot. Lockers two rows of 12 to the right of the door. Counter workspace with cupboards and additional closet-style cupboards. Private office and storage spaces included in the classroom. Charcoal grey Berber carpeting with tan and light grey flecks. White walls, light grey workstations with black trim. Office upholstered swivel chairs charcoal hound’s-tooth subtle pattern.

Describe the impressions of the trainer.
Trainer welcomed observer into the classroom and stated that the students were unhappy with her because she had been out of town at the Michigan Career Educator’s Conference for the past two days. Instructor was professionally attired in chocolate brown gabardine slacks a brown shell and an off white gabardine shirt-style jacket with metallic grey snaps. She responded to student questions and moved around the room answering specific questions. Students were working on cash proofs, beginning balance and accounting skills.

Number of students/employees present. 13

Describe the activity that is taking place.
Students were working independently on accounting assignments. They had text books opened on their desks and appeared to be working on content in the middle of the book. Students worked at their computers and used paper and pencil while working through problems in their text books.

Some students had calculators and were transposing numbers to paper and the computer. An Excel spreadsheet template was open on the computer screens. Some students listened to headphones while working. One student had bright pink headphones on that appeared to be her won personal property. One student had black headphones that may or may not have been part of the lab equipment. Two students were male and 10 students were female. 1 student had a music screen saver displayed on her computer screen as she listened to pink headphones and worked through an accounting balance sheet that was photocopied onto a yellow sheet. There were several similar sheets stapled together that she was working on. Another student had a picture of a music celebrity on her screen. She was listening to ear buds while reading her accounting text book.

Students seemed to be comfortable asking the instructor for help. Most of the students raised their hands if they had questions. One student verbalized questions and interacted with the instructor. She asked about the dress code for the BPA competition that was coming up. The instructor discussed proper business attire and stated that blue jeans were not permitted at any point in time during the BPA conference. Two students complained and problem further to ask if they could wear “normal cloths” when they were on their own time. The instructor said “No” and added that she was not even to wear jeans at anytime and anyone who did would be sent home. Students discussed appropriate skirt length and another student informed the class that their skirts should always be below the knee. This conversation took place over a two minute period.

Students were directed to work on their accounting assignments. The instructor discussed sales and cash receipts and showed students where each of the items should go on their balance sheets. They were working on sales credits and taxes. One student had a questions and the instructor went through calculation of sales tax and where it should go on the balance sheet. The student was directed to go back to the sales tax area and recalculate the sales tax. This student expresses that she was confuse. The instructor verbally assisted the student on the problem. The student continued to tell the teacher she did not understand. She asked “Where did you get that calculation?” The instructor pointed to each figure in the book and demonstrated to the student where to type the appropriate values. The instructor moved on to another student who had her hand up. That student needed clarification on a problem. The instructor moved to an adjacent student who wanted clarification that she had completed all the requirements. This student turned her work into a mailbox slot. Just then another student informed the teacher that her phone was ringing. The instructor went into the private office and answered the phone.

Students continued working and one student raised her hand while the instructor was on the phone. The phone call lasted 92 seconds and the instructor immediately went to assist the student who had raised her hand. There appeared to be five students who frequently asked for assistance. The other students seemed to be focused and engaged.

There was a student who appeared to be working intensely. The investigator/observer moved closer to examine what this student was working on. She was on the Internet looking at a music-related web page. She scrolled through the
document and looked up at the observer. She did not move on to another activity but continued to read the webpage.

A male student started singing along with his the music that was emanating from his earphones. The rap music had a distinct beat and could be heard by the observer from across the classroom. This student was typing, singing, and waving his hands in dance-like motions. Then this student got up and left the classroom for seven minutes. He left his earphones on the work surface of his workstation. About 45 seconds later the teacher looked around the classroom and asked who had their music turned up. No one responded to her. She asked again and one student replied “we all do”. The teacher then told the students that they knew the rules. They needed to wear their earphones if they wanted to listen to music. One student challenged the teacher and stated that she could not afford earphones. The teacher and student debated this issue for over a minute.

The teacher resumes walking around the room and overseeing student activity. The observer asked the teacher what the lesson objective was. The instructor responded by saying that the class was learning about cash receipts and they were working on recording in the sales and cash receipts journal and automated accounting.

How do the participants respond to the trainer?

Participants asked the trainer for assistance on a frequent basis. The trainer was busy moving from one work station to another. They seemed to feel comfortable with their instructor and surroundings but did not all follow the same class norms such as raising one’s hand when assistance is required. Some students did this, but four students vocally asked for assistance and challenged the instructor on Business Professionals of America (BPA) dress code and earphone/music policy. The instructor mentioned three times that her students were upset with her for leaving them while she attended the conference.

Are the participants engaged in the training session?

Most of the participants were engaged in the training session 100% of the time. When the class was discussing professional attire as a group or earphone policies they contributed vocally and with eye contact. After these brief discussions the task-based activities would resume.

Are employees/students trained in problem-solving (PS)? If so, how?

Students were working through problems on worksheets, in their text books, on the calculator, on paper, and using a spreadsheet. Students were able to perform multiple step calculations and answer progressive problems that spanned several pages of a textbook. Interestingly, students were able to perform these tasks with varying levels of assistance while listening to music.

Are employees/students trained in higher-order thinking (HT)? If so, how?

While there was problem-solving taking place, the dependency on the instructor’s guidance lends this observer to believe that four students may not be at a point in their knowledge base where they can comfortably use higher-order thinking skills. They were able to move from textbook to spreadsheet and calculator with guidance. The observer
noticed that three of the four students appeared to be on track with the process but wanted the instructor's guidance to insure they were on the right track. The rest of the students were able to work with a variety of tools (as addressed above) to solve problems.

**Are employees/students trained in customer service (CS)? If so, how?**

The instructor offered that Business Professionals of America (BPA), Key Train, and employment, if they are out on the job, are ways students learn customer service skills. The instructor added that there is a career skills portion/lesson in Key Train. Aside from the discussion at the beginning of the observation, this observer did not witness customer service training as was stated by the instructor.

**What other elements for success (ES) appear to be present in the training session?**

Most students were able to self-manage their work. They worked on accounting principles independently and sought assistance when needed. Students were communicating with each other. Some students checked for understanding and followed the established classroom norms such as placing finished assignments in the appropriate mail slot. Students were able to self-check the process and verify correct answers to the problem with and without assistance.

**Does the training session incorporate aspects of globalization or economics? If so, how?**

As the instructor moved from one workstation to another she did make mention (to one student) of converting money to foreign exchange rates. When the instructor moved she brought up the conference she had just attended and mentioned that globalization was a topic that was covered in one of her sessions. She commented to the observer that she is aware of the importance of globalization and working in a global context, but she wasn’t certain how she could incorporate it into her class. She stated, “Globalization – to me it is the length of the day, types of transactions, conversions quality and standards, weights and measures. How certain things are weighted in terms of measurements. Kilograms verses ounces. We still have two different styles of measurements. It is important to know how to convert these.”

**What is the objective of the training session?**

The observer asked the instructor this question. The instructor replied, “We are working on balance sheets and advanced accounting. I have also incorporated organization into the expected activities so students are accountable for their behavior. Students did not do a lot of work while I was gone, but were worried about their progress. Students need to maintain their time cards sign Internet use policies. I let them use headsets to listen to music because I know their brains function better when they can multi-task. Students are visual and auditory. I let the morning class stretch a little more because they have a good work ethic.”
The secretary was supposed to escort this observer to the next classroom observation. She did not show up so the instructor volunteered to escort the observer to the office. The instructor provided the following information without questions or prodding from the observer. (Please note that the observer merely listened as they walked down the hall. The observer did thank the instructor for her time.)

“I would like to see more of the stations worked to the back need more space. I have mostly females in the morning and males in the afternoon. Most of my students are interested in accounting, entrepreneurship, business accounting and CPA. I am trying to expose student to the requirements.” She began talking about the new state standards, employability, technical, and academic and state standards. The instructor then told the observer that there were four things that were important for her students to exhibit if they were to be considered for co-op jobs. These were: Character, dependability, maturity, honesty. She stated, “If they have those, the tech skills a lot of times employers can overlook. Those are the students I choose to send out if students can show those 4 things. (We) talked about a lot of these at the staff meeting (Soft skills).” She mentioned that she has some students placed in accounting and areas where they do not use as much of that where they’re taking mess. Varies by job they are sent out on. She added, “More than 75% of the time employers want the students to utilize soft skills, job skills.”

This led the instructor to bring up her philosophy of learning, she stated “Learning = Learning Lifelong learners (and it) is still just the thing to be a life long learner and professional development education is still important and trying to get them somewhere, even a two year degree or to try to get them into a company.”

As we walked down the halls to get to the main office the instructor commented about her career center, “We are unique because we have a physical building and money available to help student learning.” She related that she came from a public school and it was difficult to get anything (supplies and classroom tools). She enthusiastically stated, “The monetary situation here is uplifting to say the least.”
APPENDIX N
CTE1c Implementation Observation (1a) Field Notes

Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 2-13-08
Starting Time: 10:15 a.m.
Ending Time: 10:30 a.m.

Describe the setting. Machine Tool lab with adjacent classroom and instructor’s office both with large windows. Natural lighting at ceiling. High ceiling (approximately 24 - 30 feet). Instructor was dressed in a pewter long sleeve dress shirt with the sleeves rolled up just below his elbows. He also wore dark blue Levis and brown leather tie shoes with rubber soles.

Describe the impressions of the trainer.
Calm, confident, and seasoned. 32 years of teaching experience. When the observer disclosed the parameters of the study and informed the instructor that his identity would be kept confidential and the results of the observation would be kept confidential from his supervisor he stated that the observer could repeat anything he did or said to his principal. He further stated that he had 32 years of teaching under his belt and he was confident in his teaching skills. The trainer seemed relaxed around his students and the observer. He did not appear nervous and did not interfere with the observer’s observation time. The students approached the instructor to ask questions for clarification.

Number of students/employees present.
13 in the a.m. session

Describe the activity that is taking place.
1/ working on lathe other half on mill. All first year students. None working on CNC. 2 out working and 7 second year that are here. Pm working on lathe. Students were cleaning up in the shop.

What is the objective of the training session?
The observer asked the instructor what the objective of the training session was. He stated that each student was working at an independent level. They each had projects and tasks they needed to complete and master. He added ½ of the students were working on lathe and the other half on mill. In the a.m. session all first year students are either working on the lathe or the mill but none working on CNC. CNC is complex and is a second-year process. Of his second-year students 2 are out working and 7 second-year students remain in the classroom. Students were cleaning up in the shop.

Students were observed at the end of the class period. Instructor requested that the observer come back at the start of the second session 11:45 – 12:00 noon. There is a staggered start with students from various sending districts arriving at various times. Students cleaned with shop vac, hand brooms, and hand dust tools.

All appeared to be on task all students wore safety glasses.

How do the participants respond to the trainer?
Students were polite and continued working around the observer. Did not seem to be bothered by the observer's presence. Students went to their lockers and put their safety attire on which included glasses Students found tools and began working at various stations. Students verbally communicated with each other but discussions seemed to center around tasks in the lab. There was some personal conversing going on but did not seem to distract from the work. Students appeared to get along and worked well as a team. The instructor did not need to hover over students. One student needed assistance threading a large drill bit into a lathe. The instructor guided this student through the process. Students seemed to know where to find their materials. Each was engaged in a different task.

Are the participants engaged in the training session?
Students interacted with machinery, computers, and made decisions on dimensioning, material selection and the type of tasks they needed to complete or goals they needed to work on. At 10:20 a.m., all students shut down their equipment and began the cleanup process. The instructor suggested that the observer return to view the afternoon session as the remaining time would be dedicated to the cleanup routines. The observer agreed but remained until the class was dismissed. Students worked up until dismissal time at 10:30 a.m.

Are employees/students trained in problem-solving (PS)? If so, how?
Students seemed to work well in teams and as individuals. They asked each other for help and also approached the instructor.

Are employees/students trained in higher-order thinking (HT)? If so, how?
Students were observed working independently on various tasks. Some students were reading blueprints and machining parts based on those specifications. Other students were operating equipment independently.

**Are employees/students trained in customer service (CS)? If so, how?**

While cleaning the shop/lab area students seemed to assist each other with various tasks. Two students brought cleaning tools to other students and then proceeded to engage in cleaning activities such as sweeping, vacuuming and placing tools in their designated areas.

**What other elements for success (ES) appear to be present in the training session?**

Students were primarily cleaning the shop/lab area at the end of the morning session. They were on task at all times and communicated with each other through both verbal and non-verbal interaction. At no time did the instructor announce it was clean up time. The students were self-directed and self-managed in this activity.

**Does the training session incorporate aspects of globalization or economics? If so, how?**

Students seemed to adapt to working both individually and as teams. Specific issues pertaining to globalization were not observed. Between sessions the instructor discussed the economic base of Muskegon and told the observer that there is a large demand in the community for students who are in his program. He did note that machine trades and manufacturing jobs were declining on average but seemed to be increasing locally.
Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 2-13-08
Starting Time: 11:45 a.m.
Ending Time: 12:32 p.m.

Describe the setting. Machine Tool lab with adjacent classroom and instructor's office both with large windows. Natural lighting at ceiling. High ceiling (approximately 24 - 30 feet). Instructor was dressed in a pewter long sleeve dress shirt with the sleeves rolled up just below his elbows. He also wore dark blue Levis and brown leather tie shoes with rubber soles.

Describe the impressions of the trainer. Calm, confident, and seasoned. 32 years of teaching experience. The trainer seemed relaxed around his students and the observer. He did not appear nervous and did not interfere with the observer's observation time. The students approached the instructor to ask questions for clarification.

Number of students/employees present. 16 in the p.m. session. The instructor indicated that there were 3 students who were absent and 2 students who were out on work-based learning assignments.

Describe the activity that is taking place. Attendance was taken in classroom. The instructor walked to the front of the classroom and sat at his desk facing the students. One female and six males were present. Some of the class had arrived. Due to staggered start times the rest are anticipated to arrive later.

The instructor communicated with the observer that he usually does an integrated math or blue print reading lesson at the start and end to adjust to the time/schedule differences. Today he had to alter his plans because his para-educator was absent due to illness and the para-educator had the blueprint reading book.
After attendance was taken, this procedure took 90 seconds, the instructor declared, “Okay ladies and gentlemen, let’s go to work.” The students responded by standing up, pushing their chairs in underneath the desks and walking into the lab.

**What is the objective of the training session?**
Students working independently to master tasks related to machine trades.

All appeared to be on task all students wore safety glasses.

**How do the participants respond to the trainer?**
Students were polite and continued working around the observer. Did not seem to be bothered by the observer's presence. Students went to their lockers and put their safety attire on which included glasses Students found tools and began working at various stations. Students verbally communicated with each other but discussions seemed to center around tasks in the lab. There was some personal conversing going on but did not seem to distract from the work. Students appeared to get along and worked well as a team. The instructor did not need to hover over students. One student needed assistance threading a large drill bit into a lathe. The instructor guided this student through the process. Students seemed to know where to find their materials. Each was engaged in a different task.

**Are the participants engaged in the training session?**
Only one student (Lenny) was not engaged in a task. He went to three different stations and tried to socialize with some students. This was a very brief and short-lived activity for Lenny or so it seemed. Lenny liked to discuss personal issues but other students redirected Lenny.

At 12 noon more students trickled in and prepared for work. Some students had blue prints they were working from that they pulled out of their lockers. Others looked for specific pieces of aluminum, copper or other materials. Two students were working together on the new CNC mill. The female student was wondering around the shop and the instructor went up to her and discussed something. Then the female student began collecting materials and began working on a project. It became difficult to hear conversations because many machines were running. Students continued working and periodically engaged each other in conversation. Many students smiled broadly as they spoke with one another. The communication did not seem to interfere with their tasks.

Students interacted with machinery, computers, and made decisions on dimensioning, material selection and the type of tasks they needed to complete or goals they needed to work on.

**Are employees/students trained in problem-solving (PS)? If so, how?**
Students seemed to work well in teams and as individuals. They asked each other for help and also approached the instructor. Some students consulted blue prints and other course materials such as manuals.
Are employees/students trained in higher-order thinking (HT)? If so, how?
CNC mill students exhibited higher order thinking skills in the large CNC Mill. They plotted X, Y and Z coordinates, programmed the machine, selected the improper materials and as a team (2-3) machined an aluminum part. The student volunteered that he was machining a miniature replica of a car steering wheel. He told the observer that he had been working on the project for about one week. He was animated when he talked about the process of creating his project and stated that he enjoyed what he was working on. As the observer peered into the window of the CNC Mill, the student began instructing the observer on the process of calculating the coordinates and setting the aluminum in the machinery to be milled.

Another team of four students used trial and error to test machine parts. They collaborated and discussed what part to try next based on the degree of fit of the previous parts they had tried.

Are employees/students trained in customer service (CS)? If so, how?
Students seemed to keep each other engaged and motivated. Several students approached others and asked for input in various ways. Lenny asked a student who was operating a Lathe about the size of a part he was holding. He asked for information on tolerancing. The other student offered a suggestion and gave Lenny a couple of suggestions. Students again seemed to interact well with one another. Students were polite in the observer’s presence. She tried to stay out of their way and be as unobtrusive as possible. One student asked if the observer was studying the class and asked if he could help in any way. He was told to ignore the observer, by the observer, and just work as he usually would. Students exhibited customer service skills in helping each other and being mindful of the equipment and the instructor.

What other elements for success (ES) appear to be present in the training session?
100% of students wore proper safety attire and exhibited communication skills by their non-verbal and verbal responses to one another. Every student in at least one point in the observation worked actively as a member of a small group. The observer interpreted this behavior to be a demonstration of team-work, problem-solving, and enjoyment of work.

Does the training session incorporate aspects of globalization or economics? If so, how?
Students seemed to adapt to working both individually and as teams. Specific issues pertaining to globalization were not observed.
Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

Date: 3-26-08
Starting Time: 9:15 a.m.
Ending Time: 10:30 a.m.

Describe the setting.
A rectangular room approximately 32 x 48. The walls were a light mocha/mauve color and the carpet was a subtle Berber with brown and taupe flecks. The front of the classroom had a wall of windows and an oak and glass door. The student receptionist station was located to the left of the door (from the observer’s position). The receptionist’s station had floor and shelf plants and a contemporary frosted glass section divider with glass and black panels. The Receptionist’s area contained office equipment including a phone, desk blotter, name plate, facsimile, computer, and scanner. To the right of the door was a small private office with a large window and an oak door. The student mailboxes were located between the window and the office door. The wall to the adjacent classroom had an oak door and windows that were partially covered with student project posters. The instructor’s desk was in the back of the classroom and there was a fourth solid oak door with a glass side panel to the left of the door. There were 25 computer work stations in addition to the receptionist’s desk and instructor’s desk. There were additional work surfaces. All computers had flat screen displays. The lighting was bright and easy to work in. There were motivational, framed posters on the walls to inspire students to think about “Vision”, “Goals”, “Attitude”, “Excellence”, and “Work Ethic”. There were 3 color laser jet printers, a photocopier, bookshelves, dry erase board, overhead LED projector and two televisions.

Describe the impressions of the trainer.
The subject was dressed in business casual attire. She wore a layered outfit with a solid pink shell, black and pink striped dress shirt, and ribbed cardigan sweater. She wore black pants and shoes. The instructor was pleasant and enthusiastic about her curriculum.
She briefly discussed her English Language Arts pilot program with the observer prior to the observation. The instructor greeted students as they entered the classroom. She was friendly and interacted with the students in a jovial yet professional manner.

**Number of students/employees present. 12**
Instructor indicated that some students were out due to MME make-up examinations. Typically there are 17 students in the morning and 19 in the afternoon sessions.

**Describe the activity that is taking place.**
Students had already begun arriving and started work prior to the sound of the bell. Class officially began at 9:20 a.m., however 7 out of the 11 students were already working at their work stations prior to the start of the class session. All students were seated at the sounding of the bell. As students entered they were observed checking their mail boxes, settling in at their workstations, reading, and typing. One student was seated adjacent to the classroom door in a simulated receptionist area. She had her own name plate, phone, and computer. The CTE Principal arrived at 9:23 a.m. and was greeted by the student receptionist. He walked around the room and greeted the students using their first names.

**How do the participants respond to the trainer?**
The student receptionist was organizing paperwork and filing. She had a question and began to approach the instructor. The instructor promptly responded and walked toward the student. They spoke in hushed tones. The observer could not hear the dialogue, but the instructor used eye contact and leaned closer to the student to communicate without disturbing the class. The receptionist and instructor returned to their work stations. As the instructor walked around the classroom, student remained focused on their work. The instructor made a few copies and collected a student file and then approached a female student and quietly discussed her performance in the class. The instructor quietly told the student the things she still needed to work on specifically the ELA assignments. The instructor encouraged the student and gave both positive and constructive suggestions. The student stated she had a few questions about her project. The project entailed using multiple office productivity software applications such as Word and Excel. The student was working on a sales forecasting project that entailed the use of problem-solving skills. The instructor and student discussed the project in terms of impact on customers, the specific data that was to be included in the report and how to pull it all together in a comprehensive project.

**Are the participants engaged in the training session?**
Yes. They all remained engaged in their work. At 10:20 a.m. some students began to get up and stretch. The LEA instructor came into the room and began working with the male student on his discussion questions. One student asked for permission to sign out for a break. They appeared to work through problems on their own. Occasionally a student would make contact with the instructor and discuss their ideas or ask for assistance. The instructor responded by asking questions and encouraging the students to come up with
the answers using their knowledge base. She would directly answer procedural questions but probed the students to encourage them to problem-solve.

Students remained engaged until the designated break time at 10:30 a.m. At 10:29 a.m. some of the students were directed to continue working for another minute. All time appeared to be used wisely and efficiently.

Are employees/students trained in problem-solving (PS)? If so, how?
Yes, students are self-managed. Mostly, they were on track and engaged in various activities. Students were observed moving easily from one activity to another with little or no direction given by the instructor. They were all working on different projects independently with the exception of the team of two students who appeared to be working on a group entrepreneurship project.

Upon closer inspection of the team of students, they were discussing different personality profiles. After the observation the instructor explained to the observer that the students were learning about personality profiles, specifically promoters, reflective, controllers, and perfectionists. The goal of that project was to find other students who had the same personality profile and discuss how they could interact and work with different personality profiles. The students suggested that the instructor create a final exam that centered around personalities. They could work through a scenario in a business. Every student personality profile could be slotted into a position. They also suggested that it would be a great idea to be grades on their team-work abilities and effective communication skills.

Are employees/students trained in higher-order thinking (HT)? If so, how?
The instructor informed the observer, prior to the observation, that all students were working at a self-directed pace. All students had keyboarding exercises that they would be performing the first part of the session and then they would be working in various assignments related to accounting, finance, entrepreneurship and English Language Arts. Additionally, prior to the formal observation period, the ELA teacher entered the classroom and engaged the instructor in a conversation pertaining to the results of the previous writing assignment. A group of students in this class was participating in the pilot program for ELA. They were reading “First Contract” and were instructed to write, in Memo format, about their impressions of the text as well as 6 connections to the business industry. The observer was given the opportunity to read the student paper. There were many higher-order thinking elements in the paper. One of the most exciting discoveries was that the student gave specific comparisons from the book and linked them with specific entrepreneurship learning objectives. The paper/memo was well-developed in ideas and creatively made connections between the assignment and the world of work.

Are employees/students trained in customer service (CS)? If so, how?
Students greeted the instructor, parapro and each other as they entered the room. There was some friendly communication, but after the bell sounded all students were quietly engaged in their work. Two visitors entered the room during the observation session and were greeted by the student receptionist. At first there were two students who were curious about the presence of the observer. The instructor identified the observer. The
students acknowledged the observer and a few smiled, but they went about their business. Customer service was also observed when the instructor interacted with students. Their response was polite and they seemed to like the instructor, but respected her. The instructor modeled customer service through listening and monitoring the students.

One student was subtly asked to speak with the instructor in a private office in the front right corner classroom. The student responded promptly and quietly. Other students did not even look up from their work to see why another student was talking to the instructor in the office. After the conversation, the student returned to her work. Customer service is also applicable to those who we work with. Students are being taught not to make a big scene if they are pulled out of class to speak with their supervisor. The instructor approached the observer and briefly discussed what had happened. She stated that she was asking the student if she would be interested in a Co-Op position. She stated that she pulls students aside to discuss discipline as well as other conversations that are not intended for public announcements but are also positive in nature.

Students asked for assistance by raising their hands. Sometimes assistance was given simply by making eye contact with the instructor.

**What other elements for success (ES) appear to be present in the training session?**

The classroom environment was organized and efficient. Today was the Culinary Arts pizza day. Instead of having all the students go to the restaurant, the student receptionist took orders and money. Students will have their pizza delivered during the break. This is a proactive way of allowing students to participate in school activities without disrupting work flow.

At one point two students appeared to be collaborating on a project. One student held papers in her right hand that appeared to be discussing a table or chart.

Some students were working on their business plans, others were working through accounting projects, Access databases, Excel spreadsheets, and discussion questions.

**Does the training session incorporate aspects of globalization or economics?**

*If so, how?*

Students were working on entrepreneurship projects that involved product research, demographics, sales projections, and internal and external factors that will influence entrepreneurial success.

**What is the objective of the training session?**

The training session was self-directed. Students have assignment sheets listing tasks they are to complete. They are given rubrics for assignments. The instructor indicated that students who are working on the ELA pilot will be pulled out of the simulated office environment to participate in lectures and discussions. Today, the objective was to continue working on goals and assigned tasks related to business, entrepreneurship, and accounting.
Thank you for participating in this study. Your time and input are greatly appreciated. During the interview, you will be observed for between forty and eighty minutes. The researcher will view the participants in a natural setting where implementation of your school/company training is taking place. Field notes will be taken according to observations made by the researcher. Please try to respond as you would under normal circumstances.

**Date:** 3-26-08  
**Starting Time:** 12:20 p.m.  
**Ending Time:** 1:40 p.m.

**Describe the setting.**  
The Machine Tool Precision Trades program was housed at the M-Tech Center which was located on property adjacent to the Career Tech Center. This facility was built approximately 6 years prior to the observation date, circa 2002. The classroom/lab area was located down the first corridor to the right of the main entrance. The lab/shop area was a large space approximately 90 x 70 square feet. A floor plan was provided to the observer upon request. Two instructor’s offices were located one on each side of the entrance into the lab/shop area. A formal classroom and a small instructional lab space were located to the west of the lab/shop area with a storage room separating the two classroom areas. Observation windows created visibility in both classroom areas as well as both instructor’s offices. The CTE Instructor and parapro shared the office directly to the west of the lab/shop entrance and the college instructor utilized the office to the east of the lab/shop entrance. The shop was well light and bright. There was one large bay door in the center of the room and the entire outside wall had a row of square windows that allowed for natural light but did not allow for people to look in or out. The machines were clean and looked to be well-maintained.

Two classes were simultaneously conducted. Both CTE and college instructor shared lab/shop space during the observation.

**Describe the impressions of the trainer.**  
Plaid shirt neutral shades and brown dress pants. Personable. Instructor greeted the observer and introduced parapro. Briefly discussed the process of the observation. Instructor shared some stories about student success. (See notes)

**Number of students/employees present.** 10 out of 15 students were present
Describe the activity that is taking place.

Class began at 12:20 p.m. Students entered the space and either began working in the shop with the paraeducator. Three students went to the small instructional lab to begin working on project designs. There were three computers and 6 scaled versions of work stations with granite (thick 4 inch) blocks on wood work benches. Instructor worked with a team of two students while they problem solved machine tool specifications. They collaborated on geometric design concepts including diameter and tolerancing. Instructor asked students to map out the procedural steps they needed to complete for the project. The instructor guided the students on their projects for their Process Plans. Students asked questions and wrote down each step. Both students watched the instructor and he discussed how they were chucking on the diameter of the object and how to find the diameter and length of the material for the part specification. Students also discussed how to cut thread and measure diameter pitch. MD Major diameter by the length. Modeled one problem and explained that they could work backwards from the finished project. Then the instructor had the students calculate another diameter problem and encouraged students to arrive at the answer. Instructor continued to explain the remainder of the procedure. The entire process was broken down into steps to find major and group diameters as they relate to the part print. Instructor explained the process for chamfering the part using the minor diameter. The instructor wrapped up the small group activity by reinforcing the lessons and explaining how the students would apply mathematics in the classroom lab/shop area. The message was reiterated as the instructor checked for understanding. Then the instructor moved on to dialogue with the third student.

The third student was working independently. He was at a computer workstation watching a video on machining proper angles. The video had footage of machine tool engineers in the workplace. There were specific demonstrations that echoed the same topic the instructor was working on with the other students. The video demonstrated proper techniques and reinforced safety precautions that should be taken in the workplace. The video demonstrated how to measure parts and check for tolerancing in order to insure accuracy.

At 12:56 pm the instructor exited the small instructional lab and walked into the lab. The three students remained in the classroom and worked independently. The two students who were working in a team began discussing the procedures. They examined their worksheets and the male student wrote his calculations as the female student began organizing her book and notebook. She opened her book and began working. The third student (M) worked independently.

At 12:58 p.m., the observer left the small instructional lab area and entered the lab/shop area. One student was working on filing clamp arms down on the lathe. He stated that he needed to file the nicks out of the files. The students greeted the observer and was curious about what she was doing. He was polite and enunciated his words with clarity. The observer told the student to she was conducting research and to proceed as usual. Each time the student worked a file on the lathe he would check the tolerancing using a micrometer/dial caliper. He intuitively worked the mechanisms of the machine while watching the part that was being machined.

Two students were working independently on the standard Mills. Another student was working with the para-educator on the Mini Mill. He was setting the X Y and Z
coordinates. The paraeducator gave suggestions to the students on how to program the laser drill so it would accurately cut the aluminum block according to the X Y and Z axis that the student was programming. The parapro continued to guide the student through the process. The parapro referred to the student’s resource notebook. The student asked for affirmation as he continued. At a natural break in the activity the parapro introduced the student to the observer and asked him to explain what he was doing. The student stated that he just started in this program this past fall. The student explained the difference between the regular mill and the CNC mill. The parapro explained that students watch a demonstration on the standard mills and can work with less direct supervision. The CNC mill requires constant supervision because of safety and cost issues. The student explained that CNC is expensive and can perform many tasks at one time. He also told the observer that the slightest miscalculation can easily crash the system. The student then proceeded to explain how he programs the CNC mill to find the zero point or the absolute start (Part Zero). Everything hinges on that calculation. Student was friendly, and articulate in his description of the CNC mill process. He also discussed how this program helps to prepare him for the workforce by learning the specific skills of the trade.

At 1:17 p.m., the college instructor introduced himself to the observer and explained that four of the students working in the lab were from the college. Students are given a set of projects they are to complete and work independently throughout the semester. The college instructor offered/suggested that he thinks students learn better with hands-on application. He stated that when the students are going to learn a new skill set then they will sit down and go over procedures, but they learn more in-depth through contextual experience.

At 1:24 p.m., the student on the CNC Mill continued to work collaboratively with the para. Both college and CTE instructors walked around the lab and asked students questions or assisted them.

At 1:28, 2 of the 3 students who had been working in the classroom came out onto the lab/shop floor and began applying their procedures using separate lathes. At this point there were 4 CTC students on the lathes, 1 CTC student operated the CNC mill and 4 college students operated the standard mills.

At 1:38 The observer was asked to witness the final CNC program. The student conducted an analysis or simulation of the process on the computer screen and then the parapro walked the student through the machine program initiation. The parapro spoke and moved his hands near the appropriate buttons This enabled the student to visualize where the buttons were and what order they should be pressed. The parapro kept verbally reinforcing why the student was doing each step.

How do the participants respond to the trainer?
The two students who were working with the instructor in the classroom seemed to be comfortable with the instructor. Their body language suggested they were listening. The students asked questions for clarification. They responded with eye contact. One student was seated and looking on the paper the instructor was working off of. The other student
stood to the left of the instructor and leaned forward while watching and asking occasional questions.

The instructor supervised the lab by walking to each occupied station and walking the entire area of both the small instructional lab space. He watched students individually as they worked on the lathes and either encouraged or made suggestions. Students seemed to easily engage the instructor whenever he approached and students periodically sought the instructor to ask questions pertaining to their projects.

The instructor seemed to have a calm demeanor. Students were on task for the entire observation time. They seemed to be self directed. At no time did a student verbally challenge the instructor in a disrespectful manner. The students were observed asking questions and applying their knowledge to the projects they were working on. Additionally, the student who worked with the parapro was also engaged. The parapro seemed to have the student’s focused attention for the duration of the class period.

**Are the participants engaged in the training session?**
Throughout the observation, students were observed checking and rechecking the parts they were machining. Also students would periodically stop to clean their machines/equipment. Students remained on task and seemed to solve problems with little or no assistance.

**Are employees/students trained in problem-solving (PS)? If so, how?**
According to the instructor, first-year students are given part specifications with procedural sheets. They use the procedures to guide them through the machining process. 4 students were observed using these procedure and mechanical renderings of the specified parts. The student who was working on the CNC Mill also referred to a procedure that he kept in a notebook. Students who operated the lathes were observed checking tolerances with dial calipers. The student on the CNC Mill used problem-solving skills as he programmed the CNC Mill. Second-year students were observed working with the instructor to write their own procedures to create specific machine parts using the lathes. An example of a Process Plan and Mechanical Renderings for a CLAMP-DET. #3 & * (SMALL PINS) project were provided to the observer upon request.

**Are employees/students trained in higher-order thinking (HT)? If so, how?**
The instructor noted that second year students have to write their own procedures and are expected to design and machine a tool to not only include predetermined specifications, but they must also incorporate unique elements that are both original and functional.

Students work through several processes throughout the year and are given a final exam that encompasses both written and practical applications. According to the instructor, students are tested on two processes they have mastered during the year. Students write procedures for creating their Mini CNC Mill and Lathe exam projects. They may use any lab/shop and classroom resources that are available. The process to complete both the written and practical exam components are timed. Both CNC MILL...
and CNC TURNING CENTER (Lathe) practical exam sheets were provided to the observer upon request.

Students are given a list of required projects to complete each term. Each project must be inspected by the instructor and students are responsible for the quality assurance of their projects. An example of the PROJECT INSPECTION REPORT was provided to the observer upon request. Students must manage their time and learn how to properly utilize classroom and lab/shop resources in order to complete the requirements of the course. Students are also required to write demonstration notes that detail safety, setup and operation procedures. An example of the DEMONSTRATION NOTES form was provided to the observer upon request.

**Are employees/students trained in customer service (CS)? If so, how?**

Yes, the students appeared to exhibit politeness to both the other students and staff members. Students actively listened to the instructors and parapro. The student who operated the CNC Mill was enthusiastic about sharing what he was learning when prompted by the parapro.

Both the CTE and college-level instructors, as well as the parapro, conveyed a positive attitude regarding their program. They were eager to discuss the program both prior and after the observation ended as well as during the interview. An exuberance and sense of pride for the student’s success and CTE program were evident.

**What other elements for success (ES) appear to be present in the training session?**

Students were able to self-manage during the observation time. They asked questions and seemed to demonstrate a sense of pride in their work. Students were also observed cleaning their equipment, checking and rechecking tolerances, and demonstrated skills in quality control. All students took initiative of the projects they were working on during the observation.

Prior to the observation, the instructor discussed the role of mathematics in his program. The example the instructor related was regarding a young woman who entered his class with no interest in mathematics. She had stated that she was not good at math. After two years in the machine tool program the student had successfully completed several projects where she used applied math skills including trigonometry. She scored a 67 on the ASVAB and had high math scores and an in-depth understanding of applied mathematics. Additionally, she was able to raise her Work Keys Applied Math score as well.

Other elements for success were not observed but were touted by the instructor and parapro. Five students were reported to be out working at their Co-Op jobs. This training was occurring at the time of the observation but was not observed. Students compete for the Co-Op positions. This is reflective of the real-world process for obtaining employment. The instructor indicated that there was a great deal of industry support. There is a competitive scholarship process for the Co-Op and Scholarship program. Students are expected to create portfolios that they will present to a panel of industry representatives in an interview. Candidates who are selected are given the opportunity to work in 2 or 3 shops during their rotation. They are paid for their positions and are given $750 in scholarship money that may be used for education or tools. Some students have
benefited beyond their scholarship and Co-Op pay check by participating in profit sharing and 401K plans if they qualify.

**Does the training session incorporate aspects of globalization or economics?**

*If so, how?*

Prior to the observation, the instructor shared some anecdotal stories regarding success of students who had graduated from his program. He noted that the students who showed the most initiative in this program had gone on to work in the industry or had signed on to work in the military. Presently, he knew of one student who was going to be working in England for two years and another student who was presently working in Iraq. Both were going to be working in areas related to machine tool.

**What is the objective of the training session?**

Students were working independently on projects. They were given a list of tasks at the beginning of the term and had to self-manage in order to meet their deadlines. Students worked to become proficient on lathes and mills that are used in this industry.
## Interview SWOT Analysis

### Emerging Concepts and Themes

**MT 1 Leadership Interview**  
**Category:** Leadership  
**FOCUSED CODING AND SWOT ANALYSIS**

### Articulation with CTE

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<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTE students can be assets to the organization.</td>
<td>CTE students have been adequately trained, but it depends on the student.</td>
<td>CTE background and employability skills can translate to higher earnings at a faster rate compared to employees with no CTE</td>
<td>CTE programs teach skills that can articulate into the workplace.</td>
</tr>
<tr>
<td>CTE students have been adequately trained, but it depends on the student.</td>
<td>Has had experience with CTE students who are deficient in employability skills/ work ethic.</td>
<td>CTE instructors honestly communicate each student's strengths and weaknesses.</td>
<td>CTE students can benefit from work-based learning activities such as site visits.</td>
</tr>
<tr>
<td>Employee has received specialized training in a vocational area.</td>
<td></td>
<td>CTE training provides students exposure and experience operating workplace equipment.</td>
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<tr>
<td>Hire students from Career Centers</td>
<td></td>
<td>Hire students from Career Centers</td>
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</table>

**Recommendations**  
Employer utilized students with CTE training and is willing to give students an opportunity for employment based upon a CTE instructor's recommendation. MT has a positive rapport with CTE. However, the quality of the employee's technical and employability skill level depends on the individual not necessarily the specific training.
### Cross Training

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<tbody>
<tr>
<td>Training in all areas is essential</td>
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**Recommendations**

Cross training is present in all aspects of this MT site. Cross training was apparent in both the interviews and the observations. Being able to operate multiple types equipment and software programs is an essential component for success. Limitations of cross training are that the skill level of the organization is dependent upon the skill level of the most effective employee.

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### Customer Service

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<tbody>
<tr>
<td>Provide customer service to generate and retain business.</td>
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</table>

**Recommendations**

MT awareness of customer service is limited to literal interpretation of face-to-face interaction with customers. Observations and discussions with leadership show a deficiency in customer service awareness and training in this area. Customer service skills could be improved in the office setting as observed in the office setting.

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### Economic Shift Related to Inflation

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**Recommendations**

Rising costs associated with operations and production were prevalent in this interview. The MT subject views the economic climate as a threat and not as an opportunity. Response to the economic climate is reactionary.

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**Recommendations**

Rising costs associated with operations and production were prevalent in this interview. The MT subject views the economic climate as a threat and not as an opportunity. Response to the economic climate is reactionary.
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</tr>
</thead>
<tbody>
<tr>
<td>An employee's lack of work ethic can be detrimental to an organization.</td>
<td>An employee's lack of work ethic can be detrimental to an organization. Globalization has placed more demands on the company.</td>
<td>An employee's lack of work ethic can be detrimental to an organization.</td>
<td>An employee's lack of work ethic can be detrimental to an organization.</td>
</tr>
<tr>
<td>Employee has made a positive impression during the first six months of employment.</td>
<td>Employees who are unable to improve speed and accuracy do not remain employed with this company.</td>
<td>People may need to make sacrifices early in their careers to achieve success later on. Experience is an investment.</td>
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<tr>
<td>Employee produces quality work.</td>
<td>Employees who make frequent mistakes do not remain employed with this company.</td>
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<tr>
<td>Employees should be able to work with little supervision.</td>
<td>First impressions are a crucial factor in hiring employees.</td>
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<td>Employees who may few mistakes are noticed and valued.</td>
<td>Some employees are incapable of improving their performance level.</td>
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<td>Some employees are unaware of how their quality of work impacts the organization.</td>
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<td></td>
<td>Work Ethic is valued and noticed. Lack of work ethic is viewed as detrimental and noticed. Not all CTE students are assets. One student missed many days and did not want to put in the effort.</td>
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**Recommendations**

Employer relies heavily on each employee's level of work ethic. Several questions focused on the necessity of people within the organization who can multi-task and perform at a high level of production for many hours. Employer is willing to take risks in hiring employees if he believes the individual possesses a strong work ethic. The employer does not hesitate in releasing employees from the organization if their performance is inadequate. MT1 did not seem to have a concept of specific technical or problem-solving skills that may be needed to proactively advance the organization. Showing up on time everyday and ready to work as well as the ability to multi-task and make little to no mistakes are valued. However, specificity of skills was not communicated to the observer.
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<tr>
<td>Hire detail-oriented employees</td>
<td>Maximizing employees skills and talents may create a deficiency in another area.</td>
<td>Hire detail-oriented employees</td>
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</tr>
<tr>
<td>Place people according to skill level</td>
<td>Specialized employees in math and programming</td>
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<tr>
<td>Preference to employees who can multitask and cross train in multiple areas</td>
<td>Maximize employees skills and talents.</td>
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<tr>
<td>Specialized employees in technical areas</td>
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**Recommendations**

Employees who can multitask are valued in the organization. The ability to perform at a high level of production lowers the operational costs and maximizes the production output. This is a reoccurring theme in this interview.
## Impact of Globalization

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<tr>
<td></td>
<td>Survival is reactive</td>
<td>Higher quality plastic molds and attention to customer needs give this company an advantage over global competitors.</td>
<td>China can produce plastic molds at 1/3 of the cost as US companies.</td>
</tr>
<tr>
<td></td>
<td>Hires dislocated workers from other MT businesses that have gone out of business.</td>
<td>Improving the system enables this company to compete. Will fight to stay in business at any cost.</td>
<td>Globalization and competing with other countries has been detrimental.</td>
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<tr>
<td></td>
<td>Globalization and inflation have placed more demands on the company.</td>
<td>Other MT businesses have closed because they have not found a way to be profitable with rising costs and global competition.</td>
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</table>

### Recommendations

Globalization is mainly viewed as a threat to MT1. The organization has responded reactively instead of proactively to global competitors and their lower prices for comparable goods. MT is able to increase productivity and deliver goods within a shorter time frame thus finding a way to adapt to the customers needs.
<table>
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<td>Specialized employees may not be able to cross train</td>
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<td>Work Ethic is valued and noticed. Lack of work ethic is viewed as detrimental and noticed</td>
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<tr>
<td>Recommendations</td>
<td>The employer relies mainly on the employee's ability to show up for work and remain productive throughout the shift. Skill level determines if the employee will cross-train other employees. Employees must be able to multi-task to increase production output. Employees who are trained in highly specialized areas may not be able to work in multiple areas.</td>
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<td>Strengths</td>
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<tr>
<td>Chances for increasing level of compensation may be available to the employee every 3-4 months based on evaluation.</td>
<td>Entry-level wages are not competitive.</td>
<td>Competitors may offer more competitive wages early on, but employees with longevity and skill at MT1 have the potential to achieve higher wages.</td>
<td>Competitors may offer more competitive wages early on, but employees with longevity and skill at MT1 have the potential to achieve higher wages.</td>
</tr>
<tr>
<td>Maximize employees strengths to help them improve their own skills.</td>
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<tr>
<td>Maximize employees strengths to improve the skill level of other employees.</td>
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<tr>
<td>OJT is a benefit for employees.</td>
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<tr>
<td>People are the most important asset.</td>
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<tr>
<td><strong>Recommendations</strong></td>
<td>Initial wages may not be competitive, but an employee can quickly earn higher compensation based on skill level and work ethic. Employee skill level and work ethic traits that are valued are rewarded.</td>
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</table>
### Problem-Solving Skills

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</thead>
<tbody>
<tr>
<td>Problem-Solving is present at all levels from design to production.</td>
<td>Problem-solving is ingrained in employees as a result of cross-training. Formal training in problem-solving was not observed.</td>
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### Produce More Product for Less Revenue

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</thead>
<tbody>
<tr>
<td>Increase production</td>
<td>Increase in productivity and turn-around time is translated in increased operational expenses.</td>
<td>Faster turn around time and delivery gives this company an advantage over global competitors.</td>
<td>Lower profit margins</td>
</tr>
<tr>
<td>Increase production at lower cost and turn around time on delivery</td>
<td>Increase production, Survival is reactive</td>
<td>Increase in productivity and turn-around time is translated in increased employee base.</td>
<td></td>
</tr>
<tr>
<td>Increase production, Survival is reactive</td>
<td></td>
<td>Increase production at lower cost</td>
<td></td>
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<tr>
<td>Increase turn around time on delivery</td>
<td></td>
<td>Training to increase production at lower cost and turn around time on delivery</td>
<td></td>
</tr>
<tr>
<td>Preference to employees who can multi-task and cross train in multiple areas and Increase production at lower cost and turn around time on delivery.</td>
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<tr>
<td>Training to improve speed and accuracy</td>
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<tbody>
<tr>
<td>Increased production and lower product pricing is the main element for success for MTI. This reactive approach to globalization and economic trends has given MTI the ability to sustain growth and expand their customer based. This approach can be detrimental in terms of shop cleanliness, employee safety, and the ability to provide a variety of training to the employees. Cross-training works in this environment because workers are training while they are producing. There is no formal time that is set aside for employees to obtain training which the exception of the CAD/CAM department. Observations lend support to this finding.</td>
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</table>
### Reactive not Proactive

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<th>Threats</th>
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</thead>
<tbody>
<tr>
<td>Will fight to stay in business at any cost.</td>
<td>Manager works in a high pressure environment. Only trusts family resources to take on some of his responsibilities.</td>
<td>Survival is reactive. Sustain growth by quantity of orders, not specialization.</td>
<td>Unwilling to relocate or manage a plant in Mexico. Risk is viewed as too high.</td>
</tr>
</tbody>
</table>

**Recommendations**
- MTI is able to sustain growth and stay competitive at a time where his local competitors are shutting down. Again the reactive approach to sustaining the company is prevalent. Resources outside of the employees, family and the local community are not utilized. Limited resources, time, and training may prove to be the demise of this organization. Mission/vision does not seem to be clearly communicated to employees outside of the management/family circle.

### Team Approach to Quality Control

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<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees are supervised for quality control.</td>
<td>Employees are supervised for quality control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mistakes in production are costly. Quality control measures and mistakes are communicated with the employees.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**
- All the focus seems to be on production. Employees self-manage in terms of quality control, however there is always some form of supervision either by management or a higher skilled employee. Employees who are not at the skill level of their supervisors do not seem to be empowered to improve or assess product quality on their own.
**Teamwork, Collaboration, Communication, Critical Thinking**

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
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<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Team work and collaboration to make critical decisions.</td>
<td></td>
<td>Continuous refining of the system to increase productivity and lower costs.</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**

Critical thinking refers to improving production and improving methods of production in regards to specific products. Outside of cross training aspect, teamwork is limited to the family members/management team are involved in the collaborative critical thinking process.

**Training options maximize resources but are limiting.**

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
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<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees are supervised for quality control.</td>
<td>In-house training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands-on Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-House training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learn the company from the ground up.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Recommendations**

In-House Training is a strength, but is also be a weakness because other forms of training should be applied as well to give the company a more diverse perspective. Outside resources and varied training opportunities are not provided to the majority of employees as this would slow production.
### Interview SWOT Analysis

**Emerging Concepts and Themes**

**MT 2 Leadership Interview**  
**Category:** Leadership  
**MT2a**  

**FOCUSED CODING AND SWOT ANALYSIS**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smaller companies have an advantage because they can more quickly implement decisions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
<td>MT2 views company as being able to adapt quickly because of smaller organizational size. Other comments in this interview support opinion that this subject views complex organizational hierarchy as detrimental to adaptability and communication.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Articulation with CTE

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTE provides relevance</td>
<td>By design, employees in larger companies do not see the big picture</td>
<td>By design, employees in smaller companies can more easily see the big picture</td>
<td>CTE provides relevance</td>
</tr>
<tr>
<td>CTE students need to be exposed to business and industry</td>
<td>CTE students and US businesses could benefit from a more comprehensive work-based learning program.</td>
<td>CTE students can benefit from work-based learning activities such as site visits.</td>
<td>Exposure to CTE</td>
</tr>
<tr>
<td>Work-based learning creates interest</td>
<td>CTE students and US businesses could benefit from a more comprehensive work-based learning program. CTE students can benefit from work-based learning activities such as site visits.</td>
<td>Exposure to CTE and work-based learning motivates students to complete their education.</td>
<td></td>
</tr>
<tr>
<td>Employees should have a comprehensive understanding of all aspects of production</td>
<td>CTE students should be exposed to the how every aspect of that industry operates. Post secondary education does not adequately train employees to have a comprehensive understanding of production. Smaller companies cannot afford to participate in an expanded work-based learning program</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Recommendations
Strengths and weaknesses may have the same heading depending on the application. The interviewee perceives there are opportunities to improve areas of CTE such as WBL. He is encouraged by intensive WBL programs in countries like Germany but does not believe smaller companies have the financial resources to participate.
<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attention to Corporate Details</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>Awareness of details pertaining to Accounting</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Daily checks and balances in the Accounting department</td>
<td></td>
<td></td>
<td>MT2 is proactive in management areas pertaining to accounting and daily checks and balances of the corporate finances. Subject seems to possess a working knowledge of operational details.</td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication Skills</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>Communication skills to be able to ask questions</td>
<td>Inability to use Communication skills can be detrimental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leader listens to employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
<td></td>
<td></td>
<td>Employer values communication skills in employees and practices personal communication skills particularly listening skills. Employer noted that he travels extensively where he communicates with clients and associates from around the globe. Employees were observed asking questions for clarification and communicating problems and ideas they were encountering in their work.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical Thinking Skills</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>Comprehensive understanding of design software</td>
<td>Creative Thinking Skills</td>
<td>Creative thinking and excellent attendance records</td>
<td></td>
</tr>
<tr>
<td>Critical Thinking Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use their resources to think on their own</td>
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<tr>
<td>Utilize creativity to foster innovation</td>
<td></td>
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</tr>
<tr>
<td><strong>Recommendations</strong></td>
<td></td>
<td></td>
<td>Employer empowers staff to be creative and think on their own. Employer is perceived as supporting innovation.</td>
</tr>
</tbody>
</table>
## Customer Service

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service involves active listening</td>
<td>Employees who do not have customer service skills are dissuaded from interacting with customers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Service skills are assessed in regards to employee retention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First impressions impact Customer Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production crew sometimes engages in direct Customer Service</td>
<td></td>
<td></td>
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</tbody>
</table>

### Recommendations

Customer service is interpreted as the ability to listen, communicate effectively, project a positive first impression, and interact with customers. Employer values customer service, however, no formal customer service training was noted. Employees who lack customer service skills are dissuaded from working with clients instead of encouraged to receive training to improve on those skills.

## Diverse Training Options

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care taken to selecting trainers due to bad experience in the past</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross training of employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee experts conduct the Cross Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee experts conduct the Cross Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee mentoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent meetings to communicate key information to production employees.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT2 has diverse training options which include: Outsourcing professional trainers, cross-training, employee mentoring, frequent communication regarding production, continuing education, nationally accredited training programs, and industry standard training techniques. Training may even take place on a global scale. The employer extensively researches training options and places resources behind training in terms of time and financing. Training appears to be highly valued as a proactive approach to the</td>
<td></td>
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</tbody>
</table>

### Recommendations

| | | | |
| | | | |

Care taken to selecting trainers due to bad experience in the past
### Employability Skills & Work Ethic

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Thinking Skills</td>
<td>Employees who do not work up to standard are let go</td>
<td>Learn to adapt to changing environment</td>
<td></td>
</tr>
<tr>
<td>Employees are self-motivated at work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learn the business from the ground up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learn to adapt to changing environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math and Reading Skills are an essential prerequisite to technical programs</td>
<td>Math, Reading and Technical Skills were also included in this category because of the context of the answer. This employer looks for the ability to combine all of these skills to most effectively perform one's job. The employer is perceived to value creative thinking and problem solving as employability skills.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Skills</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**

**Mathemas:**

- Employees who do not work up to standard are let go
- Learn to adapt to changing environment

### Employee Incentive Programs

<table>
<thead>
<tr>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees bonus program has quarterly returns</td>
<td>Employees are self-motivated to obtain further education</td>
<td>Employees are self-motivated to obtain further education</td>
<td></td>
</tr>
<tr>
<td>Employees self monitor as a result of the bonus program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward employees with a bonus program</td>
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</tbody>
</table>

**Recommendations**

**Employee Incentive Programs: Employee Incentive Programs foster empowerment to improve the quality of the process, product, and obtain further education and training.**
## Impact of Globalization

<table>
<thead>
<tr>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representation in several countries.</td>
<td></td>
<td>Globalization is an opportunity for expansion and to be competitive.</td>
<td>Changing economic market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Globalization is an opportunity for expansion. Operating in the US and overseas.</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**

While the changing economic market is perceived as a threat to MT2, the employer views globalization mainly as an opportunity. He utilizes his resources to gain understanding of cultures in other countries. MT2 has representation in several countries and creates a corporate culture based on global awareness. Photographs of employees/subsidiaries in other countries were visibly posted in high employee traffic areas. Visible images of world maps were present in various forms throughout the building. Employees were observed listening to NPR while working. The public radio station was featuring a discussion on the impact of globalization in China during one of the observations. Globalization was communicated in a myriad of forms.

## Math Skills

<table>
<thead>
<tr>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Skills</td>
<td>Employees with poor math skills do not get promoted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Skills are crucial</td>
<td>Lack of Math Skills is detrimental to employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skills in using measuring devices</td>
<td></td>
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<td></td>
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</tbody>
</table>

**Recommendations**

Math skills are viewed as an element for success for both the employees and the organization. Employees need to understand measurement and accuracy as well as mathematics related to geometric construction and trigonometry.

## Mission/Vision Communicated at All Levels

<table>
<thead>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication via individual conversations preferred over meetings</td>
<td>Layers of management detrimental to companies regarding higher order thinking skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good companies don't have layers of management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No layers of management</td>
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</tbody>
</table>

**Recommendations**

MT1 values transparency in management style. Communication of company mission/vision seems to be prevalent.
<table>
<thead>
<tr>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate key information to employees.</td>
<td></td>
<td>Awareness of issues pertaining to globalization</td>
<td>Adaptability to changes in world market</td>
</tr>
<tr>
<td>Communicate with employees to increase awareness of corporate direction.</td>
<td></td>
<td>Global searches to obtain equipment that improves the product quality</td>
<td></td>
</tr>
<tr>
<td>Employees are given visual examples of corporate events.</td>
<td></td>
<td>Obtain equipment that increases efficiency</td>
<td></td>
</tr>
<tr>
<td>Employees observe products being shipped globally</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment in this company comes from all over the world. This increases awareness of globalization.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lean and mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtain equipment that meets the needs of employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality as a method to compete globally</td>
<td></td>
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</tbody>
</table>

**Recommendations**

MTI operates successfully in a global context through their proactive approach. Proactive measures include: Communication of mission/vision, communication of key information to stakeholders, employee empowerment to insure quality control, employee globalization awareness, obtaining the most efficient equipment and providing specialized training on the equipment, and increase efficiency of operations.
### Problem-Solving Skills

<table>
<thead>
<tr>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to read blue prints and execute accurate multi-dimensional coordinates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptability in thinking skills</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Changing environment requires adaptability in thinking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservative in decision-making</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Employees are empowered to problem solve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Must be able to combine multiple skills to problem solve such as Math Skills and Reading for Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to read blue prints</td>
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</tbody>
</table>

**Recommendations**

Problem-solving is evident in daily operations as it relates to: Accuracy of geometric construction and programming of CAD/CAM/CNC equipment, adaptive thinking, multi-tasking, mathematics reading for information, and the ability to read blue prints.

### Technical Skills

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Skills</td>
<td>An employee's inability to perform all technical aspects of the job can be detrimental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programming Skills</td>
<td>Must be competent in technical skills or employee will not be retained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use CAD/CAM and CAD software</td>
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<td></td>
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</tbody>
</table>

**Recommendations**

Technical skills are perceived as the ability to perform: Computer-related tasks, CAD/CAM/CNC programming, and other computer software programming skills. Technical skills are essential and employee retention may be determined by the level or lack of technical skills an employee possesses.
### Interview SWOT Analysis

#### Emerging Concepts and Themes

**CTE 1 Leadership Interview**  
**Category:** Leadership  
**FOCUSED CODING AND SWOT ANALYSIS**

<table>
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<th>Strengths</th>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapt to changes in technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE is adaptable and proactive</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CTE is adaptable based on research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE is adaptable in order to improve student success</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase Health programs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Resources are available for improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE1 has resources and utilizes them to benefit students. CTE1 is proactive and adaptive when it comes to making research-based decisions as well as improvement of instruction and technology.</td>
<td></td>
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</tr>
</tbody>
</table>
## Articulation with MT

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train students in occupational areas.</td>
<td>Articulation between post secondary and manufacturing trades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE collaborates with local partners in business and industry through active advisory committees</td>
<td>Student participation in advisory committees can lead to job offers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE is providing opportunities for students in post-secondary and manufacturing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE skills are specific to industry standards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing trades are being given more emphasis at this CTE center despite state trends</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Prepare students for the next level.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevance motivates students to continue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training includes a specific career development program</td>
<td></td>
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</tr>
</tbody>
</table>

### Recommendations

CTE1 collaborates with community partners, stakeholders, and advisory committees. Training for specific program areas prepare students for the next level and are relevant in their training areas. This center emphasizes manufacturing trades despite state trends as the CTE1 leadership perceives these trades remain viable career choices in the area. This center is perceived as having several strengths articulating student training with MT industry standards.
### Strengths
Communication Skills are required by employers
Communication skills include how to meet and greet and work with others

### Weaknesses

### Opportunities
CTE1 perceives communication skills as the ability to greet and interact with others. CTE1 perceives employers will want an employee who is animated, asked questions and has the ability to appropriately interact with the employer and other stakeholders.

### Threats

---

### Strengths
All CTE programs teach problem-solving and critical thinking skills
Critical thinking skills may not be utilized in daily operations but are incorporated in CTE delivery

### Weaknesses

### Opportunities
All students are taught to problem-solve within their program areas. CTE1 employees are perceived as using critical thinking skills but not on a daily basis. CTE1 leadership was not certain how critical thinking skills were used by employees but was certain that students were taught critical thinking skills. This response seems contradictory in nature. Perhaps the operational definition of critical thinking was not entirely known to the subject.

### Threats

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### Strengths
Establish post-secondary partnerships to meet employer's needs
Establish post-secondary partnerships to prepare students for further education

### Weaknesses

### Opportunities
Post secondary articulation and linkages are perceived as opportunities. These areas need to be expanded to offer more opportunities for students to prepare for higher education in CTE area. This community offers both a community college and private business college option for post secondary training.

### Threats

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### Recommendations

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### Critical Thinking Skills

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### Articulation with Post Secondary

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### CTE Assessments

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in student schedules are only permitted if the EDP supports it</td>
<td>EDP does not always support placement</td>
<td></td>
<td>Local post secondary institution is also a Work Keys site for the post secondary and</td>
</tr>
<tr>
<td>CTE Placement Coordinator is a Work Keys Certified Job Profiler</td>
<td>Provide opportunities for students to earn a National Career Readiness Certificate still in preliminary stages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDP supports placement</td>
<td>Work Keys Training Center is not a revenue generator</td>
<td></td>
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<tr>
<td>Establish a Work Keys Training Center, a nationally recognized assessment program.</td>
<td>Work Keys Training Center is only licensed for secondary students.</td>
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<tr>
<td>Provide opportunities for students to earn a National Career Readiness Certificate</td>
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<tr>
<td>Training includes assessment and career awareness software that is used on a regional level</td>
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<tr>
<td>Work Keys Training Center includes academic support</td>
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<tr>
<td><strong>Recommendations</strong></td>
<td>CTE1 utilizes assessments such as: ACT Work Keys, the National Career Readiness Certificate, and student EDPs. These provide individualized data pertaining to student placement and student achievement. The center also has established a Work Keys Training Center that is managed by a certified Work Keys Profiler who also is the CTE Placement Coordinator for work-based learning. One of the local post secondary institutions also operates a Work Keys Training Center. This may cause some redundancy of services in the area even though the CTE1 site only specializes in high school age population clients.</td>
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</table>


<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer service is important and includes building positive relationships with people</td>
<td>Customer service training is individualized to the student as well as to meet the needs of each specific industry/program area.</td>
<td></td>
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</tr>
<tr>
<td>Customer service is integral in all CTE programs</td>
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<tr>
<td>Customer service is integral in all aspects of CTE</td>
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<tr>
<td>Customer service training is individualized to the student and occupational area</td>
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</tbody>
</table>

**Recommendations**

Customer service skill training is perceived as a strength to CTE. Customer service was also apparent in the observations. The staff seemed enthusiastic towards all stakeholders who were present. Students were given immediate feedback, visitors and other staff members were greeted in a friendly manner.
## Driving Forces of CTE

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<th>Threats</th>
</tr>
</thead>
</table>
| CTE success in manufacturing areas did not translate into health areas | CTE may adapt to become a "Middle College"  
CTE may adapt to include more adult education  
CTE may assist adult ed students in the transition to college  
Diversification is a way for manufacturing to survive economic shifts  
Local manufacturing can be proactive and responsive to trends due to diversification  
Local manufacturing is sustaining growth due to diversification | Healthcare employers do not readily hire CTE students  
Political climate is a factor in moving from adequate to outstanding  
Self esteem may hinder adult ed students from attending college |

### Recommendations

While there has bee success in areas of manufacturing as they relate to CTE programs, the site has been met by opposition by some of the stakeholders as well as the professional allied health community. Healthcare employers do not readily hire CTE students from the area. Further investigation could be done to determine whether this was based on perception or lack of articulation in these skill areas. Furthermore, the subject responded that the political climate of the ISD was a factor in hindering growth and improvement of the institution. CTE1 views many opportunities to improve and expand programs. CTE1 leadership has proactive ideas that could be implemented in the event of economic and academic trends and shifts.
<table>
<thead>
<tr>
<th>Strengths</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Career awareness can assist students in</td>
<td>CTE students are deficient in &quot;Soft Skills&quot;</td>
<td>CTE students need to be trained in job expectations, attitude, people skills and communication skills</td>
<td></td>
</tr>
<tr>
<td>career planning</td>
<td>CTE students lack of &quot;Soft Skills&quot; can result in loss of employment</td>
<td>CTE students need to be trained in job seeking and retention skills</td>
<td></td>
</tr>
<tr>
<td>Career awareness can assist students in</td>
<td>CTE students need to be trained in job expectations, attitude, people skills and communication skills</td>
<td>Improvement needed in career development skills, soft skills, communication, and teamwork</td>
<td></td>
</tr>
<tr>
<td>making more informed career choices</td>
<td>CTE students need to be trained in job seeking and retention skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employability skills should align with each</td>
<td>CTE students lack of &quot;Soft Skills&quot; can result in loss of employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>program</td>
<td>CTE students need to be trained in job seeking and retention skills</td>
<td></td>
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</tr>
<tr>
<td>Training includes an established career</td>
<td>CTE students need to be trained in job seeking and retention skills</td>
<td>Improvement needed in career development skills, soft skills, communication, and teamwork</td>
<td></td>
</tr>
<tr>
<td>preparation program</td>
<td>CTE students need to be trained in job seeking and retention skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
<td>CTE1 perceives career awareness and program curriculum as being integral to career success. CTE1</td>
<td>CTE1 expressed concerns that CTE1 students were not being adequately trained in &quot;Soft Skills&quot;. These include: Understanding and ability to carry out job expectations, a positive attitude, people skills, teamwork, and communication.</td>
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<tr>
<td>Financial Management Skills</td>
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<tr>
<td><strong>Strengths</strong></td>
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<tr>
<td>CTE needs to include money management</td>
<td></td>
<td></td>
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<tr>
<td>Lack of money management skills can be detrimental to employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of money management skills can be detrimental to employment</td>
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<td></td>
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<tr>
<td><strong>Weaknesses</strong></td>
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<tr>
<td><strong>Opportunities</strong></td>
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<tr>
<td><strong>Threats</strong></td>
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<tr>
<td><strong>Recommendations</strong></td>
<td></td>
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<tr>
<td>CTE1 perceives that a student training needs to include money management skills. Lack of money management skills could be a barrier in obtaining and retaining gainful employment. This area is lacking in curriculum delivery.</td>
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</table>

<table>
<thead>
<tr>
<th>Highly Qualified Instructors</th>
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</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
</tr>
<tr>
<td>CTE instructors are highly capable, trained in industry, and hold appropriate teaching certifications</td>
</tr>
<tr>
<td>Employer values employees</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
</tr>
<tr>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
</tr>
<tr>
<td>The employer values his employees and is particularly enthusiastic about the highly qualified status of each instructor. All instructors have experience in their program areas and many possess master's degrees or some form of higher education and training.</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Recommendations</strong></td>
</tr>
</tbody>
</table>
### Impact of NCLB

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career awareness is taught at earlier grades as a response to NCLB</td>
<td>NCLB has created many new challenges for CTE specifically in areas related to curriculum and assessment. CTE1 perceives these changes as strengths and opportunities to improve CTE delivery and accountability. CTE1 is working with local schools to provide career awareness opportunities in the 7th grade instead of the 8th grade. This may help students be better informed of requirements in high school. Being prepared may assist the student in being proactive about his/her school schedule. New MMC requirements are feared to leave little to no time is a student's schedule for electives such as CTE programs.</td>
<td>NCLB has added rigor to CTE curriculum</td>
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</tbody>
</table>

### Mission/Vision Communicated at All Levels

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate philosophy is tied to the ISD mission of service and leadership</td>
<td>Corporate philosophy is not easily defined</td>
<td>Corporate philosophy reflects the need to compete in a global economy</td>
<td></td>
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<tr>
<td>CTE collaborates with local partners in business and industry</td>
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</tbody>
</table>

**Recommendations**

The corporate philosophy of service and leadership is communicated with stakeholders but it is not easily defined. CTE1 states that the mission reflects the need to compete in a global economy. Observation results are mixed. CTE1b did not have a sense of globalization and the urgency to incorporate these philosophies into the curriculum. However CTE1c did seem to have an understanding of globalization and spoke of examples where former students were successfully working in foreign countries.
### Proactive Approach to Globalization

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Threats</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Community awareness of globalization and desire to prepare students to compete in a global economy.</td>
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<td></td>
<td></td>
<td>CTE examines trends within and outside of the community to prepare students for globalization.</td>
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</tbody>
</table>

**Recommendations**

CTE attempts to "mirror" the community to be responsive to their changing human resources needs. CTE views change as being an opportunity to improve and expand programs to better prepare students for globalization.

### Problem-Solving Skills

<table>
<thead>
<tr>
<th>Strengths</th>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructors embrace problem-solving</td>
<td></td>
<td>Problem-solving is embraced by instructors and practiced in all CTE programs particularly in applied mathematics. Instructors collaborate on ways to include problem-solving in the curriculum. Staff also collaborate to solve problems within the CTE site.</td>
<td></td>
</tr>
<tr>
<td>Instructors practice problem-solving</td>
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<td></td>
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<tr>
<td>Problem-solving can be used in applied mathematics in CTE programs</td>
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</tbody>
</table>

**Recommendations**

### Technical Skills

<table>
<thead>
<tr>
<th>Strengths</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Technical skills, career readiness and soft skills are equally important</td>
<td>Specific technical skills were not addressed. The subject categorized technical skills as being essential to career success along with soft skills.</td>
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</tbody>
</table>

**Recommendations**
## Unique Qualities of CTE

<table>
<thead>
<tr>
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<th>Opportunities</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CTE benefits students who may not excel in a traditional educational setting</td>
<td>CTE cannot operate like manufacturing in regards to human resources and student management</td>
<td>CTE has not reached its potential</td>
<td>Manufacturing is product driven and CTE is people driven</td>
</tr>
<tr>
<td>CTE can benefit students who have not been successful in a traditional school setting</td>
<td>CTE cannot operate like manufacturing in regards to human resources and student management. CTE needs to work to improve human capital not remove ineffective human capital</td>
<td></td>
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</tr>
<tr>
<td>Manufacturing is driven by the bottom line</td>
<td>CTE has not reached its potential</td>
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</tbody>
</table>

### Recommendations

Because CTE is a training site for high school students there are some apparent differences between schools and businesses. The subject responded strongly in this area. He pointed out that business and industry, particularly manufacturing, is driven by the bottom line. In other words, employees can be fired if they are not adequately producing quality products and working up to capacity. In education the students are the raw material and cannot be discarded through a quality control process. Students cannot be "fired" or dropped for adequate or inadequate performance. However, the site did indicate that they needed to work to improve their human capital because they could not simply remove the ineffective human capital in contrast to business and industry.
## Use of Resources

<table>
<thead>
<tr>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTE facilities are new and were designed by examining diverse aspects of education and industry</td>
<td>CTE facilities are new and were designed with adaptability in mind</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
<td></td>
</tr>
<tr>
<td>CTE facilities are new and were designed through intensive research</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
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</tr>
<tr>
<td>CTE facilities are new and were designed with adaptability in mind</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
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</tr>
<tr>
<td>CTE facilities make the center unique</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
<td>CTE facilities are not as optimum school leader would like despite the intensive research</td>
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</tr>
</tbody>
</table>

### Recommendations

Compared to other centers in the state of Michigan, this facility is fairly new. Intensive research and collaboration were key in designing this structure. The facility was created with "green" eco-friendly features in mind. Even with the extensive planning, the site does not have adequate storage space and in some area the training space could be larger. The facilities are not optimum despite the intensive research.
### Interview SWOT Analysis

**FOCUSED CODING AND SWOT ANALYSIS**

**CTE 2 Leadership Interview** Category: Leadership  CTE2a

#### Articulation with MT

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>21st Century Skills emphasizes the ability to utilize technology in the workplace.</td>
<td>CTE collaborates with local partners in business and industry through active advisory committees and the Chamber of Commerce.</td>
<td>Many local businesses operate on an international level. 21st Century Skills are needed particularly in information technology.</td>
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</tr>
<tr>
<td>CTE stays current with technology in business and industry.</td>
<td></td>
<td>Specialized MT advisory committee discusses local and global themes.</td>
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</tr>
<tr>
<td>Most successful CTE programs have more active advisory committees.</td>
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<tr>
<td>Specialized MT advisory committee influence curriculum with real world concepts such as: Langford Team Training and Five F's, as well as emphasis on success strategies in a global economy.</td>
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<tr>
<td>Specialized MT advisory committee meets every week from 7:30-9:00 a.m. Members are experts in their field.</td>
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</tbody>
</table>

#### Recommendations

CTE2 has a unique and active MT advisory committee that is mostly comprised of former CEOs who have held positions with major automotive manufacturers. This group provides specific suggestions for training and success strategies for a global economy. The site also collaborates with the local Chamber of Commerce and local businesses that operate on an international level. Additionally, the school leadership is well-read in topics concerning globalization. The school improvement team and ISD leadership have read Thomas Friedman and Daniel Pink and are applying these concepts to CTE training. The site is taking an extremely proactive approach to globalization and articulation with MT.
### Critical Thinking Skills

<table>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunities for students to trouble shoot is an important aspect of CTE</td>
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</table>

**Recommendations**

CTE2 views critical thinking skills as opportunities for students to trouble shoot problems. The process is adherent in all programs and is perceived to be integral to CTE. Critical thinking skills were observed in both CTE2b and CTE2c subject observations.

### CTE Assessments

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>All teachers have taken the Curriculum is aligned to MMC, ACT Work Keys, and ACT Math.</td>
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<td></td>
<td>Academic achievement indicators show improvement is needed to reach standards. New curricula constraints will leave less time to teach CTE-related technical skills</td>
</tr>
</tbody>
</table>

**Recommendations**

CTE2 utilizes assessments such as: ACT Work Keys and curriculum alignment to the MMC, ACT Work Keys, and ACT Math. CTE2 perceives MMC and new CTE standards and segmenting as threats to the delivery of technical skills. New standards will take additional class time thus squeezing out time that could be spent teaching industry specific skills.
<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
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<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Every caller is important and should be treated accordingly</td>
<td>CTE could handle customer service better at all levels</td>
<td>Customer service involves all stakeholders</td>
<td>Customer service skills can be a decisive factor in obtaining employment.</td>
</tr>
<tr>
<td>First impressions are imperative</td>
<td>Customer Service could be improved in both student and staff areas.</td>
<td>Customer service skills can be a deciding factor in obtaining employment.</td>
<td>Customer service skills translate to success in a global economy.</td>
</tr>
<tr>
<td>Customer service is only integrated in 2 CTE programs. Improving integration of customer service in curriculum is a priority.</td>
<td>Customer service is only integrated in 2 CTE programs. Improving integration of customer service in curriculum is a priority.</td>
<td>Customer service skills translate to success in a global economy.</td>
<td></td>
</tr>
<tr>
<td>Customer service is only integrated in 2 CTE programs. Improving integration of customer service in curriculum is a priority.</td>
<td>Customer service skills need to be improved</td>
<td>Customer service skills translate to success in a global economy.</td>
<td></td>
</tr>
<tr>
<td>Customer service skills need to be improved</td>
<td>Specified training in customer service is needed</td>
<td>Customer service skills translate to success in a global economy.</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**

CTE2 gave several specific examples of customer service. It appears that the operational definition of customer service is established at this site. Customer service skills include: Creating positive first impressions, being personable and respectful to all callers, establishing positive customer relations, promise to follow through and research problems, follow through with contact, and treat all stakeholders as customers. Customer service is not just for the building, it is for the entire organization. CTE2 views this as a critical area for improvement to the point where leadership indicated that customer service skills may be more important than technical skills.
## Data-Driven Decisions

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
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<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Programs updated based on employment data</td>
<td>CTE needs to improve technology related to data-driven decision making in terms of access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results-based organization not entitlement-based organization</td>
<td>CTE needs to improve technology related to data-driven decision making in terms of computing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff members reassigned, positions changed, and responsibilities adjusted based on enrollment.</td>
<td>Programs are updated based on employment data. Employees are retained or reassigned based on program success. Unlike other schools, this CTE operates more like a business in the respect that teachers are not entitled to remain in their positions. If a program has low numbers or low achievement scores then the program is reevaluated based on that data. CTE2 states that the data-driven decision-making process can be improved in terms of technology and access to data. This is an area of weakness and a priority for CTE2 leadership.</td>
<td></td>
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</tbody>
</table>

### Recommendations

**Data-Driven Decisions**

**Strengths**
- Contextual learning environment
- CTE operates on a charter millage with a healthy fund balance.
- Insure students are employable
- Students are enthusiastic about CTE

**Weaknesses**
- CTE needs to improve technology related to data-driven decision making in terms of access
- CTE needs to improve technology related to data-driven decision making in terms of computing

**Opportunities**

**Threats**

### Driving Forces of CTE

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<tr>
<th><strong>Strengths</strong></th>
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<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
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<tbody>
<tr>
<td>Contextual learning environment</td>
<td>Community supports CTE</td>
<td></td>
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</tr>
<tr>
<td>CTE operates on a charter millage with a healthy fund balance. Insure students are employable Students are enthusiastic about CTE</td>
<td>Region is progressive</td>
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</tbody>
</table>

**Recommendations**

Driving forces of CTE are considered to be positive in nature. The students are positive about their education and the site is focused on making certain each student is employable in his/her program area. The school operates on a charter millage which means that they are not dependent upon student tuition. The site also has a fund balance that can support necessary changes that are needed to support contextual student learning. The community supports the center and the region is progressive in terms of industry and opportunities.
### Employability Skills & Work Ethic

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Customer Service Satisfaction survey used as a tool to teach work ethic initiative</td>
<td>Employability skills should include both customer service and technical skills</td>
<td>MT can take care of technical skills, but are most interested in &quot;soft skills&quot;.</td>
<td></td>
</tr>
<tr>
<td>Students develop confidence through WBL experiences</td>
<td></td>
<td>Students need to be able to work well with others and be dependable in order to work on innovative products.</td>
<td></td>
</tr>
<tr>
<td>Work ethic initiatives program is on-going</td>
<td></td>
<td>Students need to be enthusiastic about their work, be punctual, dependable, prepared, and have a positive attitude.</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**

CTE2 used a Customer Service Satisfaction survey to assess student work ethic. This also serves as a tool to communicate the relevance and importance of employability skills training. CTE2 has taken cues from industry and the need for employees to possess "soft skills". Students need to be able to work well with others, be dependable, enthusiastic, punctual, dependable, work on innovative products, and have a positive attitude. This is in line with the MT sites that were included in this study as well. CTE2 views employability skills as an extremely important component of the training process and should include both customer service and technical skills.

### Highly Qualified Instructors

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTE instructors are highly capable, trained in industry, and hold appropriate teaching certifications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE instructors are highly capable, trained in industry, and hold appropriate teaching certifications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer values employees</td>
<td></td>
<td></td>
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</tbody>
</table>

**Recommendations**

The employer values his employees and is particularly enthusiastic about the highly qualified status of each instructor. All instructors have experience in their program areas and many possess master's degrees or some form of higher education and training.
<table>
<thead>
<tr>
<th>Strengths</th>
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</tr>
</thead>
<tbody>
<tr>
<td>21st Century Skills are integrated into all CTE programs</td>
<td>21st Century Skills include innovation</td>
<td>CTE students can apply their skills in a global economy</td>
<td>Prepare students for careers that do not yet exist</td>
</tr>
<tr>
<td>More emphasis on 21st Century Skills as a result of Globalization</td>
<td></td>
<td>Globalization has had a significant impact on the organization</td>
<td>Thomas Friedman and Daniel Pink have influenced the organization's mission in regards to globalization and 21st Century Skills</td>
</tr>
<tr>
<td>Students are encouraged to think of their futures in a global economy</td>
<td></td>
<td></td>
<td>21st Century Skills (Daniel Pink) include:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A strong blend of left brain right brain kinds of skills, a blend of the arts and the sciences, and the ability to work with people across different cultures on a global scale.</td>
<td></td>
</tr>
<tr>
<td>Exposing students to cutting edge technology prepares them for a global economy</td>
<td></td>
<td></td>
<td>The works of Daniel Pink and Thomas Friedman dominate CTE leadership's view of globalization. Research and reading relevant works are a part of the proactive approach to globalization. The subject views the impact of globalization as an opportunity to encourage students to think of their futures as well as expose them to state of the art or cutting edge technology. Globalization seems to be a driving force in including 21st Century Skills in the curriculum. Students are encouraged to think on a global scale. Visual images and messages are posted throughout the center to foster a sense of belonging and encourage success in a global context. Globalization has a significant impact on this organization and is viewed as a tremendous opportunity that is embraced by CTE2 leadership.</td>
</tr>
</tbody>
</table>

**Recommendations**

The works of Daniel Pink and Thomas Friedman dominate CTE leadership's view of globalization. Research and reading relevant works are a part of the proactive approach to globalization. The subject views the impact of globalization as an opportunity to encourage students to think of their futures as well as expose them to state of the art or cutting edge technology. Globalization seems to be a driving force in including 21st Century Skills in the curriculum. Students are encouraged to think on a global scale. Visual images and messages are posted throughout the center to foster a sense of belonging and encourage success in a global context. Globalization has a significant impact on this organization and is viewed as a tremendous opportunity that is embraced by CTE2 leadership.
### Impact of NCLB

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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers understand the need to change CTE</td>
<td>Sense of urgency to change CTE in response to new graduation requirements.</td>
<td>NCLB requirements have created a sense of urgency in CTE. Teaching staff may not agree with the new requirements but they seem to understand that they are a required and integral component of CTE curriculum delivery. Teachers and leadership are willing to work around the requirements of NCLB but may not necessarily embrace them.</td>
<td></td>
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</tbody>
</table>

### Mission/Vision Communicated at All Levels

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus has not changed. Organization has adhered to their mission Organization continues to evolved based on the school mission Staff collaborates to recruit students.</td>
<td></td>
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</tbody>
</table>

**Recommendations**

Even though the climate of CTE is changing, the school mission has not changed. The organization has adhered to the focus of their mission and continues to evolve based on that mission. The staff collaborates to promote the center and the mission/vision appears to be effectively communicated at all levels. This was also apparent in both CTE2b and CTE2c observations.
**Proactive Approach to Globalization**

<table>
<thead>
<tr>
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<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTE encourages students to prepare to think, act and work in a global economy by developing people and teamwork skills, developing appropriate work ethic. CTE proactively responds to globalization through the school mantra &quot;Anywhere in the World!&quot;, 21st Century Skills, and curriculum alignment to national and global career trends.</td>
<td>Chinese education emphasizes math &amp; science. US education needs to emphasize innovation &amp; creativity. Innovation and creativity can produce new products and technologies</td>
<td>Standardized testing is detrimental to creative thought process and innovation.</td>
<td></td>
</tr>
</tbody>
</table>

**Recommendations**

CTE2 definitely has taken a proactive approach to globalization by encouraging students to prepare to think, act, and work in a global economy. Students are encouraged to develop interpersonal communication skills, work in teams, and apply 21st Century Skills. Curriculum is aligned to state and national standards and is regulated by active advisory committees. CTE2 also values creative thinking and innovation. This contradicts the new MME, NCLB and CTE standardized testing movements. Standardized testing is perceived as a definite threat that may quell innovation and the creative thought process.
## Problem-Solving Skills

<table>
<thead>
<tr>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 of CTE programs do warm-up problem-solving activities</td>
<td>Problem-solving includes the use of mathematics and original thought instead of the regurgitation of memorized facts. 50% of CTE programs have a strong emphasis on problem-solving as part of the daily routine. These programs have specifically targeted problem-solving activities, and daily warm-ups. All programs use applied and/or contextual math that is integrated into the established curriculum. CTE2b did have students performing warm-up problem-solving activities. CTE2c had students gather at the beginning of the session to discuss the objectives for the day. Both CTE2b and CTE2c were observed participating in problem-solving activities.</td>
<td></td>
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<tr>
<td>1/2 of CTE programs have specifically targeted problem-solving</td>
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<tr>
<td>CTE programs use basic math skills to demonstrate the problem-solving process.</td>
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</tr>
<tr>
<td>Problem-solving is used in all CTE programs on a daily basis</td>
<td></td>
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</tr>
<tr>
<td>Teach students to think instead of memorize in terms of mathematics.</td>
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</table>

## Technical Skills

<table>
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<tbody>
<tr>
<td></td>
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<td></td>
<td>Michigan Technical Standards will only address a portion of the skills students will need to be employable locally, regionally, and internationally.</td>
</tr>
<tr>
<td>Recommendations</td>
<td>The new CTE Michigan Technical Standards are perceived as a threat. These new standards are not as comprehensive as the current curriculum that is being addressed at this CTE site. The new standards include skill areas that are vague and not specific to the region. It is feared that these new standards will be detrimental to the overall success of students when they have completed their training. Furthermore, these standards were not created with local advisory committee suggestions in mind.</td>
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</table>
# Unique Qualities of CTE

<table>
<thead>
<tr>
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<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom line is a secondary factor for CTE; student achievement is number one</td>
<td>CTE has room for improvement. 30% - 40% of students are not meeting success standards in regards to competency certificates</td>
<td>CTE has room for improvement. There is a population of students that may not be successful in current educational frame</td>
<td>Manufacturing is driven by the bottom line</td>
</tr>
<tr>
<td>Continuous improvement of the system including equipment updates, student placement, and WBL.</td>
<td>CTE continually strives to improve human capital not remove ineffective human capital</td>
<td>CTE needs to improve student intervention</td>
<td></td>
</tr>
<tr>
<td>CTE cannot operate like manufacturing in regards to human resources and student management. CTE needs to work to improve human capital not remove ineffective human capital</td>
<td>CTE has set the success standard at 80% in regards to competency certificates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTE continually strives to improve</td>
<td>CTE is evolving into a results oriented organization which creates buy-in from all stakeholders. Students have the opportunities to experience the world of work first hand</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This organization is ranked high in the state regarding CTE but leadership believes there is always room for improvement</td>
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</tbody>
</table>

**Recommendations**

Manufacturing is driven by the bottom line and schools are required to serve all students regardless of the bottom line. However, CTE2 expressed strong options concerning continuous improvement. CTE needs to work to improve human capital not remove human capital. CTE1 has set the student success standard at 80% in regards to the competency certificates. Only 60%-70% of students actually achieve 80% of the standards.
<table>
<thead>
<tr>
<th>Use of Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
</tr>
<tr>
<td>Students in IT program were involved in national technology-related events</td>
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<td></td>
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</table>

**Recommendations**

CTE2 needs to improve community collaboration. CTE needs to improve relationship with post-secondary partner. CTE needs to improve use of technology to create international experiences for students. Facilities and staff need to be available outside the current 8 to 3 schedule.
Date: January 22, 2008

To: Richard Zinser, Principal Investigator
    Jennifer Harrison, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number: 07-07-21

This letter will serve as confirmation that your research project entitled “Contextual Learning in a Global Environment” has been approved under the expedited category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

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

Approval Termination: January 22, 2009
Consent Form for Contextual Learning for a Global Economy Participants
Western Michigan University College of Education
Principal Investigator: Dr. Richard Zinser
Doctoral Candidate Investigator: Jennifer L. Harrison

I am invited to participate in Jennifer Harrison's dissertation research project entitled "Contextual Learning for a Global Economy". This research is intended to study the opinions of individuals who oversee professional development and training in career and technical education (CTE) and business-based environments.

I will be invited to participate in at least one (but no more than two) forty-five to eighty minute observation(s). My responses and activities will be recorded by the researcher who will take field notes on paper or a laptop device. As in all research, there may be unforeseen risks to the participant(s). I will be observed in my work setting participating in typical training activities. I may experience mild discomfort as a result of being observed. My participation in this study will enable me to gain insight into areas related to contextual learning for a global economic areas.

All of the information collected from me is confidential. This means that my name will not appear on any papers on which this information is recorded. The transcripts and forms will all be coded; the student investigator will keep a separate master list with the names of participants and corresponding code numbers. Once the data are collected and analyzed, the master list will be stored in a secured location for at least three years. All other forms and documentation will be retained for the duration of the project, in a locked metal container located in the investigator's home office. Once the dissertation is completed, all data will be stored in a secured location for three years.

I may refuse to answer a question or to participate, and I may quit at any time during the study, I may contact Richard Zinser (269) 387-3007, or Jennifer Harrison (231) 592-9608.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right hand corner. Do not participate in this study if the stamped date is older than one year.

My signature indicates that I have read and/or had explained to me the purpose and requirements of the study and agree to participate.

______________________________  ________________________________
Signature                          Date

Consent obtained by: ________________________
Figure 5. Interview Consent Form

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I will be invited to participate in at least one (but no more than two) thirty to forty-five minute interview(s). My responses will be recorded on a digital recording device and later transcribed. As in all research, there may be unforeseen risks to the participant(s). I will be asked questions pertaining to training practices and implementation. I may be asked to provide artifacts or documentation to support my responses. My participation in this study will enable me to gain insight into areas related to contextual learning for a global economic areas.

All of the information collected from me is confidential. This means that my name will not appear on any papers on which this information is recorded. The transcripts and forms will all be coded; the student investigator will keep a separate master list with the names of participants and corresponding code numbers. Once the data are collected and analyzed, the master list will be stored in a secured location for up to five years. All other forms and documentation will be retained for the duration of the project, in a locked metal container located in the investigator’s home office. Once the dissertation is completed, all data will be stored in a secured location for up to three years.

I may refuse to answer a question or to participate, and I may quit at any time during the study, I may contact Richard Zinser (269) 387-3007, or Jennifer Harrison (231) 592-9608.

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Signature  Date

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