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Considering human capital theory in assessment and training:mapping the gap betweem current skills and the needs of a knowledge-based economy in northeast Iowa

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Considering human capital theory in assessment and training: Mapping the gap between current skills and the needs of a knowledge-based economy in northeast Iowa

by

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DEDICATION

The song written by Elton John, *The Circle of Life*, says “you should never take more than you give. In the circle of life, it is the wheel of fortune…” I have had the opportunity to learn about life from three important individuals whose lives were too short on earth, who lived simple but full lives and who, at different time periods, left imprints on my heart and soul.

My Uncle Kenneth Croatt who taught me how important it is to move forward even when you are handicapped. He taught me that it is not the handicap that holds you back, it is the attitude you take on life.

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These three remarkable individuals lived the philosophy of never taking more than you give from life. They lived life with inspiration; hope, passion, and drive to push forward even in times of despair. All three were still giving to others as each met their untimely passing. I dedicate this dissertation to Ken, Jacque, and Haus. I know they would be so proud of this accomplishment and I, too, hope to emulate the way they exemplified “to give more than you take from life”.

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ABSTRACT

In light of the current economic downturn, thousands of Iowan's are unemployed and this is the ideal time to build the skills of the workforce to compete in the knowledge-based economy so businesses and entrepreneurs can compete in a global economy. A tool for assessing the skills and knowledge of dislocated workers and students as well as identifying skills deficits in order to match individuals' transferrable skills to high-demand jobs is essential in order for dislocated workers and students to increase their human capital. It is essential for individuals to make informed decisions regarding the training they need and for educational institutions to provide appropriate educational programs that are responsive to the needs of the knowledge-based economy. The purposes of this study were to compare the relationships between knowledge levels, transferrable skills, and skill needs of dislocated workers in northeast Iowa to the knowledge and skill needs of area businesses, to outline and develop a model for equipping Iowa's workforce for a knowledge-based economy, and to provide a paradigm for assessment and training.

The research questions guiding this study included: (a) What are the demographic characteristics of northeast Iowa's dislocated workers? (b) What are the current skills, knowledge, and competencies of dislocated workers in northeast Iowa? (c) Are there differences in the skills, knowledge, and competencies between male and female dislocated workers? (d) What are the aspirations of dislocated workers in northeast Iowa? (e) What are the skills gaps of dislocated worker regarding the knowledge-based economy? (f) What education and training programs are needed to adapt the current skills set clusters to a knowledge-based economy in northeast Iowa?

This quantitative study was conducted using the theoretical frameworks of human capital, new growth, knowledge-based economy, and action research theory concepts. Further, this study analyzes the role the community college system is expected to take in workforce preparation and economic development, along with the Workforce Investment Act (WIA) One Stop Centers and the Iowa Workforce Development Research Bureau. The quantitative techniques of descriptive and inferential statistics were used to describe the data set of 477 individuals—284 males and 193 females—laid off from industries in northeast Iowa. The dislocated worker data was matched with additional demographic and occupational data obtained from the Occupational Information Network (O*NET).

The results indicate a high percentage of females and males intend to continue their education. The findings show a significant need for additional training for dislocated workers to be employed in emerging occupations to increase their knowledge and work activity (skills) in order to be prepared for emerging occupations in biotechnology, advanced manufacturing, and information technology. The workforce analysis on regional competitive advantage supports the need for emerging occupations.

The study demonstrates the need for further assessment and training for dislocated workers. It also provides a replicable model for other community colleges, One Stop workforce centers, and economic development interests and has the potential to provide an on-line tool for advising, education and recruitment. Finally, the study contributes knowledge and research valuable for One Stop workforce Centers, community colleges and economic development.

CHAPTER ONE

INTRODUCTION

Background

As the United States continues to face increased global competition for labor from resource-rich countries, it is increasingly important for the U.S. to focus on human capital in order to build and strengthen a skilled labor pool that will allow the country to maintain a competitive edge in a knowledge-based economy. The nation is facing a deep recession and the highest unemployment rates in 28 years (Borbely, 2009) making efforts aimed at developing a skilled workforce vital. The economic crisis the nation currently faces did not happen overnight. Many leaders have been aware for the last decade that markets have been growing more global, countries have been developing educated workforces, industries have been moving overseas and workers have been forced into a knowledge–based economy with or without the skills to compete (Fernandez, 2010). For centuries, the U.S. has valued hard work and encouraged citizens to build a better life for themselves and their families.

The Knowledge-Based Economy

Those in today's workforce are faced with the difficult reality that, to succeed in a knowledge based economy, education and training are critical elements in gaining a competitive edge. Creating quality training and educational programs has always been important. The current recession has underlined the need for developing a skilled workforce for employers throughout Iowa and the nation. Houghton and Sheenan (2000) highlight the importance of examining the knowledge and skills possessed by those actively involved in the workforce to determine the intellectual property held and human capital needed in order to build local and national economies.

An increase in skills and knowledge where innovation and ideas translates into an increase in high-demand job opportunities which, in turn, results in high paying job growth driving a knowledge-based economy are essential (Houghton and Sheehan, 2000; Hodges & Lusting, 2002; Organisation for Economic Co-Operation and Development [OECD], 1996). Minimum qualifications for entry-level positions increasingly require an associate degree and, for many occupations, a bachelor's degree is required (Baum & Ma 2007; Borbely, 2009; National Center of Education and the Economy, 2000; Ross-Gordon, 2003; Snyder, Dillow, & Hoffman 2007; U.S. Department of Labor, Bureau of Labor Statistics, 2009b, 2009c) and occupations that require a college degree are growing twice as fast as other occupations and are among the highest paying (U.S. Department of Labor, 2002b). Students have been influenced by the change in the economy and the need for higher education. In 1981-82, 19% of students enrolled in college expected to get a bachelor's degree compared to 2003-2004 when 32% of students planned to pursue the same degree. In 2006, 66% of high school graduates in the nation were enrolled in a post secondary program (Snyder, Dillow, & Hoffman, 2007).

The need to address the 21st century movement to increase the skills of workers in order to meet the demands of next-generation industries began to be addressed in policies, programs and debates at the end of the 20th century (Fernandez, 2010, Grubb & Lazerson, 2004; Hamm, 2000; Harkin, 2003; Iowa Workforce Development [IWD], 2009; Iowans for a Better Future, 2002; Kotkin & Zimmerman, 2007; Malo, 2003). It is projected that, by the year 2028, there will be 19 million more jobs than workers, with the fastest growing jobs requiring a post secondary education (Harkin, 2003).

Currently, 65% of all jobs are being redefined and the need for additional training has been recognized by businesses throughout the nation (Harkin, 2003; Herman, 1999; IBM Global Services, 2008; IWD, 2009; Pikulinski, 2004). In the 2009 Area Development Annual Corporate Survey (Steele, 2009) availability of skilled labor was the sixth most important site selection criterion for relocating a business with an 86.9% importance rating by survey respondents. High demand jobs are defined as jobs with the most expected openings in the future with the highest pay level and has a higher level of education required. In Iowa and nationally, the majority of high demand jobs are in professional services, health, advanced manufacturing, and environmental/bio-tech industries (Iowa Workforce Information Network, 2009).

A high percentage of the individuals who lost their jobs in 2008 and 2009 were working for manufacturing industries (Borbely, 2009; IWD, 2009; U.S. Department of Labor, 2009c). The loss of manufacturing jobs is significant based on changes in technology that affect manufacturing production techniques. Manufacturing has largely moved from jobs requiring physical hands-on work to knowledge-based jobs that utilize technology widely (Balfe and McDonald, 1994; Cortright, 2001; Grubb, 1996; Grubb, & Lazerson 2004; Harkin, 2003; OECD, 1996). The increase in jobs that require knowledge-based skills fosters a focus on lean practices and the development of new technologies which decrease production costs and ultimately increase business capital (Cortright, 2001; Fesers, 2003; Grossman & Helpman, 2001; OECD, 1996; Nonaka and Takeuchi, 1995).

With the decrease of assembly production jobs, the need for skilled workers in technology has risen greatly in the United States (Fesers, 2003; Grubb, 1996; Grubb & Lazerson, 2004; Hamm, 2004; Harkin, 2003; Herman, 2003; Kletzer, 2005). According to

Herman (1999), though many workers are in occupations that do not require bachelor's degrees, the highest paying occupations will require advanced education up to an associate degree and further technical training. Based on national labor market statistics, occupations that require college degrees are growing twice as fast as other occupations and are among the highest paying positions (U.S. Department of Labor, 2002b). Unemployment studies have shown that individuals with a high school diploma or less have a greater likelihood of being unemployed and the higher the education level the lower the chances of being unemployed in a knowledge-based economy (Borbely, 2008; U.S. Department of Labor, 2009). With new occupations being developed weekly, knowledge and skills training designed to meet the demands of these occupations is essential (Fernandez, 2010; Kotkin & Zimmerman, 2007).

In 2009, the average college graduate earned 42% more than the average high school graduate at the 50th percentile (U.S. Department of Labor, 2009b). A knowledge-based economy is premised on the belief that knowledge can raise the return on investments which can, in turn, contribute to the accumulation of knowledge that stimulates more efficient methods of production which results in new, improved products and services (Houghton and Sheehan, 2004; OECD, 1996). As a result of a skills shortage, corporations are going to be more aggressive in tracking and holding talent, and training along with degree obtainment will accelerate in the corporate world (Herman & Gioia, 2003; IBM Global Services, 2008; Kotkin & Zimmerman, 2007).

The State of Iowa

According to the Labor Market and Workforce Information Division of Iowa Workforce Development (2009a), thousands of workers are trying to find employment in Iowa. Iowa's unemployment rate climbed to a 22-year high of 6.6% in December 2009 and

the overall average unemployment in 2009 was 6.0%. While the U.S. unemployment rate pushed to 10.0% in December of 2009, employers cut 661,000 jobs (National Center for Education Statistics, 2006; U.S. Department of Labor, 2009c).

The Iowa Works Campaign (2006) predicts that, by 2012, 45% of all occupational jobs in the state will require a post-secondary degree or training. Currently, 44% of young adults from 18-24 years of age are enrolled in college in Iowa, with 40% attending community colleges, 24% public institutions, 36% private four year colleges (National Center for Public Policy and Higher Education, 2008). Among working age adults between 25 and 47 years of age, 9.4% are enrolled in post-secondary programs. This participation level is slightly higher than the national rate of 8.9%. In Iowa, 27% of the workforce has a bachelor's degree (National Center for Public Policy and Higher Education, 2008) and the average age of Iowa workers is 43 (Iowa Workforce Development, 2009). Currently, Iowa's median annual wage is $48,980 (IWD, 2009), the national median annual hourly wage is $18.84 per hour, and the national median annual salary is $52,029 (U.S. Department of Labor, Bureau of Labor Statistics, 2009).

The Iowa Workforce Development Data and Business Bureau (2008) published a report for the governor on the condition of employment in the state of Iowa. Alarmingly, the report predicts that, by 2030, over 200,000 individuals could be retired. This represents 16.9% of Iowa's December 2009 workforce of 1, 602,900. In 2006, Iowa's labor force was among the highest in the nation with 72.7% of Iowa's' employment population employed and 8.9% of employed individuals working multiple jobs. With lower birth rates and limited population growth in Iowa, the state is facing an unprecedented amount of skilled and professional laborers leaving the employment base (Iowa Workforce Development, 2008).

Iowa must take action to address ways to build the knowledge and skills base with existing employees and with high school and post-secondary students to continue to advance in the knowledge-based economy (IWD, 2009; Iowa Works Campaign, 2006; Iowans for a Better Future, 2002). According to the Iowa Workforce Development Business Needs Survey (2009), many Iowa businesses are having trouble finding workers to fill critical positions which impedes competitiveness and productivity (Iowa Works Campaign, 2006).

A workforce needs assessment conducted by Iowa Workforce Development (2009c) found that Iowa employers are having difficulty filling their skilled positions and are concerned about their recruitment needs now and into the future. The growing need for technology knowledge and the need for employees to have a wide range of skills underlie the knowledge-based economy. Knowledge is recognized as fueling the potential for economic growth, increased productivity for employers and leading a new focus for economic performance through information and technology in the work place (OECD, 1996). Rural Iowa has many geographical regions that have unique industrial compositions that need to be examined for future growth in a knowledge-based economy.

Region One—Iowa Workforce Development

Eight counties (Allamakee, Chickasaw, Clayton, Delaware, Dubuque, Fayette, Howard and Winneshiek) in northeast Iowa are among the hardest hit by the current economic conditions. These counties comprise Region One in the Iowa Workforce Development structure. Throughout 2009, over 4,490 employees were laid off permanently from their place of employment and over 8,262 individuals received unemployment compensation in the fourth quarter of 2009 (IWD, 2009a) with a high percent of these

individuals working in manufacturing facilities, especially automotive industries (Borbely, 2009; IWD, 2009a).

Occupations of those who were laid off included: welders, assemblers, forklift operators, machinists, quality assurance, managers, accountants and engineers (IWD, 2009a). The individuals laid off from these industries were mainly in the age category labeled as *non-traditional age students*—25 years of age or older (Rodriguez & Zavodny, 2003). The average age of the dislocated workers in Region One is 43 years old (IWD, 2009a).

According to the Workforce Research Bureau of Iowa Workforce Development (2009b), in Region One 59.3% of the labor force has education/training beyond high school, 25.3% have obtained college education, and 4.0% are underemployed. The total population in Region One is 207,245, which represents 7.1% of Iowa's population. The Region One labor force includes 116, 860 employees in 6,711 businesses with 95% of these businesses having less than 50 employees (IWD, 2009b).

Table One compares the state of Iowa unemployment for 2008 to 2009. This information shows that a greater percentage of men have been laid off with a 67% increase from 2008 to 2009 compared to a 50% increase in the number of women laid off. The unemployment rate in the age group 25-34 is the age group with the highest percent change (85%) from 2008 to 2009.

Table 1

State of Iowa Unemployment Rates 2008 and 2009

Category	% 2008	% 2009
Gender		
Men	4.3	7.2
Women	3.6	5.4
Age		
16-19	12.0	16.4
20-24	5.9	10.7
25-34	4.0	7.4
35-44	3.4	4.7
45-54	3.0	4.7
55-64	2.5	4.1
>65	2.9	2.9

Note: Data source—IWD, 2009a.

In 2009, workers from nine businesses in Region One participated in a dislocated worker survey from the Iowa Workforce Development Labor Market division. These workers were laid off from companies mainly in manufacturing including: automobile manufacturing, trailer manufacturing, agriculture manufacturing, and aviation. Survey results indicated varied levels of education with the highest percentage of the individuals (48%) having a high school diploma, 23% had some education beyond high school and only 7.5% held an associate degree. The mean pay level at the time of layoff was $13.96 and the mean age was 44 (IWD, 2009b).

Overwhelmingly, 76% of the individuals responding to the survey indicated they wanted to find employment and 79% of respondents indicated they need assistance to identify appropriate career choices and future work opportunities. Approximately 43% of the individuals indicated they were interested in training but were unsure of the skills they possessed which would transfer to training, education, and employment (IWD, 2009c).

Many of the individuals laid off in 2008 and 2009 attended training through the Workforce Investment Act (WIA) program. The performance outcomes for 2009 have not

been released, but anecdotal evidence shared by Region One Employment and Training employees indicates 216 individuals enrolled in training programs in 2008-2009 (IWD, 2009d). In 2008, 372 individuals were served through the WIA program in Region One. Across Iowa, a total of 4,147 persons were served (IWD, 2009d).

Performance data for the WIA Region One employment for 2008 for Region One obtained from Iowa Workforce Development indicate that 88.1% of those who were unemployed were in training compared to 89.8% in state of Iowa (IWD, 2009d). The training retention rate after six months was 100% for Region One compared to statewide retention of 96.9%. Average earnings for Region One participants were $12,427 compared to $14,402 for those across Iowa (Iowa Workforce Development, 2009d).

The individuals served mainly attended community colleges for training (IWD, 2009d). Individuals who do not seek training looked for another job and, without training, they are at high risk of being laid off again (Borbely, 2009; U.S. Department of Labor, Bureau of Labor Statistics 2009a). Individuals who are laid off who seek assistance from Region One are offered job search assistance and career exploration through a variety of assessments— Career Ability Placement Survey (CAPS); Career Orientation Placement and Evaluation Survey (COPES); and Career Occupational Preference System (COPS). These assessments match individuals skills and education to occupations (IWD, 2009e) and are administered through the WIA program. Individuals are asked to conduct internet searches for career exploration on O*NET.

O*NET is the nation's primary source of occupational information for career exploration and job analysis. The online data base contains information on 965 occupations, information online includes the different mix of skills, knowledge, abilities, activities, and

work performing activities such as work tasks, work context, job zone, interest and work style. O*NET has information on projected openings, pay wage and links to job opening throughout the nation (O*NET, n.d.). This activity allows those who have been laid off to explore jobs in demand, the education, knowledge and skills needed to perform these jobs, and they typical wages earned in these occupations (IWD, 2009e).

The Role of the Community College

As institutions with multiple missions, community colleges have been leading the charge by providing workforce preparation training and leadership in economic development activities at the state, regional, and national levels since their inception (Bailey & Morest, 2004; Dougherty & Bakia, 1999: Orr, 1999). The mission of community colleges has expanded to include on demand development training programs for higher levels of skilled workers in a knowledge-based economy, though funding at the local, state and federal levels has not kept pace. These changes coupled with the open admissions policy offered almost universally by U.S. community colleges present significant challenges as community college systems strive to meet the demands placed on them.

Community colleges are forced to refine and focus their multiple missions in order to provide workforce preparation for high school students, traditional age college students, non-traditional students, and incumbent workers to help support the economic development of the region the college represents. Community college administrators must grapple with how they can appropriately and successfully incorporate credit and non-credit programs internally while juggling separate funding streams, regulations and community demands (Bailey & Morest, 2004).

Expanded Partnerships Needed

There is a need to develop customized training opportunities through the community college system to address skills gap training instead of full programs of study. Community colleges are the ideal educational institution to help fulfill the skills needs for business with limited training and they can provide promotion of lifelong learning so that individuals will have the tools to be successful in a knowledge-based economy (Bailey& Morest, 2004; Baird, 2008; Grubb, 1996; Grubb & Lazerson, 2004; Iowa Works Campaign, 2006; Hamm, 2004; Harkin, 2003; Malo, 2003; Rendon, 2000).

The higher the education level attained the more likely an individual will be employed in knowledge-based economy based on the demand for high skilled workers (Borbely, 2009; National Center of Education and the Economy, 1990; OECD, 1996). Further, the research of addressing emerging skills demand will assist employers in meeting their workforce gap (IWD, 2009c; Iowa Works Campaign, 2006) and enhance the community college mission of meeting the skills and labor needs of the business world (Bailey & Jacobs, 2009; Balfe & McDonald, 1994; Cohen & Brawer, 2003; Grubb, 1996; Hamm, 2004; Harkin, 2003; Rendon, 2000).

Developing a methodology that examines skills needed for knowledge-based industries for future employment and improving the ability to match the skills of dislocated workers to high-demand jobs in a region are essential for an improved economy in the 21st century (Eberts, 2005; Grubb, 1996; Grubb & Lazerson, 2004; Harkin, 2003; Malo, 2003; OECD, 1996). This research will assist Iowa policy makers, community college administrators and WIA Employment and Training providers in gaining critical information that can help guide new policies for training programs, funding sources. Further, this

research will provide a closer look at the real issue of what types of training are needed for emerging occupations that can grow the human capital of individuals and assist businesses in being competitive in the global economy which will result in an increase in the wealth of the nation, state, and region (Feser, 2003, Houghton & Sheehan, 2004; Iowa Works Campaign, 2006; Iowans for a Better Future. 2002; Kotkin, & Zimmerman, 2007; OECD, 1996; Porter, 1990).

Statement of Problem

In light of the current economic downturn, thousands of Iowan's are unemployed and this is the ideal time to build the skills of the workforce to compete in the knowledge-based economy so businesses and entrepreneurs can compete in a global economy. Individuals seeking work would be more employable in a knowledge-based economy if they could appropriately identify their transferrable skills and skills deficits, match their skills to high demand occupations, and receive appropriate training designed to enhance transferrable skills and improve skills deficits (Fernandez, 2010; Feser, 2003; Florida, 2000; Grossman & Helpman, 1991; Herman, 1999; Herman & Gioia, 2003; OECD, 1996). The lack of awareness and insight about how to access assessment data designed to assist in making appropriate choices for skills training results in many unemployed individuals failing to get the needed assessments and training (U.S. Department of Labor Employment and Training Administration 2009).

Millions of public dollars are being spent training individuals for employment (U.S. Department of Labor, Employment and Training Administration, 2003; United States Government Accountability Office, 2008) with limited or no systems in place to identify skills deficits or to match individuals' transferrable skills to high-demand jobs. It is essential

for individuals to make informed decisions regarding the training they need and for educational institutions to provide appropriate educational programs that are responsive to the needs of knowledge-based economy.

Purpose of Study

The purposes of this study are to compare the relationships between knowledge levels, transferrable skills, and skill needs of dislocated workers in northeast Iowa to the knowledge and skill needs of area businesses, to outline and develop a model for equipping Iowa's workforce for in a knowledge-based economy, and provide a paradigm for assessment and training.

Research Questions

This study will address the following research questions.

1. What are the demographics characteristic of northeast Iowa's dislocated workers?
2. What are the current skills, knowledge, and competencies of dislocated workers in Northeast Iowa?
3. Are their differences in the skills, knowledge, and competencies between male and female dislocated workers?
4. What are the aspirations of the dislocated workers in northeast Iowa?
5. What are the skills gaps of dislocated worker regarding the knowledge-based economy?
6. What education and training programs are needed to adapt the current skills set clusters to a knowledge-based economy in northeast Iowa?

Theoretical Framework

In order to gain an enhanced understanding of the issues, this research will draw upon human capital theory from research done by Becker (1975), Houghton and Sheehan, (2004), Laanan, (2000), Lepak and Snell, (1999), Mincer, (1958), Shultz, (1971), and Thurow, (1999). Human capital theory focuses on competences, knowledge, and personality attributes incorporated in laborers ability to produce economic gains for the individual and for the business (Becker, 1975, Mincer, 1958). Lepak and Snell (1999) believe "two unique dimensions of human capital are important to examine which are value (varies skills that are created) and uniqueness (skills to a particular firm) ubiquitous and exist everywhere and differentiate most if not all human capital" (p.33). The study will further draw upon the new growth theory which posits that increased knowledge of how to produce products with smaller amount of resources (Grossman & Helpman, 1991). The research will explore knowledge-based theory belief that human capital can be increased through higher education training promoting access to a range of skills and knowledge to promote lifelong learning and economic security for communities (OECD, 1996). Lastly, action research is used in this study based on the desire to promote immediate change by advancing a social cause and changing existing practices of inequality (Bogdan & Bilken, 2003). A systematic approach to the collection of data occurred; hard facts and survey results were analyzed using descriptive and inferential statistical quantitative analysis; identify changes in the systems to be challenged through research; understanding and awareness of the problem, based on my practical experience in the field, promote the involvement in action to be taken; and to have confidence in the recommendation. Causal comparative research approach was used to find reasoning for existing and difference between groups (Johnson, 2005).

Research indicates that workers who acquire additional skills in training programs will earn higher wages of 50% or more with an associate or bachelor's degree compared to those with a high school diploma (Borbely, 2009; Feser, 2003; Feser & Bergman 2000; Swenson & Eathington, 2003; U.S. Department of Labor Employment and Training Administration, 2005). Individuals who receive training usually receive higher wages and have a higher degree of job security (Borbely, 2009) which suggests individuals derive economic benefit along with society.

However, a cautionary note was provided by Grubb (1996) who revealed that not in all circumstances did individuals who received additional education at a community college receive higher earnings. Students who start and drop out of a program or do not finish for particular life instances do not always have an economic gain from additional education. In fact, 10.6% of those in the U.S. with less than a high school diploma were unemployed in 2008 and 7% of those with a high school diploma but no college were unemployed (Borbely, 2009). The higher the education level research the more likely individuals are to be employed or stay employed in a knowledge-based economy. Human capital is seen as a potential for economic growth in regional economies where skills are localized and can spillover to other businesses. This generates productivity gains specifically in generating new ideas, innovations and technology in a knowledge-based economy (Grossman & Helpman, 1991). Researchers have studied the impact of human capital in our society however the theory of new growth is essential to examine its impact on human capital. The new growth theory suggests economic growth results from the increasing returns connected to new knowledge. New growth theory views technology progress as part of economic development and holds that knowledge and technology have increasing returns that drive the process of

growth (Cortright, 2001). Better said "knowledge drives growth and it is a shift from a resource-based economy to a knowledge-based economy" (Cortright, p.2) that generate new ideas and fosters innovation.

An enhanced knowledge-based economy is where the creation and use of knowledge are the dominant activity and intellectual property the primary assets (OCED, 1996). For this study three emerging industries based on education level required, high demand for occupations, and the potential for higher wages were examined, these industries are: advanced manufacturing, biotechnology and information technology. The emerging industries have well defined skills gaps that are mapped to training to meet employers' skills demand in the state and this will be expanded to region one economy with the potential to increase the human capital of it workers. This study will explore the impact of a knowledge-based economy on the new growth economy and growth of human capital.

Human capital focuses on the economic gain obtained through training and the impression that individuals will have an increase in earnings with additional wages (Becker, 1975). This research looks at skills and knowledge as the means for obtaining higher wages in high-demand occupations that increase the individual's ability to market their assets.

Multiple studies statewide and nationally have been conducted to examine return on investments for attending education by examining income levels match to education from high school through post-baccalaureate level, focusing on different levels of education with the findings showing the higher degree of education having the highest degree of benefit (Baum & Ma, 2007; Grubb, 2002, Sanchez & Laanan, 1998). Studies of post college earnings at the community college level have used self reported wage data until recently when Compton (2008), Laanan, Compton, Starobin, and Friedel (2007), Laanan, Hardy, and

Katsinas, (2006), and Stoik, (2004) used UI wage records to show actual earnings matched to entire population sets from the Iowa Department of Education and Iowa Workforce Development. These studies show that additional education for workers results in shorter periods of time on unemployment and lower unemployment rates, more individuals in civic responsibilities and participation from participants who attend higher education (Baum & Ma 2007; Borbely, 2009; Grubb, 1996).

Further, it is important to recognize that not all individuals realize financial benefits from attending college. The types of education, different types of students and students having multiple differing circumstances when attending higher education can affect their earnings potential (Bowl, 2001; Eberts, 2005; Johnson, Schwartz, & Bower, 2000; Kasworm, 2003; Kilgore, 2003). This can be based on receiving education for traditionally low paying fields or for individuals who do not find employment in their field of study. Additionally, females tend to enter fields of study where the level of pay is lower than the non-traditional fields that are considered male dominant fields, such as construction, manufacturing, engineering, architecture, fields (Grubb, 1996; J. White, 2001; M. White, 2003).

Limited research is available using dislocated worker data matched to earnings, occupations, and skills/knowledge for a framework to define human capital and the new growth economy as has been done in this study. Studies matching wage earnings per occupation, location quotient percentage of jobs by industries in the nation, state and region do exist as do studies using O*NET skills/knowledge relating to human capital in the state and to define creative or emerging industries (Feser, 2003; Feser & Bergman, 2000; Swenson & Earthington, 2003; U.S. Department of Labor Employment and Training Administration, 2009). Studies by Feser (2003) and Feser and Bergman (2000) were used as guides to frame

the current study. By researching the use of the current skills and knowledge sets of dislocated workers to determine the potential for human capital growth in a workforce region, it is hoped that the results from this study will provide important pedagogical applications and tools for future research and policy development.

Significance of Study

Through quantitative and action research analysis of data sets included in this study results in a methodology and model for use in the assessment of dislocated workers' current skills clusters, transferrable skills and skills deficits and maps these skills to employers' skills needs in a knowledge-based economy. This model, once replicated, will help identify needed training for dislocated workers by establishing the skills deficits and by mapping the training needed to adapt to the knowledge-based industries in Iowa. It is hoped that the results of this study can be used to inform legislators and policy makers of the importance of addressing current skills and skills deficits that are needed in knowledge-based economy in order for the economy to stabilize and grow and to recognize the importance for accurate mapping of skills sets to assist in determining career paths.

The model proposed as a result of this study does not currently exist. Although there are data sets available to facilitate research matching dislocated workers to high-demand occupations, the elements of transferrable skills and skills gaps and the idea of mapping the education and training needed to meet the employer demands for high-demand occupations have not been combined in a model previous to this study. Without accurate and effective models for building the knowledge and skills of dislocated workers, many unemployed individuals will fail to take advantage of the educational incentives and the new legislation providing extended unemployment benefits. Further, the skills and knowledge levels of Iowa

workers will not be improved resulting in the failure of obtaining higher paid, more secure jobs in Iowa.

Another reason why this research is so important comes from the perspective of community college administrators, key business representatives and economic development officials. Community colleges, whose mission is to educate tomorrow's workforce, are facing a financial crisis due to state and federal cut backs. These cuts will affect the ability of colleges to develop new and innovative training programs that will benefit the knowledge-based industries (Bailey, Jenkins, & Leinbach, 2005; Balfe & McDonald, 1994; Dougherty & Hong, 2005; Grubb, 2002; Grubb & Lazerson, 2004; Herman, 1999; Rendon, 2000). Illustrating the need for training for high wage, high-demand jobs is critical for community colleges to help secure additional funding and to prove to lawmakers that this funding is critical in growing the economy.

Lastly is the impact on the Workforce Investment Act (WIA) to address more short-term training needs of businesses in the new knowledge-based economy and address funding for entrepreneurial programs based on the talent that is available in northeast Iowa communities. The WIA program's performance measures are related to degree completion, skill attainment, and employment with a wage threshold (U.S. Department of Labor Employment and Training Administration, 2005, August) which limit short term skills building training.

This study will have implications on the refinement and development of performance measures for the state of Iowa and on national programs which impact the financial support for these programs. Economic developers will have access to a model that is current, accurate, and based on dislocated workers' transferrable skills which will enable them to

promote these skills to business prospects. Among the top concerns when businesses relocate are the knowledge and skills of prospective employees (Steele, 2009). Businesses are not looking to hire bronze but are looking for intellectual capacity of the workers. Having a model that identifies knowledge and skills sets along with transferrable skills will provide the potential for economic developers to have access to a critical tool for the success of business growth in rural Iowa (Baird, 2008; Fernandez, 2010; Florida, 2000; IWD, 2009; IWD, 2009c; IWD, 2009f; Iowa Works Campaign, 2006; Iowans for a Better Future, 2002).

Limitations

The data used for this study are from surveys of dislocated workers in Northeast Iowa who were laid off from advanced manufacturing industries. The policies of the programs that serve dislocated workers in Iowa are relatively new. One significant change is the requirement that dislocated workers must train for high-demand occupations which limits data available on individuals who are not taking advantage of the training. Another limitation of the study is that, because the sample of dislocated workers consists primarily of those from manufacturing, the results will be skewed toward that industry and the occupations therein. While the Region may have a considerable advantage in other occupational groups or industries, the results will be narrowed. This limitation was minimized by doing a comparison between the dislocated worker sample and the actual population of occupations. Further, the emerging occupations are not representative of all high-demand occupations and are narrowly focused comprising just advanced manufacturing, bio-science, and informational technology occupations.

Definitions

Declining occupation: is one in which there is a lack of sufficient current demand in the labor market area for the occupational skills for which an individual is prepared by training and experience or current physical or mental capacity and lack of employment opportunities is expected to continue for an extended period of time (Iowa Workforce Information Network, 2009).

Dislocated Worker: Individuals who are laid off from a business which closed, down sized or discontinued employment through no fault of their own (U.S. Department of Labor Employment and Training Administration, 2005, August).

High-demand occupation: is an occupation in a labor market area in which IWD determines work opportunities are available and for which there is a lack of qualified workers or applications for work (Iowa Workforce Information Network, 2009).

Iowa Workforce Development (IWD): is Iowa's employment and securities agency. The IWD mission is to "improve the income, productivity and safety of all Iowans." In conjunction with state and local economic development efforts, IWD also assists businesses in fulfilling their workforce needs. The majority of IWD services are mandated by state and federal laws and regulations (Iowa Workforce Development, 2009).

Knowledge-based or next-generation industries: are used synonymously to mean those industries where the creation and use of knowledge is the dominant activity and where intellectual property is the primary asset. These industries, and therefore occupations, create more value for the local economy and are much harder to outsource (OECD, 1996).

Knowledge worker: Individuals who do not engage in the output of physical products but, rather, use their skills for longer-term gains in productivity (OECD, 1996).

Laborshed: is the region from which an employment center draws its commuting workers (Gerrish, 2003).

Location Quotation: is a way of quantifying how "concentrated" an industry is in a region compared to a larger geographic area, such as the state or nation (Feser, 2003).

North American Industry Classification System (NAICS): standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy (U.S. Census Bureau, 2009).

Non-traditional Students: Individuals 25 years of age or older attending post secondary education (Rodriguez & Zavodny, 2003).

O*NET: Is the Occupational Information Network development by the U.S. Department of Labor's Employment and Training Administration. The O*NET program is the nation's primary source of occupational information. The database contains information on hundreds of standardized and occupation-specific descriptors. (U.S. Department of Labor, Employment and Training Administration, n.d.).

Participant: Individual who is receiving WIA services. The services provided include case management, training dollars or one-on-one career counseling (U.S. Department of Labor Employment and Training Administration, 2005, July).

Shift share: exammines the sources of employment growth or decline among states or regions (Feser, 2003).

Skills gap: matching skills needed for employment today to the industry needs of skills for the future (OECD, 1996).

Skill set cluster or cluster: is the aggregated set of measured abilities or knowledge possessed by a geographically-defined group of people. Almost all skills can be found to some extent within a region, but this study is most interested in those clusters that are relatively large and concentrated (Porter, 1990).

Transferrable skills: knowledge and skills acquired through the years that can be transferred to an emerging occupation even if the individual was not employed formally in that occupation (Porter, 1990).

Worker Adjustment and Retraining Notification (WARN): WARN helps ensure advance notice in cases of qualified plant closings and mass layoffs (U.S. Department of Labor Employment and Training Administration, 2002)

Workforce Investment Act (WIA): Federal legislation to provide job training or educational training for participants who are dislocated from businesses in the United States. The intention is to provide assessment, skills building; job seeking, intensive training, and classroom training so dislocated workers enhance their employability skills to obtain employment at a like or similar wage from where they were dislocated (U.S. Department of Labor, Employment and Training Administration, 2005).

Dissertation Overview

The succeeding chapters of this dissertation will provide a review of the literature of the theory on human capital value and uniqueness, new growth theory and action research theory along with supporting literature (Chapter Two), a description of the methodology for the study (Chapter Three), a discussion of the results and findings (Chapter Four), and implications for future research, practice, and policy (Chapter Five). The review of literature in Chapter Two will begin with a discussion of Iowa's economic status in a global economy,

dislocated worker services and the complexities that are associated with their loss, governmental policies and legislation, employers' skills deficits and the skills needs, and information pertaining to career/skills preparation for dislocated workers.

In Chapter Three will provide an overview of the methodological approaches employed which will be followed by descriptions of the existing data sets and methodology used in the research and by the ways in which the data were analyzed. The review and approval process through Iowa State University's Human Subjects Review Committee review will then be described. Chapter Four includes a reporting and discussion of the results of the study and Chapter Five includes presentation of the models developed by the researcher from the study and a discussion of the implications for future research, practice, and policy.

CHAPTER 2

LITERATURE REVIEW

Introduction

The literature is rich in information pertaining to the need to upgrade American's skills in order to meet the demands that 21st century occupations will require of workers. Researchers including Eberts (2005), Grubb (1996), Grubb and Lazenson (2004), Feser (2003), Hamm (2004), Harkin (2003), and Herman (1999) have conducted research on the benefits of education and training and the need for appropriate assessment and career planning (Bowl, 2001; Flint & Frey, 2001; Jacobson, LaLonde & Sullivan, 2005; Kasworm, 2003; Kilgore, 2003; Ranney & Betancur, 1992; Rocha & Strand, 2004) in order for individuals to be successful in their education and the role community colleges play in enhancing economic well being. Research has also addressed the need for skills in 21st century if the United States is to remain competitive in the global economy (Grubb, 1996; Hamm, 2004; Harkin, 2003; Malo, 2003; Porter, 1990). Further, researchers have studied the human and social capital impact of the degrees held and wages earned by workers within the framework of human capital theory (Baum & Ma, 2007; Laanan, 2000). However, limited research has been conducted on the impact of the individual's knowledge and transferrable skills and the impact on human capital as it relates to the knowledge economy.

There is a need for further research that addresses the impact of knowledge transfer to emerging industries by workers who receive limited education or training. Most research shows the more education the higher the wages earned but this research does not take into account the skills and knowledge that displaced workers have gained during their years of employment. Further, there has been limited assessment of how this knowledge and skill

contributes to society's human capital or of the fact that college does not always lead to stable income and employment (Grubb & Lazerson, 2004, Markusen, 2000). Research that identifies skills gaps and matches transferrable knowledge and skills possessed by those in the current and future workforce with the needs of current and future employers is critical for the growth of local, state, and national economies.

Globalization

The increased concern in the United States of competing globally, increased off shoring and fierce competition for imports and exports in the 21st century coupled with the crash of the housing market have increased the number of business closures and worker layoffs. According to Department of Labor statistics (2009a), the majority of workers affected by these business closures were tenured employees with limited education.

In 2008, the group that was most impacted by layoffs were males between the ages of 25-54. Overall, the employment level fell by 2.25 to 98.3 million in the fourth quarter of 2008 with 84.6% of males and 71.7% of females in this age group in the workforce. Individuals with less education experienced a greater percentage increase in unemployment rates than individuals with higher levels of education. Those with less than a high school diploma experienced a 10.6% rate of unemployment. Of those who had attained a high school diploma or equivalent 7% were unemployed while those with some college saw only a 5.5% rate of unemployment and those with an undergraduate degree saw a 3.3% unemployment average for the fourth quarter of 2008 (Borbely, 2009). This data shows that males are disproportionately the losers in this recession. The industries most affected by the recession are male-dominated including construction and manufacturing while women are

more represented in traditional industries like healthcare and education (Borbely, 2008; IWD, 2009).

In the past 50 years, the workforce has changed significantly due to a new economy that is technology-driven and has a higher demand for technical occupations which require higher skill levels (Cortright, 2001; Hodges & Lustig, 2002; Houghton & Sheehan, 2000; Nonaka & Takeuchi, 1995; OECD, 1996; Peters, 2005). Diversity in the workforce, changes in education, and the rapid change in technology are all important factors affecting how the workforce impacts our economy's ability to respond to globalization (Eberts, 2005; Grossman & Helpman, 1994; Grubb, 1996; Grubb, 2002; Grubb & Lazerson, 2004; Hamel & Prahalad, 1994; Harkin, 2003; Laanan, 2000).

These factors are a significant reason why non-traditional students attend higher education. Following World War II and the Korean War, expansion of wages and full employment gave rise to the professional class and became a driving force of the knowledge society where the scientific-technical revolution enabled America to prevail (Hodges & Lusting, 2002). Further, the researchers contend, high-paid and high-skilled jobs were in abundance in the nation and these factors played a key role in educating the over 20 million veterans when Congress passed the G.I. Bill. In the twentieth century a major influence on the economy included the "concept of expertise whether you call it knowledge, education, human capital, intellectual capital or brain power it is prevalent in studies and essential for our nation to grow" (Hodges & Lusting, 2002). In 1971, Schultz noted individuals were attending education and training at a rapid pace and attributed this increase to the substantial unexplained rise in earnings in the economy.

Grubb (1996) looks closely at the mid-skilled labor market and addresses the need for education and training programs that are preparing workers to meet the workforce demands. He focuses on what is currently occurring in training programs in postsecondary education and addresses what additional steps and restructuring need to occur so there is an integrated, coherent system for two-year community colleges, short-term training programs, job training programs—JTPA (currently known as Workforce Investment Act of 1998 or WIA), students, employers and tax payers.

Harkin (2003) reported that employers estimated that 39% of their current workforce and 26% of the new hires will have basic skills (reading, writing and math) deficiencies. Harkin predicted that 42% of the projected new jobs between when the article was written in 2003 and 2010 would require some level of college education beyond high school. Sixty five percent of all American employment requires specific skills. Of the existing workforce, 75% need retraining merely to retain their jobs (Harkin, 2003).

Leaders from IBM Corporation conducted a study to better define the challenges companies face in recruitment, allocate and invest in their human capital to address skills shortages and to become more competitive in a global economy. Many companies are wrestling with a changing workforce, global employment market and increased competition. The need to identify and connect talent has never been more critical (IBM Global Services, 2008). The study recognizes the economy is transforming into an integrated market full of opportunity and the need to be good at predicting future sills, hiring the right skills, and identifying local experts and skills sets that can enhance the company's competitive edge for most businesses is critical for success in a new growth economy. The study focused on the need to assign work tasks based on employee skills so they can be more effective and

efficient which will lower the company's costs and increase productivity and the overall profit for the business. The study provides recommendations regarding what businesses can do including the need to look regionally for talent development.

In Dubuque, Iowa IBM made the choice to open up an IBM business data center in a community where 1,300 people will be hired in 2009. One of the strongest factors in IBM's decision to relocate was the promotion of education which was evident with the highly educated workforce—the result of having five higher educational institutions within 60 miles. This underscores the fact that rural Iowa can excel and compete in a new growth economy with a continued focus on knowledge development in order to enhance competitive advantage. The Greater Dubuque Development Corporation Media release on January 15, 2009 announcing IBM's decision to move to stated:

> 'We selected the City of Dubuque for our new delivery center based on several criteria, including the strong positive public-private partnership within the city, its competitive business model and the talent and skills that Iowa and the Midwest have to offer,' said Mike Daniels, senior vice president, IBM Global Technology Services. 'We continue to invest in IBM's future and recruit the skilled persons we need to grow our business. The Dubuque service center is a model for creating new opportunities and we look forward to working with the City and the state of Iowa to accomplish great things together' (Blouin, 2009).

Kotkin and Zimmerman (2007) emphasize the need to examine and cultivate the talent of the workforce in the Midwest. Their report focuses on the resurgence potential for the Midwest based on two key factors: one is the emphasis on fostering technology literacy in K-12 education and encouraging more students to pursue science, math, and engineering

careers, the second is the mobilization of existing assets by encouraging colleges and universities to develop curricula more closely aligned with the needs of core regional industries. The report supports economic growth in less densely populated areas in rural communities and indicates non-metropolitan areas are gaining jobs at a greater rate.

Further, the report emphasizes the "brain belt" of highly educated individuals and the worker's need to know his/her existing skills and knowledge to promote economic development and to determine skills surplus. The Midwest has a high level of underemployment and this contributes to concerns that human capital is underutilized and markets the need for skills and knowledge to the existing human capital. The report used the high graduation rates from colleges and enrollments in advanced science to determine human capital. However, this study does not focus on existing skills of the workers, nor the gaps of skills that are needed to move forward in a knowledge based economy.

Iowa's Economy

According to Iowa Workforce Development (2009f), Iowa is second in the nation with residents 85 and older. Twenty-two percent of Iowa's population is between the ages of 45-64 with a projected 200,000 working age population leaving the work force by 2030. Iowa has a median age of 36.6. Of individuals aged 18 and older, 21.4% had some college but have not attained a college degree, 7.4% have an associate degree, 14.7% have earned a bachelor's degree, and 6.5% possess a graduate degree or higher. For the first time, Iowa's population was slightly over 3 million—a 3.1% gain from 1990. Further, the report reveals that of Iowans employed between 2000 and 2006, the 45 to 55 age group increased by 11.1% while those 55-64 increased by 29.5%. Conversely, the 35-44 age group decreased by 9.1%.

The state has seen increases in population that are clustered around the larger metropolitan areas, with the vast majority of cities with populations of 10,000 to 49,999 and in cities less than 1,000 experiencing net loss in population (Eathington & Swenson, 2007). Iowa's Changing Labor Force Dynamics published by the Workforce Data and Business Development Bureau of IWD (2008) reports that estimates indicate by 2030, 200,000 (16.9%) individuals will be eligible to retire in Iowa's workforce of 1, 602,900. The majority of these individuals entered the workforce in the 1970's which was the fastest growing workforce with a large percentage being females entering the workforce. In fact, 17.1% of those in the workforce aged 55 years or older are female. Further, the report suggests 60% of the job growth will come from three board industries: health, professional/business services, and advanced manufacturing. The ten fastest growing occupations which will make up 40% of Iowa's job growth include:

> computer/mathematical and mathematical, healthcare support, community and social services, personal care and service, business and financial operations, healthcare practitioners, food preparation and serving, architecture and engineering, building and grounds maintenance and legal (p.19).

The National Center for Public Policy and Higher Education (2008) profile indicates that 51% of Iowa high school freshman enroll in a four year institution and 35% enroll a community college. Further, 3.5% of working adults attend college part-time and 27% of Iowa population has a bachelor's degree or higher. Iowa's' median personal income for 2008 was $36,680 which was 92.3% of the national average of $39,751. In 2006, 24.3% of Iowa's population held a bachelor's degree.

A study conducted by Iowa Workforce Development in 2008 focused on gender wage equity. The survey included 5,669 employed respondents—59.6% were female and 40.3% were male. The study found that females earn 21.8% less than males per hourly and salary rates. The median hour wage was $15.50 for males and $11.30 for females with a high school education and a median salary of $35,000 for females and males at $45,000 with a high school degree. Top management salaries for males were 35.2% higher than females. The differences continue among the level of education and lower wages for females were tied to types of occupations. For example, female occupations including office and administrative support work and health care and males jobs such as construction and production which normally having higher pay ranges then the latter.

The study provided wage disparity for regions. In northeast Iowa women earned on average $12.14 hourly and $35,000 salary compared to males at $13.63 and $57,000 salary. The region had more females concentrated in education, health care, social services, finance, insurance and real estate while males worked primarily in manufacturing, finance, real estate, transportation communications, public utilities, education and agriculture business. The study supports the need for females to be more aware of occupations that can help produce a higher wage not just based on gender, but based on occupations females tend to enter.

With Iowa's population growing slowly, the looming concerns of baby boomers, and post WWII children retiring it is critical for Iowa's policy makers to start addressing the skills shortage in the current and the future workforce. The Generation Iowa Commission was formed by the Governor of Iowa with oversight from the Iowa Department of Economic Development (IDED).

In January of 2008, a report was presented by this group titled: *Iowa Best Practices: How to Recruit and Retain "Generation Iowa"*. The research for the report was done by the Boston Consulting Group, a Utah-based foundation. The report indicated that the top concerns for young employees include: first—higher paying jobs and low cost of living, second—a workplace compatible with their skill sets and growth of those skills and, among the top five at number five— career advancement and leadership opportunities.

The number one factor—a workplace compatible with skill sets and growth of those skills—outweighed all the other factors. One outcome of this study was a recommendation to conduct a needs analysis in locations where labor shortages that impact business growth exist. Further, the report recommended a shift from a focus-based economy concentrated on profit and product output to a knowledge based economy (Generation Iowa Commission, 2008). An example that illustrates the ability to make this shift is health care workers who are not limited to work in hospitals. These individuals could choose to work in an advanced "bioscience" advanced manufacturing facility. These factors help support the need to move into a knowledge-based economy with a focus on worker skills and an increased capacity to grow the skills needed in high-demand jobs. This growth in human capital will allow Iowa to be competitive in a new growth economy.

Northeast Iowa Economy

Iowa State University is one of the leaders in the state in addressing economic capacity. A study conducted in 2003 by Swenson and Eathington focused on top economic regions in Iowa which contain a core city or set of core cities in which economic activities are concentrated. In northeast Iowa, two communities and one county were within the top 35 economic regions. These include: Dubuque (18th), Decorah (23rd) and Fayette County (34th).

The researchers looked at the trade center, retail flows, commuting flows, and employment and earnings and concentrated their research on three broad industrial areas on which the state of Iowa is focusing economic development energy: life sciences, advanced manufacturing, and information solutions (Swenson & Eathington, 2003).

The results of the study showed that Decorah, Fayette county, and Dubuque had higher concentrations of advanced manufacturing and life sciences industries than the statewide average but the three communities had lower percentages of information solutions. The region's average wage was lower than the state average and population growth was three to four percent lower than the state. Further, non-farm growth was higher in Decorah and Fayette county and less than in Dubuque compared to the state average (Swenson & Eathington, 2003).

These factors point to the fact that northeast Iowa has the potential to grow in emerging occupations. This report did not cover the knowledge and skill base of the employees in this region. It is the contention of this researcher that the knowledge and skill base of workers are important predictors of rural economic regions having a competitive advantage in the new growth economy.

Dislocated Workers

The majority of the participants who are enrolled in the WIA programs attend community colleges (IWD, 2009e). The WIA program's goal is for participants to be employed six months following their exit from training with a higher replacement wage and assured retention three calendar quarters after training ends. The program offers participants financial backing for training but social and academic mentoring is very limited. This is where the community college plays an essential role in the success of these participants.

According to Malo (2003) community colleges have illustrated their effectiveness by their participation in WIA One-Stop career centers. These centers have played a pivotal role delivering workforce development services that include the soft skills training programs, customer service skills, leadership and teamwork skills.

The vast majority of individuals who are dislocated in rural northeast Iowa are of non-traditional student age—older than 25 years. It is very important to acknowledge if these individuals choose to attend post secondary education, they will have greater ancillary needs to assist them in completing college (Bryant, 2001; Eberts, 2005; Flint & Frey, 2003; Kasworm, 2003; Kilgore, 2003).

The WIA Region Employment and Training program provides reemployment services, on the job retraining services, job search allowances, and relocation allowances. The program also makes available customized training which includes two- year educational programs, vocational or certificate programs, or skills upgrading in a specific skill area in order to be employed. Those who are financially eligible can participate in the WIA Title I program that assists with child care costs. The benefits are only available if the individual affected by the layoff continues to be enrolled in a certified training program. Once the classroom training is completed or the individual quits the program, benefits are terminated immediately.

The program also offers income support through the trade adjustment allowance for up to a total of 104 weeks. This includes 26 weeks of regular unemployment insurance (UI) in most states, and 26 weeks of trade adjustment allowance cash benefits, plus an additional 52 weeks. Health coverage tax credit, funding for transportation, books, supplies, tools and subsistence for commuting are further benefits. Like the WIA program, these benefits are

only available if the individual affected by the layoff continues to be enrolled in a certified training program. Once the classroom training is completed or the individual quits the program, benefits are terminated immediately.

The Trade Adjustment Act (TAA) program has very strict guidelines for participation, which are similar to the welfare-to-work program. A participant attending a community college must be enrolled full time 8 weeks after the certification date, or 16 weeks after the most recent qualifying separation, whichever is later, and must have training completed within 104 weeks. Developmental classes are approved in math, reading, and language and participants can receive up to an additional 26 weeks of training, although they are still required to attend full time. If they drop out at any time, they lose all training benefits and other TAA benefits. Students are required to maintain a full time student enrollment throughout the two-year period of time. Childcare is not paid as a benefit, nor are counseling or mental health services part of the program except for workshops offered through the One Stop system. Limited case management services are available to help with pre-planning and research for careers and training programs.

The federal government introduced the Trade Adjustment Act of 1974 (U.S. Department of Labor, Employment and Training Administration, 2003), and, in 2002, updated the program to assist dislocated employees with job search services, retraining at community colleges, and other services designed to produce a skilled workforce for new industries. To be eligible for benefits under TAA, a petition must be filed on behalf of the employees with the Department of Labor. The petition must demonstrate that the individual's employment was adversely affected by foreign trade. Once certified by the federal government, each affected employee must apply separately for TAA/TRA benefits.

In order to be eligible for Trade Readjustment Allowance (TRA) benefits, a dislocated worker must be enrolled in full-time training 8 weeks after the certification date or 16 weeks after the most recent qualifying separation. Under extenuating circumstances, the 8/16-week deadline for enrollment may be extended up to 45 days. Further, the TRA benefits are only good as long as the certification date of the petition, which is typically 2 years.

Effective January 1, 2004, a maximum of $15,000 per participant is paid out through an Individual Training Account Plan. This includes training costs, tools, supplies, tuitions, and fees. If the training plan is more than $15,000, the participant must provide a plan to fund the shortfall in order to receive the funding. The $15,000 limit does not include transportation or subsistence allowances.

Persons who have completed the services funded through the TAA program are deemed to be *exiters*. The principal outcomes expected of exiters include:

- wage replacement rate six months after exit,
- employed first quarter after exit,
- employed second quarter after exit,
- retention rate (still employed in the third quarter) and
- recalled by layoff employer.

The TAA program was designed to aid workers who have lost their jobs due to business closures that result in product(s) being produced in another business off shore. The North American Free Trade Adjustment Act (NAFTA) assistance programs were developed to aid workers displaced by business closures resulting from production being moved to Canada or New Mexico. The programs are administered similarly in Iowa and throughout the

United States. This study includes both NAFTA and TAA participants and programs when reference is made to TAA participants.

The increase in globalization and import competition in the 21st century has added to the number of business closures. This has resulted in an increase in TAA petitions throughout the United States, with over 45,000 new training recipients under this program in 2003 (U.S. Department of Labor, Employment and Training Administration, 2005, August).

The majority of the participants who are enrolled in the TAA programs attend community colleges. Almost 60% of participants are women, many of whom juggle multiple roles as mothers, students, employees, and spouses. In addition, they are coping with the social, economic and academic stressors resulting from the loss of their jobs (McClenney, 2004). The TAA program goals include participants being employed six months following their exit from training with a higher replacement wage and assured retention three quarters out. The program offers financial backing for training, although social and academic mentoring is very limited. This is where the community college plays an essential role in the success of these participants.

Re-employment Services (RES) is a federal program and is a component of placement and unemployment insurance. It is designed to provide intensive services to individuals receiving unemployment insurance who have, through a federal formula, been identified as "at risk" of exhausting their unemployment insurance benefits prior to obtaining new employment. Rapid response services are defined as the event of a substantial layoff or plant closing that falls under the WARN (Worker Adjustment and Retraining Notification) Act, the Workforce Center will help in the coordination of a Rapid Response. The initial Rapid Response meeting with the employer and applicable labor organizations or employee

representatives will provide an opportunity to exchange information about the layoff or closure and resources available to employees. At that meeting, arrangements will be made for a worker information meeting. At the worker information meeting, employees will be informed of assistance available from area agencies and organizations, including the Workforce Center and WIA (IWD, 2009e).

The United States Government Accountability Office (2008) compiled a report that indicated the need for enhanced collaboration between WIA, community colleges, and the One Stop system. Also noted were the need to be more proactive in increasing the numbers of individuals who receive training in post secondary programs and the need to significantly increase the number of workers training. The goals recommended were to strengthen the One-Stop career counseling and coaching services and develop talent plans for training of individuals who take advantage of these services.

Other training programs in Region One include Northeast Iowa Community College's training and economic development programs. The College delivers outreach and training services through the 260E and 260F programs. The 260E program provides training for new and expanding businesses and the 260F program provides training for incumbent workers.

The College is a strong player in working with established business partnerships in providing training. The Northeast Iowa Community College Economic Development team has strong ties with businesses and is focused on bringing workforce training to the region and to developing strategies that solve community and workplace needs.

The College and the Iowa Department of Economic Development (IDED) are key contributors to serving business training needs through 260E & 260F programs. Funding

opportunities are available for new, expanding, and existing businesses which meet program criteria (IWD, 2009e).

The Iowa Training Extension Benefits program was part of the UI Modernization Bill (Iowa Legislature Senate File 197, 2009) and it relates to unemployment insurance benefits and compliance with federal law in order to qualify for funding. Training extension benefits are available for individuals who have been separated from a declining occupation or who have been involuntarily separated from the last place of employment and who are involved in a job training program through the WIA. A training extension for 26 weeks is available for individuals who are in training for high-demand occupations (Iowa Legislature Senate File 197, 2009).

The Role of Community Colleges

Community colleges play a critical role in educating the current and future workforce. In a knowledge economy, the traditional and critical function of community colleges and universities is to promote public knowledge and enhancing knowledge as a global public good (Peters, 2005). The changes in the economy in the 21st century pertaining to globalization, enhancements in technology, and the need for a skilled workforce have increased the demand for community colleges throughout the United States (Bryant, 2001; Harkin, 2003; Kasworm, 2003; Laanan, 2000).

Demographics of Community College Students

America's two-year colleges attract a wide range of students. According to the American Association of Community Colleges (Phillipe, 2000), 44% of all U.S. undergraduates attend community colleges and 45% of first-time freshmen attend a community college. Of the 5 million students who attend an American two-year college,

58% of them are women (Phillipe, 2000). Individuals choose community colleges because of the ability of these institutions to offer a high-quality educational experience at a low cost (Johnson, Schwartz, & Bower, 2000; Kasworm, 2003). Additionally, community colleges are often located a convenient distance from home. This convenience allows individuals of non-traditional age, who often have to meet the multiple demands of work and family, to pursue their educational aspirations (Johnson, Schwartz, & Bower, 2000). Additionally, non-traditional students who attend community colleges attend because the institution is readily accessible, have programs relevant to their current life needs, are cost effective, flexible in course scheduling, and supportive of adult enrollments (Kasworm, 2003). According to Rendon (2000), the unique function of community colleges is to provide access to a wide range of students, with the explicit purpose of educating students and encouraging them to become active and responsible citizens.

The definitions for 'non-traditional' age students for this study have been borrowed from Kasworm's 2003 study in which she defined the non-traditional age (adult) student as one who represents "the status of age (typically defined as twenty-five years of age and older" (p. 4). In her article, Kasworm gives figures from the National Center for Education Statistics (NCES) indicating that, in 1970, college students aged fourteen to twenty-one years of age accounted for 55% of all college students. Kasworm reported that NCES predicts that by 2010, the fourteen to twenty-one age groups will represent only about 46% of the college population.

A study conducted by Laanan, (2000) used the 1996 Cooperative Institutional Research Program (CIRP) data, which sampled 10,638 community college freshmen throughout the United States. Laanan examined what influenced these students to attend a

community college. The results indicate that the number one reason was to get a better job, the second to make more money, and the third, to enhance knowledge. The influences for attending a community college included a relative's wishes, advice from teachers, and financial aid (Laanan, 2000).

Non-traditional Students

Hamm (2004) states non-traditional students face a higher level of risk for non-completion than their traditional peers. "The characteristics that define non-traditional students are risk factors because they relate negatively to staying in school or earning a degree" (p.30).

> Sixty-two percent of non-traditional students with multiple non-traditional characteristics leave the community college without a degree, compared to 19% of traditional students. Focus groups of community college student and former student who stayed in school reported key factors that assisted them include: stable childcare, personal supports, peers and college faculty and staff and employers who accommodated school attendance (Matus-Grossman &Gooden, 2002 as cited in Hamm, 2004, p. 30).

Flint and Frey (2003) further indicate faculty and institutions need to have programming that respects the knowledge of the adult student. They suggest *learning contracts* that are closely related to work settings and students' career goals. Such learning contracts offer the students, the college, and the business community the ability to design concentrations of study that are related to the workforce skills that are needed. *Partnerships* with economic development organizations and businesses are essential for education. The role of the community college is to grow the skills of the workforce and to teach students to

become life-long learners. Educational institutions must pay attention to businesses' demands for needed skills and must have employers become an integral partner in program development in order to be successful in retaining non-traditional students.

Coccia's (1997) recommendations concluding her study include mentoring with faculty, career guidance that addresses real world salary potential, placement rates and flexible scheduling and involvement in volunteering to gain skills and expertise. One of the goals of the current study is to build on Coccia's study by focusing more on why participants attend additional training and to learn participants' views on services that are needed including counseling, financial, child care, spousal supports, transportation, mentoring, tutoring, academic assistance (study skills, writing skills, math skills) career counseling, and stress management. Clark (2000) recommends that for a college to be highly competitive in recruiting non-traditional students and helping them choose non-traditional careers that earn more money, colleges need to:

- market *career and technical* programs that reach all students;
- present *career clusters* and possible pathways to employment in technical and professional careers;
- provide *multiple ways to explore non-traditional careers* due to these careers normally paying more than traditional careers;
- challenge *students' beliefs* by exploring underlying attitudes regarding career choices;
- help *students overcome stereotypes* by making sure that services are in place if students choose a non-traditional career path;

- address *curricula and program design; give students support and time* to try unfamiliar equipment; and
- provide *mentors and role models* (Clark, 2000).

It is important to address counseling on career pathways for non-traditional students who will need to have careers that are self sufficient because many of them are single parents and/or are in low income jobs (Kasworm, 2003; Kilgore, 2003; Laanan, 2000; and Sanchez, & Laanan, 1999).

According to Grubb (1999) the *program effects* for students who attend community colleges for two years but do not obtain an associate degree have resulted in positive financial and occupational gains, especially for males in trade occupations. Once students obtain a degree they are considered to have a *certification* that distinguishes them from all other non-degree students who are seeking job opportunities (Sanchez & Laanan, 1998).

The minimal qualifications for entry level positions are moving closer to an associate degree, and for some occupations a bachelor degree is required (Ross-Gordon, 2003). According to Herman (1999), even though many workers are in occupations that do not require bachelor's degrees, the highest paying occupations will require education and further training. Based on national labor market statistics, occupations that require college degrees are growing twice as fast as other occupations and are among the highest paying positions (U.S. Department of Labor, 2002e). In 1979, the average college graduate earned 38% more than the average high school graduate; today this percentage has risen to 71% (Herman, 1999; U.S. Department of Labor, 2002b).

According to the Community College Building Bridges for Tomorrow's Workforce Skills 2000 survey there is a great need for training in the health care field, manufacturing,

retail trade, and education and business occupations. The results are consistent with the Iowa Values Fund (Iowa Works Campaign, 2006) which focuses on training dollars for advance manufacturing, life science and information technology. The need for replacement of employees and for new employees is consistent with the national trends. Businesses have been forced to look at ways to upgrade their workforce to meet technology needs and address processes in order to retain their business.

Kilgore (2003) indicates it is the professional responsibility of the school to assume the role of life-long educating, and faculty and staff have a moral responsibility to meet the demands of their community stakeholders when educating students. Kilgore further indicates it is essential for instruction to engage relevant context, "which includes social, economic, labor market, legal and technological" (p. 82) skill needs and qualifications of the workforce. It is important to address non-traditional students' multiple roles in education. Adult students bring a wealth of experience to the classroom and they attend because they want to change their lives, broaden their intellectual interests, develop critical thinking and enhance their study skills, and apply their knowledge in their careers. The goal of examining the holistic approach in institutions in the research proposal will aid in making recommendations to the administration to ensure successful outcomes.

Many non-traditional students entering a community college indicate the experience was stressful, even if the student was eager to attend. The fear of failure can be overwhelming, knowing that they have lived long enough to encounter a life-altering event that may have triggered attendance in higher education (Johnson, Schwartz, & Bower, 2000). The concern relates to programming the community college needs to consider

offering, to assure appropriate advising and counseling services are available to promote retention of non-traditional students.

According to research, students enter community colleges to better themselves financially, to obtain employment, to develop entry-level skills or upgrade skills, for personal fulfillment, for financial stability, or to transfer to a four year institution (Bryant, 2001; Johnson, Schwartz & Bower, 2000; Kasworm, 2003; Keim, Stauser & Ketz, 2002). It is important to understand the motivation community college students have for attending to education in order to assist them in meeting their aspirations.

Multiple Missions of Community Colleges

Community colleges play a critical role in educating the current and future workforce. The changes in the economy in the 21st century pertaining to globalization, enhancements in technology and the need for a skilled workforce have increased the demand for community colleges throughout the United States (Bryant, 2001; Harkin, 2003; Kasworm, 2003; Laanan, 2000).

Community colleges are poised to provide workforce preparation for mid-level and high level jobs that require postsecondary education preparation for youth and adult learners thus promoting colleges to be engaged in multiple functions and collaborations throughout their local communities (Orr, 1999). Dougherty and Bakia (1999) contend that community colleges continue to play the traditional role of workforce preparation for economic development in their regions and point out that this role has expanded to include contract training for business, business incubators and small business assistance while also playing a role in economic planning. Their study found that close to 90% of community colleges are

offering contracted business classes and are successfully charting new non-credit offerings with some tie-in to existing credit programs.

The benefits of having trained professionals teaching in community colleges include deepening the educational experience for students and having up-to-date course content with a direct link to the working world. Contract training programs afford community colleges the ability to bring in income that is not tied to credit programs, where these funds can be expanded in multiple programs throughout the college and generate revenue for the community colleges.

This change in programming forces community colleges to address the multiple missions they are faced with providing (Bailey & Morest 2004). Further, the research from Bailey and Morest suggests that, when President Truman's Commission on High Education was established, the concept of a comprehensive community college was the root of the development. The research Bailey and Morest conducted on the organizational efficiency of community colleges which have multiple missions looks at three categories: *comprehensive*, *vertical*, and *horizontal*.

Comprehensive includes the core mission of the college, degree-granting programs which lead to an associate degree, vocational/occupational degree or transfer to a four year institution. The *vertical* mission's focus is for students to follow the traditional path of education and to assure their completion with engaging traditional age college students to high school students in dual enrollment or other high school enrollment programs. The last category is the *horizontal* mission of reaching out to meet the community's needs through a variety of non-credit contract training and continuing education opportunities.

The study emphasized community colleges have no intention of deemphasizing their multiple missions. In fact, they are pushing forward in the horizontal mission by enhancing services they are providing to the businesses to promote regional economic development. This very factor is why it is so important for the community college to continue to focus on multiple missions to bring the college together to enhance traditional core comprehensive traditional education with vertical and horizontal needs of the community to have a renewed look at curricula, training programs, collaborations among programs rather than being separate.

Grubb (1996) and Dougherty and Bakia (1999) caution community college administrators to be mindful that contract training programs do not drive a wedge between traditional credit programs. Noy and Jacobs' (2009) research indicates that, in most cases, non-credit offerings at community colleges enroll more students than credit programs. Most enrollments are with workforce instruction and contract training to promote the shift of workforce demands for skills needed in the current economy. The research suggests a continued growth in contract programming at the community college with an emphasis on accountability; data-focused outcomes, and a strengthened connection between credit and non-credit offerings. It is important to note at this juncture that the intent of this study is to focus on policy changes that promote enhanced curricular agreements between credit and non-credit programs and the continued emphasis on non-credit programs that can train students in new skills to meet the demand of local businesses so these businesses can enhance the financial self-sufficiency of the region. The goal is to promote lifelong learning initiatives with incentives for students, business, and educators to partner.

Orr (1999) points out that, for community colleges to succeed in business contract programming, they need to seek out and engage business participation to encourage working relationships. These relationships can benefit high schools by providing transitions to college programs and contract classes. The need to align curricula with business needs is critical for continued success for the multiple missions of community colleges.

Baily and Jacobs (2009) pose the question—Can communities increase the number of graduates to assist the nation in addressing the shortage of skilled workforce? The researchers point out that community colleges face challenges with their open admissions policies and with the nearly 60% of first-time community college students being referred to remedial classes. They also raise concerns regarding students who are working full time while attending community college classes and the 35% of students who have dependents to care for while attending college part time. Another concern is the number of first-generation students who do not have family members and friends to help promote the college experience. The authors question whether community colleges can be successful in retaining students with these challenges.

Baily and Jacobs (2009) also question whether there will be jobs for community college students once they are trained. These questions are critical for individuals in training programs as they are closely tied to economic needs locally and across the state of Iowa. The current study can help address these concerns by developing a tool that matches skills to the knowledge-based economy and gives insight into the educational training needed for dislocated workers.

Northeast Iowa Community College (NICC) is a good example of a college with multiple missions. NICC maintains a focus on high school students, traditional college age

students programs, non-traditional student programming, credit and non-credit programs, business contract training, and economic development activities. NICC's mission statement:"Northeast Iowa Community College provides accessible, affordable, quality education and training to meet the needs of our communities" and the vision: "The Northeast Iowa Community College educational community will live the values of service, respect, innovation, stewardship and integrity within a culture of continuous improvement"(Northeast Iowa Community College [NICC], n.d.). NICC has been innovative in their partnership with Iowa Workforce Development where they have a state of the art One Stop Service Center for individuals looking for employment, retraining programs or business start ups. The Dubuque One Stop is located in NICC's Town Clock Center for Professional Development. Iowa Workforce Development Services, Region One Employment and Training, NICC business training for credit and non-credit programs, College Readiness programs, GED programs, NICC Business Accelerator program, NICC Economic Development Business Outreach program, Senior Worker program, NICC Career Connection Program and Business Development center programs are all located in this one building.

The innovation of multiple programs being in one building and partnering together to service the thousands of individuals who enter their building yearly is an example of the multiple missions of community colleges combining to meet local demands. NICC has made great efforts in developing and enhancing partnerships. However, these efforts have not been made without drawing concern from the traditional programming credit staff and faculty. There have been philosophical and mission-focus clashes at times among the institution's staff regarding how programming should be defined and offered.

Fulfilling the mission of the community college has been challenged in the last year in regard to funding, and it is most apparent that, when funding is short, the administration, the faculty union, and the support staff union are in support of the traditional college program going back to the degree granting institution. This was evident in the final report of the NICC FY2011 Budget Task Force. Partnerships with economic development and the One Stop Center, as well as to NICC child care centers were in the top tier of program cuts and eliminations recommended to and approved by the NICC Board of Trustees.

NICC has made recent progress with partnerships between credit and non-credit offerings. A good example of this is the Department of Labor Green Jobs grant that was received in early 2010 for a twenty-seven county partnership between counties in northeast Iowa, northwest Wisconsin and southeast Minnesota. The grant was received to build the community college curriculum in green jobs for current and future job demands. The grant outcomes are for non-credit and credit programs to be developed collaboratively for wind energy occupations, energy auditors, and green construction practices. The community college is in the beginning stages of implementation of this grant, though great progress has been made to assure the success of the grant and to train over 400 individuals in a two year period of time in these fields. (NICC, n.d.)

Emerging Industries Clusters

Pikulinski's (2004) study indicated that most new and emerging firms have fewer than 100 employees and are seeing a higher growth in the more rural Midwestern states. The study found that new jobs had a pay range of $8.50 to $17.00 an hour with the most dominant occupations being healthcare, management and production occupations.

A framework for grouping educational programs into sixteen clusters for the purpose of integrating academic and occupational skills and providing pathways to and through higher education within board educational groupings. The system was originally designed and implemented by the National Association of State Directors of Career Technical Education Consortium (NASDCTE) (Ruffing, 2006). The sixteen clusters are shown in Table 2.

Table 2

NASDCTE Educational Program Clusters

PROGRAM CLUSTERS	
Agriculture and Natural Resources	Human Services
Arts and Communication services	Information Technology services
Business and Administrative services	Legal and Protective services
Construction	Logistics , Transportation, and Distribution services
Educational and Training services	Manufacturing
Financial services	Public/governmental Administrative services
Hospitality and Tourism	Scientific, Engineering, and Technical services
Health services	Wholesale/Retail sales and service

Note: Data source—States Career Clusters, 2008.

Table 3 lists high demand occupation projections for 2006-2016 for Region One and the state of Iowa from Iowa Workforce Development (2009). Region One has multiple high demand occupations ranging from cooks to engineers indicating all skill levels from less than high school, on the job training to professional degrees.

Table 3

High Demand Occupations

Standard Occupational Classification	Occupational Title
Region One	
35-2011	Cooks, Fast Food
35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop
35-9021	Dishwashers
41-2012	Gaming Change Persons and Booth Cashiers
41-4011	Sales Reps, Wholesale and Manufacturing, Technical and Scientific Products
41-4012	Sales Reps, Wholesale and Manufacturing, Except Technical and Scientific Products
47-2061	Construction Laborers
49-9042	Maintenance and Repair Workers, General
51-3021	Butchers and Meat Cutters
51-4121	Welders, Cutters, Solderers, and Brazers
53-3033	Truck Drivers, Light or Delivery Services
State & Region 1	
11-9111	Medical & Health Services Managers
13-1199	Business Operations Specialists, All Other
13-2011	Accountants & Auditors
13-2052	Personal Financial Advisors
13-2072	Loan Officers
15-1041	Computer Support Specialists
25-2011	Preschool Teachers, Except Special Education
25-2021	Elementary School Teachers, Except Special Education
29-1111	Registered Nurses
29-2052	Pharmacy Technicians
29-2061	Licensed Practical & Licensed Vocational Nurses
31-1012	Nursing Aides, Orderlies, & Attendants
31-9091	Dental Assistants
33-9032	Security Guards
35-1012	First-Line Supervisors/Managers of Food Preparation & Serving Workers
35-2014	Cooks, Restaurant
35-2021	Food Preparation Workers
35-3011	Bartenders
35-3021	Combined Food Preparation & Serving Workers, Including Fast Food
35-3031	Waiters & Waitresses
37-2011	Janitors & Cleaners, Except Maids & Housekeeping Cleaners
37-2012	Maids & Housekeeping Cleaners
37-3011	Landscaping & Groundskeeping Workers
39-3091	Amusement & Recreation Attendants
39-9011	Child Care Workers
39-9021	Personal & Home Care Aides
41-2031	Retail Salespersons
41-3021	Insurance Sales Agents
41-3099	Sales Reps, Services, All Other
43-3011	Bill & Account Collectors
43-3031	Bookkeeping, Accounting, & Auditing Clerks
43-3071	Tellers
43-4051	Customer Service Reps

Table 3 (continued)

43-4081	Hotel, Motel, & Resort Desk Clerks
43-4171	Receptionists & Information Clerks
43-6011	Executive Secretaries & Administrative Assistants
43-9061	Office Clerks, General
47-2051	Cement Masons & Concrete Finishers
47-2111	Electricians
49-3023	Automotive Service Technicians & Mechanics
49-3031	Bus & Truck Mechanics & Diesel Engine Specialists
51-7042	Woodworking Machine Setters, Operators, & Tenders, Except Sawing
53-3032	Truck Drivers, Heavy & Tractor-Trailer
53-7061	Cleaners of Vehicles & Equipment

Note: Data source—Iowa Workforce Information Network, 2009.

Swenson (2006) found that industries that have strong vertical linkage with like industries and are co-located in set localized areas called *clusters* assist the economies to accumulate where businesses can partner with suppliers, producers and specialized and skilled workers. Porter (1985) suggests "valuable activities and differences among competitor's value chains are key sources of competitive advantage" (p. 35) which benefits clusters of businesses in a given region and enhances the human capital to be regional and globally competitive. Swenson believes that human capital is inherently dependent upon its potential to contribute to the competitive advantage or core competence of the firm.

Swenson's (2006) study of insurance companies in the state of Iowa revealed that insurance cluster is significant in central Iowa based on the location quotient, number of related firms, higher than average Iowa wages and employees with high education levels with 45% of all workers in the insurance industry had an associate degree or higher compared to 29% of the whole economy in Iowa. These variables demonstrate the importance of examining human capital in clusters and Swenson's study provides a viable framework that can be replicated among other industries.

Sources for Comparative Analysis

The Laborshed survey is a telephone survey conducted every two years by Iowa Workforce Development. The survey is conducted by a third party administrator and randomly samples 18-64 year olds within the region. Respondents are asked demographic and employment-related questions. The data is collected and loaded into Statistical Package for the Social Studies (SPSS) for analysis by state labor market economists.

The Laborshed study is a random telephone survey of 18 to 64 year olds within a region. The Laborshed asks a wide range of questions including about respondents' demographic, educational, and occupational experience, and about the individual's ability to fulfill labor supply needs within the state. The Iowa Workforce Development Workforce Needs Assessment was used to describe the current needs of the region's employers. This data, combined with the Bureau of Labor Statistics' employment projection data and the regional Laborshed, was used to better plan which occupational groups and industries would be most important to the region's economy in the future.

The Workforce Needs Assessment data set for the study is a sample of 8,580 business responses from mail and internet surveys sent out by and returned to the Iowa Workforce Development Regional Research & Planning Bureau. The data was filtered to include only the 407 business responses in northeast Iowa that represent the same counties as the dislocated worker survey.

The Workforce Needs Assessment survey is collected by phone, internet or mail surveys sent out to businesses throughout the state of Iowa. The survey was mailed out to over 40,000 employers statewide with 3,392 of these to businesses throughout northeast Iowa. The survey asks employers about current and projected vacancies, plans in expanding

or decreasing employment, and perception of applicants. The data from the Workforce Needs Assessment is used in this research to measure the current vacancy needs of employers and to better understand which industries and occupational groups may be a factor in the region's economy.

Table 4 is taken from the northeast Iowa business needs assessment survey results. The table indicates there is a high demand index (HDI) that is above 1.00 and for northeast Iowa. There is a demand for computer and mathematical science, architecture and engineering, healthcare support, health care practitioners/technical and management occupations.

Table 4

Hiring Demand Index by Occupational Category

Occupational Category	HDI[a]
Computer & Mathematical Science	**3.15**
Architecture & Engineering	**1.74**
Healthcare Support	**1.73**
Healthcare Practitioner & Technical	**1.45**
Management	**1.35**
Building & Grounds Cleaning & Maintenance	0.89
Business & Financial Operations	0.82
Community & Social Science	0.82
Arts, Design, Entertainment, Sports & Related	0.75
Farming, Fishing & Forestry	0.69

Notes: Data source—IWD, 2009c.
[a] HDI = High Demand Index

Theoretical Framework

Human Capital Theory

Human capital theory is based in education and economic fields and claims that the higher the education, the higher the economic returns to society (Sweetland, 1996). Most of human capital research is focused on attending post secondary educational options and

examining returns (Baum & Ma, 2007; Becker, 1975; Benson, 1978; Mincer, 1958; Schultz 1971). The research is focused on skills and knowledge in knowledge-based economy of current workforce and dislocated workers who were laid off in past recessions. Mincer (1958) maintained in his study that training and skills affect an individual's personal income both formally and informally. He analyzed formal education, work experience, and number of weeks worked in determining human capital. Schultz (1961) furthered the human capital theory through research on human capabilities that increase investments which appealed to economists by analyzing these elements:

- Health facilities and services, broadly conceived to include all expenditures that affect life expectancy, strength and stamina, and the vigor and vitality of people;
- on the job training, including old-style apprenticeship organized by firms;
- formally organized education at the elementary, secondary, and higher levels;
- studies of adults that are not organized by firms, including extension program notably in agriculture;
- migration of individuals and families to admit to hanging job opportunities (p.9).

Mincer's (1958) and Schultz' (1971) applications of human capital theories opened the door for many advancements of the human capital theory in the economic field and have advanced research in many specialized areas such as "labour economics", "public sectors economics", "growth theory" and "welfare economic" (Blaug, 1970). Human capital theory has been important for scholars for decades and its analytical framework supports economic approaches used to inform and support education policy makers (Sweetland, 1996).

This advancement is critical in the current study to show the impact of human capital in a new growth economy. Benson's (1978) research asserts that on-the-job training is a

complementary factor that, with education and ability, relates to workers' income and productivity. This research supports that knowledge and skills are both essential for determining human capital in a knowledge-based economy. Benson and Mincer (1958) raised concerns that human capital theory should not only look at the rate of return method with education and income as contributing factors but should also account for the benefits, social valuations, and quality of life created when comparing to education investment.

Thurow (1999) contends that human capital is at an all time low and needs to increase for the U.S. to be competitive in a global economy. In these unprecedented times, a nation's greatest assets—skills and knowledge—are the most widely dispersed form of wealth. Thurow further contends that a knowledge economy is what makes anything possible and is an essential part of our nation's success in the future. In times of turbulence in the economy with businesses not being able to find critical skilled labor and marked job loss knowledge has lead to increased capitalism for entrepreneurial success in the past and is predicted to occur in the future.

Ulrich and Lake (1991) note that the uniqueness of an employee's skills and capabilities are critical requirements for gaining competitive advantage. Human capital theorists suggest that organizations develop resources internally only when investments in employee skills are justifiable in terms of future productivity (Becker, 1964; Tsang, Rumberger & Levine, 1991).

Human capital has an emphasis on the cost of labor relative to the return on investment in order to gain future productivity by developing employees' skills and knowledge. Employees own their human capital while firms work hard to protect these skills and knowledge so they are not transferred to other businesses. Therefore many businesses

are reluctant to invest money in generic or job-specific skills unless the investments are justifiable for future productivity (Becker, 1976; Schultz 1961). Snell and Dean (1992) found that "the value of human capital can be influenced by a multitude of sources, such as a firm's strategy and technologies" (p. 35) meaning an employee's potential to contribute by using new technologies is what created advanced manufacturing which transformed the manufacturing to knowledge worker versus a hand on worker.

Becker (1976) suggests that firm-specific skills are non-transferable. The value of any employee's human capital will be less with any other firm. Although Prahalad and Hamel (1990) noted that "extendibility" (p.44) of core competencies are developed from knowledge and skills that can be used repeatedly in different arenas. Core assets are critical for organizations to develop their employees in order to gain a competitive advantage (Porter, 1990).

Resource–based strategic relevance of knowledge-based competencies in terms of their direct link to achieving and sustaining a competitive advantage; core competencies are valuable, rare and inimitable and non-transferrable (Barney 1991; Prahalad & Hamel, 1990; Wernerfelt, 1984). Houghton and Sheenan (2000) indicated that "a knowledge economy has been described as a hierarchy of networks driven by the acceleration of change and the rate of learning where there is opportunity and the capability to join knowledge-intensive and learning-intensive that relates to determine social economic position of individuals in a firm" (p. 11.).

In a knowledge-based economy the belief is that human capital can be increased with training in higher education promoting access to a range of skills and knowledge, especially the capacity to learn (OECD, 1996). A knowledge-based economy promotes life-long

learning and investment in education, training and research to move the economy forward, especially in rural communities. The belief is that collaborating with industries to identify knowledge and technical skills that can be transferred to industries. The research that has been done by OECD (1996) has shown the higher the unemployment rate, the lower the skilled occupations and the lower the unemployment rate the higher knowledge and skills.

New Growth Theory

According to Cortright (2001) new growth theory is the ability to grow economy through increased knowledge rather than physical work or capital which gives rise to endless opportunities for growth. This theory is different from the traditional economic model that addresses decreasing returns while new growth theory focuses on increased returns (Romer, 1994). Romer suggests that the notion that an individual can grow wealthy through accumulation of physical capital is not accurate based on the fact that capital is subject to diminishing returns which a nation cannot just add more and more of as one is able to do with knowledge which is boundless and non–rival.

OECD (1996) research suggests knowledge can increase the return on investment which can, in turn, contribute to the accumulation of knowledge. This research raised questions in development of human capital studies mainly addressing education or experience which did not reflect the quality of education or learning or the return on investment. To fill some of the measurement gaps, OECD (1996) developed human capital indicators that measure private and social returns. The findings support human capital investment can lead to economic growth. This research validated that human capital leads to economic growth, though the author addressed the lack of the study to address human indicators of human capital, training and labor requirements.

Swenson and Eathington (2003) conducted a study focused on Iowa's creative economy which was borrowed from Florida's (2002) work focused on the super creative core and the creative professional. Swenson's and Eathington's study focused on the composition of Iowa's creative workforce and creative industries compared to those nationally. Further, the study examined gender differences in the creative workforce, earning differences, and Iowa's emerging creative industries. The findings indicate that Iowa needs to expand the definition of the talent it wishes to retain. Further, the study noted that the state is poised to shift emphasis away from traditional job creation in order to retain key professionals and attract more people to Iowa.

Iowa is conscious of rural areas which account for 33% of the growth in creative industry jobs in Iowa. The study provided an excellent comparison of Iowa's outlook with the national perspective regarding the creative economy. However, the study did not provide an in-depth look at current skills and knowledge of the workers. Nor did it match current skills and knowledge to emerging occupations. Such an analysis would bring "additional complexity to the issues facing Iowa and assist policy makers to see the sum of the community is greater than the sum or it jobs" (Swenson & Earthington, 2003, p.57) and influence economic change for Iowa.

New growth theory posits that increased knowledge of how to produce more acceptable products with smaller amounts of resources will impact the standard of living and will continue to increase far into the future (Grossman & Helpman, 1994). There are concerns that knowledge-based businesses are not going to be willing to invest unless they can recapture their investment. The gap between private firms investing in knowledge leads to a gap in increased knowledge in a new growth economy therein lies the reason it is critical

for lawmakers to address policies for economic development which focus on educational incentives for employers and for employees for the creation of knowledge (Nelson and Romer, 1996).

The important point is that, in new growth theory, human capital has no diminishing marginal utility and allows the economy to grow at a constant. Also, in new growth, technological improvement is not subject to 'luck' but to the prevalence of human capital in the economy (Romer, 1994). It is important to keep in mind that new business development, innovation and economic change can happen anywhere and in order to be competitive it is important to find out where the concentrated regions are located (Porter, 1990). Romer (1994) suggests that the most successful geographic areas will be the ones that support collective interests, especially innovation in new products. The concept of spillover of knowledge is boundless for the economic actors and this can create additional innovation in regions if knowledge is readily accessible (Porter, 1990). This spillover of knowledge has contributed to the concept of clusters of industries in regional areas sharing knowledge and building specialized supplies to meet the business needs.

Action Research

Quantitative research is based on the collection and analysis of numerical data. In its beginnings, it was the belief that action research falls in the realm of qualitative research because it does not manipulate the environment and does not have a cause and effect relationship. Researchers have changed their view and action research fits within the three paradigms: correlation research, casual-comparative research, and quasi-experimental research (Johnson, 2005).

Action research has evolved over the century and has evolved into a significant scientific method as a logic for the solution of problems applying to education, philosophy, and psychology (McKernan, 1988). Kurt Lewin introduced the term action research as "a way to generate knowledge about a social system while, at the same time, attempting to change it" (Elden & Chisholm, 1993, p.121). Action research is a collaborative method to generate knowledge about a social system; this involves participation, takes a vigorous and purposefully research process, and involves ensuring evaluation processes to improve a program, practice or policy (Checkland & Holwell, 1998). Further, Johnson (2005) states that action research has four basic elements: empowerment of participants, collaboration through participation, acquisition of knowledge, and social change. The process research goes through to achieve themes is a spiral of action research cycles consisting of four major themes: planning, acting, observing, and reflecting. Technical action research views the greatest need to problem solving and to promote more effective and efficient practices. Once the problem is identified, specific interventions are recommended and validated and refinement of the existing themes and is essential logical deduction is made.

Occupational Analysis Tools

Codified knowledge learned from written materials and tactical knowledge is learned from experience. Experts studying innovation and competitive strategies noted the role that tactical knowledge plays as one of the keys to success for product development. Then codifying this knowledge to the entire business has proven to be successful (Nonaka & Takeuchi, 1995). Creating knowledge is a key driver behind economic growth for particular areas if the right policies are in place that supports education and training incentives, ideas of

all kinds, small and large, can stimulate innovation and knowledge based-growth can stimulate faster growth and is sustaining (Cortright, 2001).

Occupational-based regional analysis continues to be an important tool to determine declining occupations and the potential growth of industries that should be targeted for investment and development. Human capital theory plays a crucial role in the promotion of policy changes from welfare to work programs in order to be competitive in a knowledge-based regional economy (Feser, 2003). Based on the notion skills, education, and flexibility are good indicators of local economic competitive advantage in a knowledge-based economy Markusen (2000) and Feser (2003) expand the study of occupational-based regional analysis to include "appropriate aggregation of detailed occupations into theoretically and empirically meaningful groups" (p. 1938—Feser (2003) with the goal of reducing various occupational complexity to group occupations clusters based on knowledge. This study will group occupations based on similar knowledge using O*NET occupational information to clusters of occupations.

Feser (2003) based his study on a Balfe and McDonald (1994) study that focused on education requirements with vocational skills data among industry occupations. This research developed an employment opportunity index, next occupations growth based on projected high demand occupations based on education and benefits.

Thompson and Thompson (1993) suggested that economic developers should be concerned with joining occupations with industries for potential job growth in the region. Ranney and Bectancur (1992) further this research design to analyze occupational skills of employed to unemployed and linked community's neighborhood workforce to board regional

industries needs (labor market and supply side) and developed profiles for recruitment for businesses in sub-metro areas.

Markusen (2000) furthered Ranney and Bectancur's (1992) research and suggested the most desirable occupations are those that can be captured to include growing and expected to grow and have transferrable impacts to different industries and offer entrepreneurship opportunities are the occupations you want in your region. Feser (2003) furthers the research to address similarities and differences among occupations in the derivation of knowledge-based occupational cluster sharing same board knowledge characteristics based on 33 O*NET variables. Following Balfe's and McDonald's (1994) research that illustrates how existing attributes of occupations are aggregated into regional occupation developments, Ranney and Betancur (1992) suggested challenges with using the existing data source from Bureau of Census, Department of Labor, and state employment security agencies data based on the assumption that this information can be misleading due to differing collection methodologies and data validity and timeliness. The Department of Labor Occupational Employment statistics have improved and enhanced the reliability and validity of statewide data and methodologies with the formation of the O*NET system. However, this system makes data available for state and metropolitan areas but not available for geographical areas or developing regional economies. These omissions provide challenges in using this data.

Department of Labor Employment and Training Administration commissioned the development of the Occupational Information Network (O*NET)—an accessible relational database of 965 occupations that address basic skill, knowledge and work attributes. . Each occupation is rated in two ways first, on a score of 1 (low) to 7 (high) according to level of

knowledge or skill included for the given category and secondly, on a score of 0 (low) to 5 (high) corresponding to important of the knowledge to occupations (See Table 5).

Table 5

Gaps in Skills

Area	O*NET Level	Level Translation
Knowledge	1	Less than 9th Grade
Work Related Activity	1	No previous experience
Knowledge	2	Some High School, No diploma
Work Related Activity	2	Less than a few weeks training or experience
Knowledge	3	Completed High School
Work Related Activity	3	Up to several months of training or experience
Knowledge	4	Associate level
Work Related Activity	4	At least one year of training or experience
Knowledge	5	Bachelor's level
Work Related Activity	5	Minimum of two to four years training or experience
Knowledge	6	Post Graduate level
Work Related Activity	6	At least five to ten years of training or experience
Knowledge	7	Post Graduate level plus experience
Work Related Activity	7	Greater than ten years of training or experience

Note: Data source—National Center for O*NET Development, n.d.

Appendix E—O*NET Occupational Knowledge Variables—provides information on the approximate education or experience/training needed to fulfill required levels of the variables. For example: If an occupation group needs an average knowledge level of 4.00 in Biology, people in the occupation need an associate degree level of understanding in Biology to perform the job. Further it is possible to analyze the gaps in skills possessed by the population and skills required by occupational groups. For example, if the population has, on average, a knowledge level of 2.5 in chemistry but a level 4.25 to perform the job, it can be

inferred that the population needs additional education/training in the education typically received between the end of high school through the associate degree level.

Table 6 was obtained from the ONET database and it indicates required levels of education. All occupations with the same level education required were added up and divided by the total number of occupations to get the percentage of jobs needing the level of education for biotechnology, advanced manufacturing, and information technology.

Table 6

Education Required for Jobs in a Knowledge Economy

Educational Level	% of U.S. Population Attaining Level
Less than a High School Diploma	1.27%
High School Diploma (or GED or High School Equivalence Certificate)	22.08%
Some College Courses	3.55%
Post-Secondary Certificate—Awarded for training completed after high school (For example, in Personnel Services, Engineering-related Technologies, Vocational Home Economics, Construction Trades, Mechanics and Repairers, Precision Production Trades)	9.64%
Associate Degree (or other 2-year degree)	12.94%
First Professional Degree—Awarded for completion of a program that: requires at least 2 years of college work before entrance into the program, includes a total of at least 6 academic years of work to complete, and provides all remaining academic required	.76%
Bachelor's Degree	36.04%
Post-Baccalaureate Certificate—Awarded for completion of an organized program of study. Designed for people who have completed a Baccalaureate degree but do not meet the requirements of academic degrees carrying the title of Master.	.76%
Master 's Degree	6.85%
Post-Master's Certificate—Awarded for completion of an organized program of study. Designed for people who have completed a Master's degree, but do not meet the requirements of academic degrees at the doctoral level.	.25%
Doctoral Degree	4.31%
Post-Doctoral Training	1.52%

Note: Data source—National Center for O*NET Development, n.d.

The data source used for determining occupation clusters is the movement of workers between occupations with little to no retraining provided due to high levels of skills and

knowledge, indicating many skills are in common in a knowledge-based economy. Balfe and McDonald (1994) noted concerns that the data indicates a higher level of training for individuals who are unemployed or underemployed. They indicated that training could be overestimated for emerging job openings. The above statement is the challenge the current study is being proposed hopes to build upon and address unemployed and underemployed skills/knowledge and map to emerging occupations which can show the training that is needed to become reemployed.

The literature assisted in determining the variables to be examined in this study including dislocated workers' demographics, assistance needed, and aspirations. Chapter 3 will outline the methods used in the current study to measure the competency variable of education and job title to determine knowledge and skills needed in the three emerging knowledge-based industry chosen for the study.

CHAPTER 3

METHODOLOGY

This chapter will discuss the methodological approach, data sources, sample, and data analysis procedures used in this study. This study utilized descriptive analysis, comparisons, patterns, location quotient, and shift analysis to interpret the relationship between dislocated workers' skills and the skills and knowledge needed in a knowledge-based economy.

Methodological Approach

The assumption of quantitative methodology is that numbers for a large sample of individuals can be analyzed and used to make generalizations, where warranted, about the larger population from which the sample was taken (Creswell, 2003). In the current study, a large dataset was used in the analysis of quantitative data about dislocated workers in the state of Iowa from one year (2009). The dataset includes a population of all dislocated workers who filled out the surveys statewide (3,794 individuals). This study utilized the dislocated workers who completed the survey from the northeast Iowa counties of Allamakee, Clayton, Fayette, Chickasaw, Howard, Delaware, Dubuque and Winneshiek. These data were analyzed from the dataset in order to focus on a rural setting and to have an understanding of the potential skills and knowledge needs of knowledge-based industries in this region.

Data Source

The primary data source for this study was the Iowa Workforce Development Dislocated Workers 2009 survey that was conducted from January 1, 2009 through December 31, 2009. The data set includes information from the 3,794 individuals laid off from industries in Iowa who completed the study. The surveys were conducted at the place

of employment before the individuals were laid off. After filtering the data to include only those respondents from Northeast Iowa, the sample consisted of 477 individuals—284 males and 193 females—laid off from industries in northeast Iowa in the counties of Allamakee, Chickasaw, Clayton, Dubuque, Delaware, Fayette, Howard and Winneshiek. These counties comprise Region One of Iowa Workforce Development. The businesses were largely comprised of advanced manufacturing including machinery, computer and electronic products, transportation equipment, plastic and rubber products, and other miscellaneous industries throughout Northeast Iowa.

The dislocated worker data was matched with additional demographic and occupational data obtained from the O*NET. O*NET describes 41 skills variables and 33 knowledge variables to define general work activities and educational areas. O*NET overlays each occupation with this set of skills and knowledge variables in terms of the importance of each skill or knowledge area and the level of expertise needed to fulfill job requirements.

This directory of the skills and knowledge levels needed for each occupation is quantified on a scale of one to seven. Level one skill and knowledge levels are the most basic and encompass such tasks as simple addition and repetition. Some level of training or education becomes necessary by level four and level seven requires intense levels of inferential thinking and, with few exceptions, post-graduate education. By assuming that those currently employed within an occupation possess the skills and knowledge needed for that occupation, the current workforce can be translated into an available skill and knowledge set and quantified for the level of skill and knowledge held. Using the O*NET skills profiles

of occupations allowed the researcher to translate the predominate occupations from the sample of dislocated workers in Region One into a set of skills possessed by the group.

Data Collection

The IWD Dislocated Worker Survey is conducted by the local workforce One Stop rapid response teams and funded by the IWD Research Bureau. Regional workforce development offices conduct these surveys when businesses lay off 50 or more individuals. Staff members from the regional offices collect the data for IWD which analyzes the data. Staff at the regional offices are given the survey and instructed to insert the company name at the heading of the document and also at the top of the second page. No other alterations to the survey are allowed. IWD requires the local WIA provider to discuss the importance of the survey and the data it will provide with the affected business before administering the survey. A copy of the worker survey is included in Appendix A.

The data collected from the surveys are used for determining the aspirations and needs of the dislocated workers in the region. By identifying what the dislocated workers want and need, WIA staff can provide appropriate services to those who are being laid off. The surveys are passed out at employer information meetings conducted to explain WIA services. Based on the skills and abilities of the dislocated workers, the surveys can also be used to attract new businesses to the area.

The data are stored in a state database and only shared in an aggregate format with local and state economic developers, state officials, and local WIA representatives. An aggregated report is compiled with the data upon receipt of surveys with the use of SPSS (version 15.0). It is not mandatory for the WIA staff to conduct the dislocated worker survey at the time of the layoff. It is strictly at the discretion of the regions' WIA Employment and

Training program, although it is encouraged by the state in order to obtain information on the employees' level of skills and education to better market to potential new businesses and to speed re-entry into the labor market.

O*NET collects data continually through a random sample of businesses in order to gather detail on 965 occupations. A random sample of workers within specific businesses is selected for questionnaires about their occupation. The respondents are asked questions about general demographics, experience, skills, knowledge, and abilities needed to perform their job.

The Bureau of Labor Statistics collects data from three separate surveys: the Occupational Employment Statistics (OES), the Current Employment Statistics (CES), and the Current Population Survey (CPS) to estimate projected employment growth and to create a matrix of occupations employed within each industry. The current matrix was developed for the 2010-2011 edition of the *Occupational Outlook Handbook and Career Guide to Industries*. These surveys are collected at regular intervals by the U.S. Department of Labor. The employment matrix presents employment information for approximately 300 detailed industries and 700 occupations. The projected employment growth estimates include current and projected employment levels, median and average wages, and an education summary.

Data Access and Security

These data sources were accessed by the researcher through IWD. The agency requested and the researcher agreed that all publication materials and methods developed as part of this research will be provided to IWD. Although this research involved working with secondary data, the researcher signed an affidavit of nondisclosure to ensure strict confidentiality. All data were kept on a password-protected computer in a locked room

throughout the research process. At the conclusion of the study, all analysis and data files will be returned to Iowa Workforce Development staff. Any unused analysis or data files will be destroyed by shredding or by deletion from the researcher's computer.

Human subject's research approval was sought from the Iowa State University Institutional Review Board (IRB) and was approved for this study. The affidavit of nondisclosure and the Iowa State University IRB approval for this study and are included in appendices B and C.

Sample

The individuals in the study included dislocated workers from businesses throughout the state of Iowa which closed or downsized in 2009. The total cohort of individuals who completed the survey was 3,794. For the purpose of this study, those individuals living in the northeast Iowa counties, Allamakee, Chickasaw, Clayton, Dubuque, Delaware, Fayette, Howard and Winneshiek who were dislocated from employment and filled out the IWD survey were filtered for use and the rest of the population was removed. A total of 477 individuals remained after the filtering process. Of these 477 individuals, 60% were males and 40% were females. Though smaller than the original sample of the population, this regional sample is large enough to provide reliable and valid estimations. Further, the analysis conducted can be reproduced in other IWD regions to provide local estimations and reports.

Description of Participants

Demographic characteristics, assistance needed, and aspirations from the dislocated workers survey were used as variables for this study. The researcher based the selection of these variables on Valadez' (1999) belief that the highest form of human capital development

results from examining the whole individual in order to ensure a productive, meaningful study. The variables were organized into three groups for background analysis. Group one, *demographics characteristics,* group two, *assistance needed,* and group three, *aspirations*. The variables within each group are shown in Table 7 below. The analysis of the variables will assist in determining whether significant differences exist between five age cohorts and between gender cohorts.

Table 7

Dislocated Workers Survey Variables

Demographic Characteristic	Assistance Needed	Respondent Aspirations
Sex	Understanding how your skills and experience relate to new jobs	Enroll in school
Age	Finding out what jobs are available	Search for another job
Income	Deciding which school would be best	Open own business
Number of children	Deciding what jobs you can do	Retirement
County	Tuition and books	
Currently attending school	Transportation	
Special accommodations	Dealing with loss of employment	
Child care needs	Childcare assistance	

The variable *competency* was measured for bio-technology, advanced manufacturing, and information technology occupations by grouping *education* and *job title*. The items for the variables were carefully selected to follow the level of knowledge and skills which increases an individual's human capital (Becker, 1975, 1993) and are inherently dependent upon the individual's potential to contribute to the competitive advantage or core competences needed for a knowledge-based economy (Lepak & Snell, 1999; Thurow, 1999).

Data Analysis Procedures

Descriptive, independent samples t-tests, and comparative analyses were conducted to determine the differences in skills and knowledge between male and female dislocated workers and to analyze differences in the amount of skills and knowledge for the three emerging clusters of the knowledge-based economy. The examination of background information is important to the study because these factors contribute to significant differences in an individual's willingness to obtain further training and skills needs. The data were analyzed using SPSS (version 15.0) to conduct independent samples t-tests by gender as the grouping variable for the test variables. Those with significance (2-tailed) of less than .05 were considered to have a statistically significant difference at the 95% confidence level.. Those with significance (2-tailed) of .05 or above were not considered statistically different. The code book used for the study is included in Appendix D.

The combined dislocated workers data and demographic and occupational data were analyzed to determine specific answers to the research questions for the study.

Question 1—*What are the demographic characteristics of northeast Iowa dislocated workers?*

Descriptive and frequency analysis were run based on the variables listed in Table 7 and presented by age and sex. To obtain output of descriptive characteristics for the sample, the cases of data were selected that fit each studied cohort. Then a frequency analysis was run to find a mean, median, and standard error of the mean for each variable.

The output helped to see the similarities and differences that exist within the population of dislocated workers. This also helped with further analysis as well as regional planning and training. The sample data was then analyzed as a group, by gender, and then

across the ten age cohorts (ages 18-24, 25-34, 35-44, 45-54, and 55-64 for each gender). All of the descriptive statistics and frequencies were then analyzed for mean, median, and standard error of the mean. Data were then sorted by gender and run by the same process again for each variable (hourly wage, salary, years employed, education, children at home, and lowest wage willing to accept a job). For analysis of data for hourly wage median, not mean, was used as measure of central tendency. Means, standard deviations, and independent samples t-tests were conducted for the variables representing future plans and aspirations. Levene's test for equality of variances was used. In cases where the Levene's test was significant for unequal variances, independent samples t-test results were interpreted with the unequal variance t-test. 95% confidence intervals are also reported.

Question 2—*What are the current skills, knowledge, and competencies of dislocated workers in Northeast Iowa?*

The sample of dislocated workers was used to measure possible competitive advantages within the population and to construct a current skills profile for each worker and for the population as a whole. First, the data were analyzed to find any possible competitive advantages within the group. This was done by finding a location quotient for the occupational groups. The sample was first sorted and counted by occupation. The number of respondents within each occupation was divided by the total number of respondents to find relative percentage within each job. This number was then divided by the relative percentage within each occupation on a statewide basis, found from the statewide laborshed.

The location quotient (LQ) shows relative percentage of occupational employment within the sample compared to the average across the state. LQs significantly greater than one (1.00) indicate that more people within the sample work within an occupation than

would be explained by general statewide employment factors. Depending on the reason for the relative difference, there may be special skills or advantages within the region or the sample in regard to the specific occupation or occupational group. Using these competitive advantages effectively is an important part of resource utilization and can help transition the dislocated workers into occupations in which they will be most valuable.

The second task was to translate current work experience and education into a measurable current skill set of the dislocated workers within Northeast Iowa. The level of education, occupation, and job tenure of each respondent was codified and matched with the occupational profile data in O*NET. This rated each variable by the 33 knowledge areas and the 41 work activities creating a skills and knowledge profile for each worker. The O*NET work activities and knowledge areas are shown in Table 8. These 477 profiles were aggregated to show a regional skill and knowledge profile for all dislocated workers. The O*NET Occupational Knowledge Variables are included in Appendix E.

Table 8

*Work Activities (Skills) and Knowledge Areas used by O*NET*

Work Activities (Skills)	Knowledge Areas
Analyzing data or information	Administration and management
Assisting and caring for others	Biology
Coaching and developing others	Building and construction
Communicating with persons outside the organization	Chemistry
Communicating with supervisors, peers, and subordinates	Clerical
Controlling machines and processes	Communications and media
Coordinating the work and activities of others	Computers and electronics
Developing and building teams	Customer and personal service
Developing objectives and strategy	Design
Documenting/recording information	Economics and accounting
Drafting, laying out, and specifying technical devices, parts, and equipment	Education and training
Establishing and maintaining interpersonal relationships	Engineering and technology
Estimating quantifiable characteristics of products, events, or information	English language
Evaluating information to determine compliance with standards	Fine arts
Getting information	Food production
Guiding, directing, and motivating subordinates	Foreign language
Handling and moving objects	Geography
Identifying objects, actions, and events	History and archeology
Inspecting equipment, structures, or material	Law and government
Interacting with computers	Mathematics
Interpreting the meaning of information for others	Mechanical
Judging the qualities of things, services, or people	Medicine and dentistry
Making decisions and solving problems	Personnel and human resources
Monitor processes, materials, surroundings	Philosophy and theology
Monitoring and controlling resources	Physics
Operating vehicles, mechanized devices, or equipment	Production and processing
Organizing, planning, and prioritizing work	Psychology
Performing administrative activities	Public safety and security
Performing or working directly with the public	Sales and marketing
Performing general physical activities	Sociology and anthropology
Processing information	Telecommunications
Provide consultation and advice to others	Therapy and counseling
Repairing and maintaining electronic equipment	Transportation
Repairing and maintaining mechanical equipment	
Resolving conflicts and negotiating with others	
Scheduling work activities	
Selling or influencing others	
Staffing organizational units	
Thinking creatively	
Training and teaching others	
Updating and using relevant knowledge	

Note: Source— National Center for O*NET Development, n.d.

The steps used to calculate the location quotient (LQ) included:

1. Where LQ were used, the data was extracted from the most recent (2008) Laborsheds for the Northeast Iowa region and statewide. The current occupations for the respondents of the 2008 Northeast Iowa Skillshed are downloaded into Excel. The SOC codes were sorted and aggregated by the first two digits giving the occupational group. This was also done for the statewide Laborshed. The number in each group was divided by the total number to provide the proportion working within that occupational group. Then the proportional number for northeast Iowa was divided by the proportional number for the statewide data. This results in the LQ. A number above 1.00 means there are a greater proportion of workers within that occupational group in the region than found in the larger statewide area.

2. The analysis of LQ showed that numbers above 1.00 are occupational groups in which northeast Iowa has more workers that the statewide average. An occupational group with many more workers relative to the same group statewide may have some kind of advantage in that group of occupations.

3. Current dislocated workers were then translated to skill sets for each and then aggregated for group data. SPSS was used to recode the workers' occupations into the 31 knowledge and 44 work activity variables used by O*NET. The data were then recoded into different variables with current occupation as the input variable and the importance level and skill level of each of the O*NET variables as the output variable (150 new columns). The average level in the knowledge and work activities was found. Areas with a level above 1.6 standard deviations were designated as primary advantages, those areas with a level between 1.35 and 1.6 standard deviations were designated as secondary advantages. The levels above

a 3.25 in the knowledge variables and 3.75 in the work activity variables are primary advantages of the workers, while those between 3.00 and 3.25 in the knowledge variables or between 3.00 and 3.75 in the work activity variables are designated as secondary advantages.

4. Shift-share analysis is a method of attributing the number of jobs gained or lost to one of three respective forces:

- *State growth effect*—How many jobs could be attributed to the growth in the state economy as a whole
- *Occupational mix effect*—How many jobs could be attributed to the growth in the occupational group across the state as a whole?
- *Competitive share*—How many jobs could be attributed to factors specific to the region being studied?

The state growth effect is found by multiplying the base level of employment by the gross domestic product (GDP) growth over the period. The occupational mix is the change in employment that occurred within the occupational group statewide over the period. It is found by multiplying the base level of employment by the percentage change in employment for the occupational group at the statewide level. The competitive share is that level of employment that is not attributable to statewide factors such as growth or occupational characteristics.

This portion is attributed to some undefined regional characteristic and is found by subtracting the state growth effect and the occupational mix from the total change in employment over the period. The researcher then studies the sign and magnitude of the competitive share number and analyzes possible regional characteristics. Groups with large

negative numbers indicate that the region decreased employment in the occupations while large positive numbers indicate job growth.

The competitive share is important when comparing to the occupational mix because it indicates the relative strength of the occupational group in the region against the rest of the state. A negative number in the competitive share column may not mean group weakness if there is a larger negative number in the occupational mix column. Conversely, a positive number in the competitive share column may not indicate great strength in the occupational group if there is a larger positive number in the preceding column.

Question 3—*What are the differences of skills and knowledge between male and female dislocated workers?*

The demographic and occupational data for each cohort studied in question one were studied for statistical significant differences across sex. Means, standard deviations, and independent samples t-tests were conducted for the variables representing occupational knowledge and work activity (skills). Levene's test for equality of variances was used. In cases where the Levene's test was significant for unequal variances, independent samples t-test results were interpreted with the unequal variance t-test. 95% confidence intervals are also reported.

Question 4—*What are the aspirations of the dislocated workers in northeast Iowa?*

Point estimates were found for the variables in respondent aspirations and classified according to sex and age cohorts used in previous questions. Any significant differences in the aspirations of the cohorts proved to be valuable tools in counseling and planning of dislocated workers. Averages were found for each age and gender group for the aspiration variables and differences were examined.

Question 5—*What are the skills gaps of dislocated worker for the knowledge-based economy?*

Advanced manufacturing, information technology, and biotechnology have been chosen as emerging and high-demand industries by the state of Iowa based on the Battelle Memorial Institute's (2005) recommendation to the Iowa Department of Economic Development. A review of industry peers was the most effective and least time consuming method of assigning North American Industry Classification System (NAICS) sub-sectors to each of these industries. The Bureau of Labor Statistics (BLS) Industry Occupational Matrix was used to create an occupational profile for each of the sub-sectors and the industry as a whole. From these occupations and the O*NET database, a profile of needed skills and knowledge was constructed using the same methodology used in question two to translate the sample workforce into a set of skills and knowledge variables.

These data can be used on an occupational basis to find the skill and knowledge level needed to satisfy average occupational requirements or the profiles can be aggregated into skills and knowledge needed within occupational categories like engineers, educators, or healthcare support. Once the average levels needed for respective occupations or occupational categories were found, they were compared to the skill set profiles found in question two. After that comparison, a gap analysis showed which skills or knowledge areas the dislocated workers population is in need of training to satisfy the job requirements for emerging occupations within selected industries.

By analyzing the level scale anchors O*NET uses for its knowledge and skills database, it was possible to identify necessary time on the job or education to upgrade to the next level. This was done for each of the 74 variables at each of the seven levels. It was

helpful to analyze not only the gaps in skills and knowledge within a region relative to the needs of a target industry, but also the approximate number of workers within an occupation needed to satisfy the employment needs of the target industries. To find the gap in skills between the sample of currently dislocated workers and the needs of the three selected industries, the occupations within the industries had to first be translated into a set of necessary skills and education in much the same way as the occupations of the dislocated workers were translated into a set of skills and education. O*NET provided a list of critical occupations to the three selected industries (biotechnology, advanced manufacturing, and information technology).

This list of 115 occupations was then loaded into SPSS to recode the occupations into the 31 knowledge and 44 work activity variables used by O*NET. The next step was to transform the option to recode into different variables was selected under the transform tab with current occupation as the input variable and the importance level and skill level of each of the O*NET variables as the output variables (150 new columns).

The average numerical level on the importance scale and on the level scale were found and analyzed. For the knowledge variables, any variable with an importance level above 3.00 was designated as a critical area for the industry. For the work activity variables, and any variable with an importance level above 3.75 was designated as a critical area for the industry. The level of skill needed in the designated critical area was then exported to Excel to compare with the average level possessed by the sample workforce found in question two. As was done in the translation of the sample of dislocated workers, the average level needed within the critical areas of the selected industries was also compared to the level translation

to find the approximate level of education or experience needed for the industries' occupations.

Question 6—*What education and training programs are needed to adapt the current skills set clusters to a knowledge-based economy in rural Iowa?*

O*NET provides a directory of the work activities and knowledge (educational) areas needed for each occupation on a scale of one to seven and the importance of each work activity or knowledge area on a scale of one to five from the importance estimate for each knowledge or work activity variable, a list of critical skill areas needed within each cluster was developed. Level one work activities or knowledge areas are the most basic and encompass such tasks as simple addition and repetition. Some level of training or education becomes necessary by level four, while level seven requires intense inferential thinking and usually post-graduate education. In the analysis of the data in this study, an importance estimate of 3.25 or higher for a knowledge variable or a 3.75 or higher for a work activity variable was necessary to designate that variable as critical to the cluster. As an example, O*NET shows that those in the profession Registered Nurse need an importance score of 2.52 and a score of 4.3 in the knowledge areas of computers and technology and customer and personal service respectively. Certainly nurses need some level of ability in using computers and technology but, because the 'required score' is less than 3.25, it can be inferred that it is not a 'critical' area of knowledge for the occupation. Customer and personal service, with an importance level of 4.3, is designated as a critical knowledge area and proceeds to further analysis. After the critical areas for each industry, or occupation as in the example, are selected the level of skill required within the area is examined. Continuing with the example, Registered Nurses critically need both the knowledge areas of customer

and personal service and education and training. The 'required' levels within each of these areas are 5.58 and 4.13 respectively.

These levels of skill can then be measured against the level possessed by a sample population or referenced to a translation coding such as the one shown below. From the table we see that a level of 5.58 in a knowledge area is approximately commensurate with a bachelor's degree level of understanding and a level of 4.13 is roughly equal to an associate's degree.

Tables 9-11 illustrate the projected occupations for 2008-2018 in the emerging industries for biotechnology, advanced manufacturing and information technology with growth levels projected as *much faster than average* and *faster than average* for skills gap analysis.

Table 9

Projected Growth for Bio-Technology Industries, 2008-2018

Projected Growth	Code	Occupation
Much faster than average	19-1042.00	Medical Scientists, Except Epidemiologists
	29-2056.00	Veterinary Technologists and Technicians
	29-1131.00	Veterinarians
	31-9096.00	Veterinary Assistants Laboratory Animal Caretakers
	19-1021.00	Biochemists and Biophysicists
	17-2031.00	Biomedical Engineers
Faster than average	29-2012.00	Medical and Clinical Laboratory Technicians
	19-4021.00	Biological Technicians
	11-9121.00	Natural Sciences Managers
	11-9121.01	Clinical Research Coordinators
	11-9121.02	Water Resource Specialists

Note: Data source—IWD, 2010.

Table 10

Projected Growth for Advanced Manufacturing Industries, 2008-2018

Projected Growth	Code	Occupation
Much faster than average	19-2041.00	Environmental Scientists & Specialists, Incl. Health
	19-2041.01	Climate Change Analysts
	19-2041.02	Environmental Restoration Planners
	19-2041.03	Industrial Ecologists
	13-1081.00	Logisticians
	13-1081.01	Logistics Engineers
	13-1081.02	Logistics Analysts
	19-4091.00	Environmental Science & Protection Technicians,
	49-9062.00	Medical Equipment Repairers
Faster than average	13-1023.00	Purchasing Agents, Except Wholesale, Retail, and Farm Products
	17-2112.00	Industrial Engineers
	17-2112.01	Human Factors Engineers and Ergonomists
	19-4021.00	Biological Technicians
	27-3042.00	Technical Writers
	31-9093.01	Endoscopy Technicians

Note: Data source—IWD, 2010.

Table 11

Projected Growth for Information Technology Industries, 2008-2018

Projected Growth	Code	Occupation
Much faster than average	15-1051.00	Computer Systems Analysts
	15-1051.01	Informatics Nurse Specialists
	15-1031.00	Computer Software Engineers, Applications
	15-1081.00	Network Systems and Data Communications Analysts
	15-1081.01	Telecommunications Specialists
	15-1032.00	Computer Software Engineers, Systems Software
	15-1071.00	Network and Computer Systems Administrators
	15-1071.01	Computer Security Specialists
	15-1061.00	Database Administrators
	15-1011.00	Computer and Information Scientists, Research
Faster than average	15-1041.00	Computer Support Specialists
	11-3021.00	Computer and Information Systems Managers
	17-2112.00	Industrial Engineers
	17-2112.01	Human Factors Engineers and Ergonomists
	27-1014.00	Multi-Media Artists and Animators
	27-3042.00	Technical Writers

Note: Data source—IWD, 2010.

LQ was again used to validate possible regional advantages within specific occupations or occupational groups. As explained in question two, the location quotient was not used to show that an industry is a net exporter as is usually the case, but simply that a region has a higher concentration of employment within an occupation and, by proxy, the skills necessary to that occupation, relative to the rest of the state. This provides the ability to see one piece of the puzzle relating to a possible competitive advantage of the region. The respective LQs for each occupational group for the entire region were found by using data from the regional Laborshed provided by Iowa Workforce Development. These LQs from the regional workforce were compared to the LQs found for the sample of dislocated workers identified in question two. The differences were analyzed for significance.

Shift-share analysis was also performed to further verify competitive occupational groups. Shift-share analysis affirms that the relative concentration of employment within an occupation is attributable to regional factors and not some exogenous statewide or occupational variable. By comparing the state share, occupational mix, and regional shift components one can see where the competitive advantage lies for each region. It is in these areas that a region will need the least amount of resources to train its workforce to meet the needs of next generation industries. This will have important implications for overall regional planning as well as counseling and planning services for dislocated workers. If it is found that the regional workforce as a whole is much more suited to an industry or occupational category wholly unrelated to those found for the group of dislocated workers, it may be more efficient to train or educate the group of dislocated workers into occupations more inter-related with those found in the general workforce.

With the findings from the LQ analysis, the final section of the paper will present a gap analysis and map education and training needs to satisfy skills and knowledge needs of the targeted knowledge-based industries by using the map constructed in question five.

Delimitations

In addition to the limitations of the study from the datasets that were used, decisions were made delimit the study. This study is delimited to northeast Iowa data of dislocated workers, although this has implication to the whole state and other states it was felt by the researcher it important to focus on rural communities skills and knowledge set and it is not intended to be generalized beyond the immediate context. The focus of the study was to research the skills gaps among dislocated workers and to assure the methodology developed for this study would make possible the development of a tool to map skills gaps than can be used state and nationwide.

This study compares the relationship between skills needed and skills gaps of dislocated workers matched to needs of the knowledge-based industries. Further it would be helpful to analyze not only the gap in skills and knowledge within a region relative to the needs of a target industry, but also the approximate number of workers within and occupation needed to satisfy the employment needs of the target industries. The researcher had the data available to support supply of workers, but more research will be needed to quantify demand in this current economic downturn. The use of a larger sample of dislocated workers employed in multiple industries would provide a more accurate picture of the skills and knowledge of dislocated workers in Iowa.

This research will present examples of the gap analysis and skills up-training needed for selected cases. It will not be possible to analyze the competiveness of each region within

each industry in this study; the hope is that further research and analysis can be completed for each region separately in the future.

Ethical Considerations

The data were accessed through Iowa Workforce Development with an agreement that strict regulations dictated to assure secure and appropriate use of the data would be employed. All data received was kept on a password protected computer and no duplicative datasets were made of the data. In addition, human subjects' approval was obtained for this study through Iowa State University IRB. No data has been reported individually only in aggregated form of the data provided to maintain anonymity of the individuals and businesses.

The next chapter includes the results of the analysis and will address the six research questions for the study.

CHAPTER 4

RESULTS

This study focuses on the competencies of dislocated workers in northeast Iowa and on the emerging knowledge-based economy industries of advanced manufacturing, biotechnology and information technology. The first research question asks about demographic characteristics of the dislocated workers. The second question asks about the current skills and knowledge of the dislocated workers. The third and fourth questions ask about the differences between skills, knowledge, and aspirations of male and female dislocated workers. The last two questions ask about skills gap and education/training needed to adapt the current skills to the knowledge-based cluster.

Question 1—*What are the demographic characteristics of northeast Iowa dislocated workers?*

Table 12 illustrates the demographic findings from data analysis of dislocated workers and Table 13 shows the education level of the all respondents. The dislocated worker sample in northeast Iowa indicates 60% (284) males and 40% (193) females completed the survey instrument provided to them by the WIA Region One Employment Training program staff. These results are consistent with dislocated workers throughout the nation where a higher percentage of males are dislocated (Borbely, 2009 and U.S. Department of Labor Bureau of Labor Statistics, 2009 a, b).

Results, at the 95% confidence level, indicated that the actual median hourly wage for males age 45-54 was between $12.69 and $14.62. The gender/wage data finding between males and females is consistent with research from the U.S. Department of Labor, (2009b) and the Iowa Gender Wage Equity Study, (2008). These sources indicate that females earn

on average 21% less in hourly earnings than males. Further these studies indicate that males aged 45-54 earn higher wages across the nation. This age group tends to have a higher degree of experience based on job tenure and working in traditional male occupations and have a higher wage range than females who work in traditional female occupations where the wage is lower and requires a lower education requirement (Borbely, 2009, U.S. Department of Labor Bureau of Labor Statistics, 2009a,b). This study found that the majority of the dislocated workers are working in advanced manufacturing industries in the following occupations: production, industrial engineers, electricians, maintenance and repair, first line supervisors, computer control machine operators and machinists. A full listing of the job titles held by the study respondents at the time of their dislocation is included in Appendix F.

In calculating years employed, the mean was used instead of median. Males and females in the first three age groups had generally the same number of years employed but females in the last two groups had descriptively higher years employed than male counterparts. Despite having a higher number of years employed, females in the 45-54 age group earned less than males in the same age group.

When analyzing educational level, each level was assigned a number (1-9 with the higher numbers representing increased education levels and the mean for the group was found. Means were then compared across groups. There was no statistically significant difference in education level between males and females, $t(446)=1.102$, $p=.31$—a mean of 3.72 for females and a mean of 3.79 for males—indicating a high school diploma with additional training. Descriptives further show that females aged 55-64 had a lower education level than females aged 25-44 and, also, lower than the mean of males and females. Education level was at its peak in the 25-34 age group for females, indicating a associates

degree level of education. Research has shown that males in the age group 18-24 who enter employment upon completion of high school are at lower wages and at a higher risk of becoming unemployed due to lack of education (Borbely, 2009).

Table 12

Demographic Characteristics of dislocated workers in northeast Iowa

Demographic	Workers (n=477)	%
Gender		
Male	284	60%
Female	193	40%
Age		
18-24	21	5%
25-34	69	15%
35-44	122	27%
45-54	167	38%
55-64	75	17%
Missing	24	5%
Median Age	45	
Median Hourly Wage	$12.77	
Median Salary	$45,500	
County of Dislocated Workers		
Allamakee	15	3%
Chickasaw	23	5%
Clayton	18	4%
Delaware	30	6%
Dubuque	64	13%
Fayette	193	40%
Howard	76	16%
Winneshiek	59	12%
Number of Children		
0 children	157	33%
1 child	63	13%
2 children	62	13%
3 children	34	7%
4 children	10	2%
5 children	*	*
6 children	*	*
7 children or more	*	*
Education		
Some High School	23	5%

High School Diploma (including GED)	230	48%
Beyond High School	114	24%
Trade/Certificate/Vocational	53	11%
Associate Degree	36	8%
Undergraduate Degree	*	*
Post Graduate	*	*
Table 12 (continued)		
Currently Attending School		
Yes	16	3%
No	294	62%
Special Accommodations		
Yes	*	*
No	249	52%

Note: * = Fewer than ten individuals in the cell.

Table 13

Education Difference with Age N=442

Age Range	Education level M	N=Dislocated workers	SEM
Males			
18-24	3.14	14	0.142
25-34	3.96	45	0.218
35-44	3.91	79	0.142
45-54	3.76	83	0.136
55-64	3.68	40	0.225
Total	**3.79**	**261**	**0.080**
Females			
18-24	3.50	6	0.342
25-34	4.08	24	0.225
35-44	3.85	41	0.183
45-54	3.68	79	0.122
55-64	3.39	31	0.152
Total	**3.72**	**181**	**0.080**

Note: Education level: 1 = less than 9th grade and 7 = post graduate level

Table 14 compares the job tenure between males and females. Females reported a higher tenure mean between the age group of 45-54 at 15.97 years compared to males' 10.00 year mean. Even though females reported a higher tenure, this does not equate to higher wages. An interesting note is that very few females from this sample entered employment right after high school (age group of 18-24). There were fewer than 10 respondents in that

age group so data were not reported. Additionally, there were only 23 female respondents in the age group of 25-34.

Table 14

Dislocated Worker Job Tenure N=459

Age	Gender	N = Dislocated workers	M (Years employed)
18-24	Male	13	2.70
	Female	*	*
25-34	Male	40	4.00
	Female	23	3.74
35-44	Male	80	9.24
	Female	39	9.91
45-54	Male	87	10.00
	Female	75	15.97
55-64	Male	39	9.48
	Female	32	15.65

Note. * = Fewer than 10 respondents

Table 15 shows the results from respondents for the *assistance needed* and *aspirations* variables. The findings indicate that 60% (192) of respondents indicated the need for assistance with *understanding how my skills and experience relate to new jobs*. Further 66% (206) of the respondents indicated they needed assistance with *deciding what jobs they can do,* 51% (160) with *tuition and books,* and 43% (131) with *transportation expenses to travel to school.*

Table 15

Results from 'Assistance Needed' and 'Aspirations' Variables

Question	N = Yes	%	N = No	%
Understanding how my skills and experience relate to new jobs:	192	60%	116	40%
Finding out what jobs are available:	265	79%	69	21%
Deciding which school would be best for me:	138	29%	162	34%
Deciding what jobs I can do:	206	66%	107	34%
Child care for my children while I go to school:	34	12%	246	88%
Payment assistance for tuition and books:	160	51%	156	49%
Payment assistance for transportation expenses to travel to school:	131	43%	174	57%
Dealing with the loss of employment	30	11%	241	89%

Table 16 indicates the mean, standard deviation and t-test result for future plans *aspiration* and *assistance* needed of male and female respondents. Levene's test for equality of variances was used. In cases where the Levene's test was significant for unequal variances, independent samples t-test results were interpreted with the unequal variance t-test. The findings indicate no significant difference between male and female respondents in the *aspirations* questions pertaining to wanting to *find employment* and *retirement*. The results indicate *finding employment* as the top priority with a mean at .99. A statistically significance difference exists between female and male respondents, female respondents indicated that they wanted to *continue their education* at .93 mean, with males at a .75. A significance difference is also found between males and females respondents pertaining to *plan to open their own business*. The following are the assistance needed variables indicating

statistically significant differences for all of these variables between gender with females indicating a higher need and desire for assistance :

- *understanding how your skills and experience relate to new jobs* with a mean for females at .75 and males .55;
- *deciding what jobs you can do* female mean at .78 and males at.59, *dealing with loss of employment* mean for females at .18 and males at .07;
- *financial support for tuition and books* mean for females at .63 and males at .44, and
- *deciding which school would be best for me* mean for females at .58 and males at .39 and *transportation to and from school* mean for females at .58 and males at .34.

These findings are consistent with the research that suggests females who enter college at non-traditional age may have dependents and may earn lower wages indicating the need for additional supports in order to attend college (Bowl, 2001; Kasworm, 2003; Kilgore, 2003). Research indicates females' need to continue education is greater based on the higher the education the higher wages earned (Borbely, 2009; U.S. Department of Labor Bureau of Labor Statistics, 2009a, b) and the need for career occupation awareness to assist in attending training in high-demand, high-wage occupation to increase their self sufficiency based on the notion these respondents could be single parents (Kilgore, 2003). Further, research indicates males are more likely to become employed faster than females based on the traditional occupations they tend to be employed in such as construction, truck drivers, and production occupations that are in higher demand than traditional female occupations that have a lower demand for job openings projected (Iowa Workforce Information Network, 2009).

Table 16

Means, SD, and t-test Results for Future Plans and Aspirations

Future Plans & Aspirations	Male		Female		*t*	*df*	*p*	Confidence Interval	
	M	SD	M	SD				Lower	Upper
Future plans include finding new employment	.99	.11	.99	.09	-.51	367	.61	-.01	.01
Future plans include continuing education	.75	.43	.93	.26	-4.02	249	.01*	-.26	-.09
Future plans include retirement	.19	.40	.09	.28	1.92	155	.06	-.01	.21
Future plans to own a business	.32	.47	.10	.31	3.39	147	.01*	.09	.34
Finding out what jobs are available	.78	.42	.82	.39	-.90	332	.37	-.13	.05
Understanding how skills and experience relate to new jobs	.55	.50	.75	.44	-3.57	254	.01*	-.30	-.09
Deciding what jobs you can do	.59	.49	.78	.41	-3.72	262	.01*	-.30	-.09
Dealing with your loss of employment	.07	.26	.18	.39	-2.50	154	.01*	-.19	-.02
Deciding which school would be best for me	.39	.49	.58	.50	-3.27	298	.01*	-.31	-.08
Financial support for tuition and books	.44	.50	.63	.48	-3.37	244	.01*	-.31	-.08
Financial support for child care for children	.09	.29	.17	.38	-1.90	173	.06	-.17	.01
Financial support for transportation expenses to/from school	.34	.47	.58	.50	-4.27	232	.01*	-.36	-.13

[a]Scale: 0 = no, 1= yes

Note: * $p < .05$

Question 2—*What are the current skills and knowledge of dislocated workers?*

Table 17 illustrates that northeast Iowa dislocated workers have a primary knowledge advantage (greater than 3.25) in mechanical (3.74) and production (3.36) and a secondary knowledge advantage (greater than 3.0 though less than 3.25) in education and training (3.01) and mathematics (3.24). The primary advantage work activities (skills) (greater than 3.75) are control machines and processes (4.04), handling and movement of objects (4.64), and monitoring processes, materials and surroundings (3.76). The secondary advantage work activities (3.00 to 3.75) among the top five are updating and using relevant knowledge (3.69); establishing and maintaining interpersonal (3.68), making decisions and solving problems (3.54), performing general physical activities (3.53) and communication with supervisory personnel inside (3.41).

The sample for this study was comprised of respondents mainly from advanced manufacturing industries which reflect these knowledge and work activities. The state sample would be expected to have a more varied response on degrees of knowledge and skills due to a large statewide sample and diversification of layoffs from multiple industry sectors.

Table 17

Current Skills and Knowledge of Dislocated Workers N=442

Primary Advantage Work Activity (Skills) (= > 3.75)	M
Control machines and processes	4.04
Handling and movement of objects	4.64
Monitoring processes, materials, or surroundings	3.76
Secondary Advantage Work Activity (Skills) (= > 3.0 but < 3.75)	
Communication with supervisory personnel inside	3.41
Establishing and maintaining interpersonal	3.68
Getting Information	3.16
Identifying objects, action, and events	3.33
Inspecting equipment, structures, or material	3.39
Judging the qualities of things, services, or people	3.03
Making decisions and solving problems	3.54
Organizing, planning and prioritizing work	3.61
Performing general physical activities	3.53
Processing of information	3.24
Repairing and maintaining mechanical equipment	3.00
Thinking creatively	3.01
Updating and using relevant knowledge	3.69
Primary advantage knowledge (= > 3.25)	M
Mechanical	3.74
Production	3.36
Secondary Advantage Knowledge (= > 3.0 but < 3.25)	
Education and Training	3.01
Mathematics	3.24

[a]Scale: 1 = less than 9th grade, no experience; 2 = some high school, no diploma, less than a few weeks training or experience; 3 = completed high school and up to several months of training and experience; 4 = associate level, at least one year of training or experience; 5 = bachelor's level, minimum of two to four years training or experience; 6 = post graduate level, at least five years of training or experience; and 7 = post graduate level plus experience, greater than ten years of training or experience.

The location quotient analysis and competitive share of dislocated workers shown in Table 18 indicates a strong competitive advantage for northeast Iowa for farming, fishing, and forestry; community and social services; production; building and grounds cleaning and maintenance; transportation and material moving and construction and extraction are all groups with a substantially higher amount of workers than statewide averages. Computer

and mathematical; arts, design, entertainment, sports, and media; and architecture and engineering have the fewest number of workers relative to statewide averages.

The reasons for a high or low location quotient will vary and may include: a large employer in the area, better education opportunities for the occupation group, geographical advantages, political advantages or policies for the occupational group in the area, or others. A high location quotient indicates that there is a higher proportion of that skill set. It does not preclude a region from transitioning into occupational groups where there is a low location quotient but may infer that more resources will need to be spent building the skill set in those occupation groups to complete with other regions.

The competitive share of jobs available for dislocated workers in the region, include many jobs in biotechnology and advanced manufacturing industries. Competitive share indicates a higher growth in occupations than projected which includes farming, fishing and forestry; community and social services; production; building, grounds and maintenance; transportation and material moving; construction and extraction; education and training; life, physical and social services; and architecture and engineering. These occupations fall into the emerging industries of biotechnology and advanced manufacturing these occupations correlate with higher demand for employment and high wages (Battelle Memorial Institute, 2004; Battelle Memorial Institute, 2005, March; Battelle Memorial Institute, 2005, September; Iowa Workforce Information Network, 2009; National Center for O*NET, 2009; Swenson & Eathington, 2003).

The state growth effect indicates a growth of jobs based on the gross domestic product production in the following occupations: production; transportation and material moving; sales and related; office and administrative; and management. Further, the

occupational mix which indicates change in employment that occurred within the occupational group statewide indicates a strong change in the following occupations: education and training, management, and health care practitioners and technical.

Table 18

Location Quotient Analysis and Competitive Share of Dislocated Workers

Occupation	2007 % of Total Unemployment	2007 LQ	State Growth Effect	Occupational Mix	Competitive Share
Farming, Fishing, and Forestry	0.94%	**2.18**	29	-263	**793**
Community and Social Services	2.26%	**1.38**	74	-2	**1,655**
Production	13.03%	**1.23**	**693**	188	**1,184**
Building & Grounds, Cleaning &Maintenance	1.95%	**1.12**	74	-273	**1,105**
Transportation and Material Moving	4.16%	**1.12**	**369**	-330	**-2,322**
Construction and Extraction	3.09%	**1.06**	347	-1,236	**-2,265**
Sales and Related	6.11%	**1.06**	**479**	-1,781	-813
Installation, Maintenance, and Repair	3.36%	**1.05**	221	26	-566
Education, Training, and Library	10.28%	**1.04**	**435**	**2,288**	**1,137**
Healthcare Practitioners and Technical	7.25%	**1.01**	317	**1,307**	902
Management	16.52%	0.99	**759**	**5,454**	-1,207
Healthcare Support	3.29%	0.98	361	72	-3,637
Life, Physical, and Social Science	1.07%	0.92	7	27	**1,131**
Office and Administrative	13.83%	0.92	**892**	250	-2,074
Protective Service	0.81%	0.90	59	-26	-228
Food Preparations and Serving Related	2.42%	0.90	273	1,135	-1,639
Business and Financial Operations	4.30%	0.88	199	362	712
Personal Care and Service	2.01%	0.87	162	-277	-666
Legal	0.54%	0.63	44	192	-464
Architecture and Engineering	0.94%	0.63	118	418	-1,746
Arts, Design, Entertainment, Sports, & Media	0.94%	0.62	155	-541	-1,561
Computer and Mathematical	0.54%	0.31	44	-99	-173

Notes. LQ > 1.00 (shown in **bold type**) indicate a greater number of individuals work in this occupation in Region One compared to the state of Iowa. Competitive share measures in **bold type** indicate a relatively strong competitive advantage for the region. *State growth effect* = Number of jobs attributed to the growth in the state economy as a whole. *Occupational mix effect* = Number of jobs attributed to the growth in the occupational group across the state as a whole. *Competitive share* = Number of jobs attributed to factors specific to the region being studied.

Question 3—*What are the difference of skills and knowledge between male and female?*

Table 19 shows the differences in knowledge between male and female dislocated workers in northeast Iowa. The independent samples t-tests findings indicate statistically significant differences between knowledge of males and females in regards to female traditional occupations. For instance, with clerical knowledge females had a mean of 2.57 with males at 1.80; customer and personal service showed females at 3.11 mean and males with a 2.65 mean; computers and electronics females mean at 2.97 and males at 2.74; English females mean at 2.93 and males at 2.62; economics and accounting females mean at 1.30 and males at 1.02; mathematics females mean at 3.43 and males at 3.17; and personnel and human resources females mean at 1.96 and males at 1.67.

Males had slightly higher difference in knowledge in the traditionally held occupations of mechanical with males mean at 3.90 and females mean at 3.31; building construction males mean at 1.54 and females mean of 1.24; physics males mean at 1.44 and females mean at 1.11; and public safety and security males mean at 2.36 and females mean at 2.11. One surprising finding is males and females do not have a significant difference in engineering and technology with a mean of 2.72 for males and a mean of 2.45 for females.

Table 19

Means, SD, and t-test Results for Occupational Knowledge

Occupational Knowledge Areas	Male		Female		*T*	*df*	*p*	Confidence Interval	
	M	SD	M	SD				Lower	Upper
Administrative Management	2.51	.65	2.37	.74	1.83	315	.07	-.01	.29
Building Construction	1.54	1.06	1.20	.86	2.47	270	.01*	.07	.60
Chemistry	1.59	.71	1.44	.73	1.54	270	.13	-.42	.34
Clerical	1.80	.82	2.57	1.28	-4.87	100	.01*	-1.08	-.46
Communication and Media	1.11	.65	1.25	.75	-1.45	120	.15	-.34	.05
Computer and Electronics	2.75	.73	2.97	.94	-2.11	270	.04*	-.44	-.01
Customer and Personal Service	2.65	.74	3.11	1.00	-3.63	109	.01*	-.67	-.24
Design	2.42	1.18	2.21	1.21	1.31	270	.19	-.11	.52
Economics and Accounting	1.02	.52	1.30	.79	-2.91	101	.01*	-.48	-.09
Engineering and Technology	2.72	1.13	2.45	1.27	1.67	124	.10	-.05	.61
English Language	2.62	.62	2.93	.72	-3.65	270	.01*	-.50	-.13
Law and Government	1.01	.65	1.19	.70	-2.01	270	.04*	-.36	-.01
Mathematics	3.17	.76	3.43	.85	-2.47	270	.01*	-.47	-.05
Mechanical	3.90	1.17	3.31	1.58	2.98	108	.01*	.20	.99
Personal and Human Resources	1.67	.84	1.96	.77	-2.53	270	.01*	-.50	-.06
Physics	1.44	.94	1.11	.71	2.82	270	.01*	.10	.57
Public Safety and Security	2.36	.67	2.11	.57	2.89	270	.01*	.08	.42
Sales and Marketing	1.22	.62	1.41	.68	-2.23	270	.03*	-.36	-.02

Scale: 1 = less than 9th grade, no experience; 2 = some high school, no diploma, less than a few weeks training or experience; 3 = completed high school and up to several months of training and experience; 4 = associate level, at least one year of training or experience; 5 = bachelor's level, minimum of two to four years training or experience; 6 = post graduate level, at least five years of training or experience; and 7 = post graduate level plus experience, greater than ten years of training or experience.
Note: * $p < .05$

Table 20 indicates the mean, standard deviation and t-test results for work activity (skills) between males and females. To note a few differences in which males are more dominant in these traditional occupations include: repairing and maintaining mechanical equipment with males mean at 3.24 and females mean at 2.40; handling and moving objects males mean at 4.85 and females mean at 4.12; controlling machines and processes males mean at 4.23 and females mean at 3.56; operating vehicles and mechanical devices males mean at 2.36 with females mean at 1.79; performing general physical activities males means at 3.69 and females mean at 3.13 with all having a statistical significance at $p<.05$.

Independent samples t-tests results further statistically significant difference between males and females with females reporting higher skills in the following: communication with outside organizations females mean at 2.24 and males mean at 1.86; communicating with supervisors females mean at 3.65 and males at 3.33; documenting and recording information females mean at 2.93 and males mean at 2.50; interacting with computers females mean at 2.82 and males at 2.27; organizing, planning and promoting work females mean at 3.86 with males at 3.52; performing administrative activities females mean at 2.13 and males at 1.82; and scheduling work and activities females mean at 2.92 and males mean at 2.58.

These differences among males and females are consistent with research (Borbely 2009; U.S. Department of Labor Bureau of Labor Statistics, 2009a, b) and they indicate females go into more traditional occupations of administrative assistants, assembly and shipping and receiving. This is especially true in advanced manufacturing industries where most of the individuals laid off were working when they took this survey.

Table 20

Means, SD, and t-test Results for Work Activity (Skills)

Work Activity (Skill) Area	Male		Female		*t*	*df*	*p*	Confidence Interval	
	M	SD	M	SD				Lower	Upper
Assisting and Caring for Others	2.06	.61	2.17	.64	-1.22	270	.23	-.27	.06
Coaching and Developing Others	2.67	.69	2.85	.77	-1.91	270	.06	-.38	.01
Communication with Persons Outside Organization	1.86	.76	2.24	.88	-3.33	122	.01*	-.61	-.15
Communication with Supervisors, Peers, etc.	3.33	.79	3.65	.76	-3.11	142	.01*	-.53	-.12
Controlling Machines and Processes	4.23	1.19	3.56	1.77	3.08	103	.01*	.24	1.12
Coordinating the Work and Activities of Others	2.85	1.00	3.03	.98	-1.32	270	.19	-.44	.09
Documenting/Recording Information	2.50	.53	2.93	.76	-4.62	105	.01*	-.63	-.25
Establish and Maintain Interpersonal Relations	3.64	.60	3.81	.72	-1.84	118	.07	-.36	.01
Estimate Quantifiable Products, Events, Information	2.48	.51	2.70	.58	-3.11	270	.01*	-.36	-.08
Evaluate Information to Determine Compliance	2.77	.61	3.02	.66	-2.88	270	.01*	-.41	-.08
Getting Information	3.10	.65	3.30	.70	-2.16	270	.03*	-.37	-.02
Guiding, Directing, and Motivating Subordinate	2.34	.89	2.47	.96	-1.08	270	.28	-.38	.11
Handling and Moving Objects	4.85	.89	4.12	1.39	4.28	100	.01*	.39	1.07
Inspecting Equipment, Structures, or Material	3.42	.64	3.29	.85	1.23	109	.22	-.08	.34
Interacting with Computers	2.27	.72	2.82	1.04	-4.18	103	.01*	-.80	-.29
Interpreting the Meaning of Information	2.20	.63	2.36	.69	-1.75	270	.08	-.33	.02
Judging the Qualities of Things, Services, Other	2.95	.68	3.24	.72	-3.02	270	.01*	-.47	-.10
Making Decisions and Solving Problems	3.49	.63	3.66	.68	-1.93	270	.06	-.34	.00

Scale: 1 = less than 9th grade, no experience; 2 = some high school, no diploma, less than a few weeks training or experience; 3 = completed high school and up to several months of training and experience; 4 = associate level, at least one year of training or experience; 5 = bachelor's level, minimum of two to four years training or experience; 6 = post graduate level, at least five years of training or experience; and 7 = post graduate level plus experience, greater than ten years of training or experience.

Note: * $p < .05$

Table 20 (continued)

Means, SD, and t-test Results for Work Activity (Skills)

Work Activity (Skill) Area	Male		Female		*t*	*df*	*p*	Confidence Interval	
	M	SD	M	SD				Lower	Upper
Operating Vehicles, Mechanical Devices	2.36	.95	1.79	.97	4.40	270	.01*	.31	.82
Organizing, Planning and Prioritizing Work	3.52	.91	3.86	.90	-2.76	270	.01*	-.59	-.10
Performing Administrative Activities	1.82	.85	2.13	.99	-2.49	120	.01*	-.57	-.07
Performing/Working Directly for the Public	1.37	1.00	1.49	1.00	-.94	270	.35	-.39	.14
Performing General Physical Activities	3.69	.95	3.13	1.15	4.15	270	.01*	.30	.83
Processing Information	3.17	.67	3.41	.80	-2.53	270	.01*	-.43	-.05
Provide Consultation and Advice to Others	2.30	1.01	2.52	.95	-1.59	270	.11	-.48	.05
Repairing and Maintaining Electronic Equipment	2.41	.99	1.95	.98	3.50	270	.01*	.21	.73
Repairing and Maintaining Mechanical Equipment	3.24	1.19	2.40	1.38	4.65	121	.01*	.48	1.19
Resolving Conflicts and Negotiating	2.21	.84	2.52	1.09	-2.23	111	.03*	-.58	-.03
Scheduling Work and Activities	2.58	.91	2.92	.99	-2.73	270	.01*	-.59	-.10
Selling or Influencing Others	1.67	.73	1.78	.76	-1.11	270	.27	-.31	.09
Staffing Organizational Unit	1.34	.91	1.44	.88	-.79	270	.43	-.34	.14
Thinking Creatively	2.97	1.03	3.11	.92	-1.11	270	.27	-.42	.12
Updating and Using Relevant Knowledge	3.66	.85	3.76	.74	-.91	157	.37	-.30	.11

Scale: 1 = less than 9th grade, no experience; 2 = some high school, no diploma, less than a few weeks training or experience; 3 = completed high school and up to several months of training and experience; 4 = associate level, at least one year of training or experience; 5 = bachelor's level, minimum of two to four years training or experience; 6 = post graduate level, at least five years of training or experience; and 7 = post graduate level plus experience, greater than ten years of training or experience.

Note: * $p < .05$

Question 4—*What are the aspirations of the dislocated workers in northeast Iowa?*

Table 21 shows that 43% of dislocated workers indicated that their intent is to attend future education and training while 76% want to search for a new job. A relatively low number of respondents indicated an interest in retiring which is not surprising considering that the mean age of the respondents is 45. Males were more interested in opening their own business. Further analysis on aspirations is included in the results of question number one.

Table 21

Dislocated Worker Aspirations

Aspiration	Response	N	%
Enroll in school:			
	Yes	207	43%
	No	45	9%
	Missing	226	47%
Search for another job:			
	Yes	365	76%
	No	*	*
	Missing	94	20%
Open own business:			
	Yes	35	7%
	No	114	24%
	Missing	281	59%
Retire:			
	Yes	23	5%
	No	135	28%
	Missing	320	67%

Note. * = Fewer than ten individuals in the cell.

The findings illustrated in Table 22 indicate females have significantly higher (93%) aspirations to further their education than males at 75%. Further, the findings indicate a significant difference between genders in regard to responses to *opening their own business* with 91 males or 32% with a positive response, along with a 19% positive response to *retiring* for males. For females, the response was significantly lower at 10% having an

aspiration to *own their own business* and 8% with an aspiration to *retire.* There was no significant difference among the genders pertaining to *search for another job* with both genders indicating a strong desire at 99%.

Table 22

Dislocated Worker Aspirations—Male/Female

Aspiration	Response	N	%
Enroll in school:			
	Male	154	75%
	Female	98	93%
Search for another job:			
	Male	231	99%
	Female	138	99%
Open own business:			
	Male	91	32%
	Female	58	10%
Retire:			
	Male	89	19%
	Female	69	8%

Question 5—*What are the skills gaps of dislocated workers for the knowledge based economy?*

Table 23 compares the skills gap between the education level of the dislocated workers in northeast Iowa to the average level of education needed in this occupation in the biotechnology cluster. Biology education is lacking at -3.13 and chemistry at -2.27. The skills gap is relatively low and can provide valuable information to economic development entities regarding the potential skills surplus of workers and limited training that would be needed to transition into an emerging industry or similar occupation that requires a high degree of organizing planning and prioritizing work; customer service, making decisions and solving problems, computer and electronic; interacting with computers and mathematics. One area this information highlights is the knowledge and skills of northeast Iowa dislocated

workers is higher in computer and electronics and interacting with computers and is higher than the demand for the occupations indicates, which is a competitive advantage for expanding emerging cluster of information technology for existing or expanding businesses or for business looking for these skills to located in northeast Iowa.

Table 23

Skill and Knowledge Gaps for Dislocated Workers in Biotechnology Occupations

Critical Skill & Knowledge Needs	NE Iowa Dislocated Workers	O*NET Average Level	Skills Gap
Biology	0.32	3.45	**-3.13**
Chemistry	1.55	3.82	**-2.27**
Documenting/Recording Information	2.62	4.18	**-1.56**
Processing Information	3.23	4.74	**-1.51**
Updating and Using Relevant Knowledge	3.68	5.03	**-1.35**
Identifying Objects, Actions, and Events	3.33	4.60	**-1.27**
Getting Information	3.15	4.33	**-1.18**
English Language	2.70	3.82	**-1.12**
Communication with Supervisors, Peers, or Subordinates	3.41	4.46	**-1.05**
Organizing, Planning, and Prioritizing Work	3.61	4.6	-0.99
Customer Service	2.78	3.75	-0.97
Making Decisions and Solving Problems	3.53	4.41	-0.88
Computers & Electronics	2.81	3.64	-0.83
Interacting With Computers	2.42	3.22	-0.80
Mathematics	3.24	3.96	-0.72

Note. ≥ 1.05 = gap

Table 24 reports that dislocated workers in northeast Iowa have a competitive advantage in production and mechanics knowledge, with a higher average than the O*NET level. The skills gap between knowledge and skills is relatively low with the highest gap at -1.14. This indicates a strong competitive advantage in the advanced manufacturing occupations. The region may be an ideal location for a small to medium size business to locate or expand with relatively limited training in this area.

Table 24

Skill and Knowledge Gaps for Dislocated Workers in Advanced Manufacturing Occupations

Critical Skill & Knowledge Needs	NE Iowa Dislocated Workers	O*NET Average Level	Skills Gap
Engineering & Technology	2.64	3.78	-1.14
Design	2.35	3.48	-1.13
Computers & Electronics	2.81	3.78	-0.97
Administration & Management	2.44	3.36	-0.92
English Language	2.70	3.61	-0.91
Communication with Supervisors, Peers, or Subordinates	3.41	4.30	-0.89
Interacting with Computers	2.42	3.26	-0.84
Mathematics	3.24	4.01	-0.77
Getting Information	3.15	3.91	-0.76
Customer Service	2.77	3.36	-0.59
Making Decisions & Problem Solving	3.53	4.05	-0.52
Production	3.36	3.23	0.13
Mechanics	3.73	3.53	0.20
Mathematics	3.24	4.11	-0.87

Table 25 shows that dislocated workers have lower than average competitive skills and knowledge advantage in the information technology industry. The results indicate training in this field would be beneficial to increase the marketability of the workers in this field for high-demand occupations. The results further indicate the training gap is fairly significant with skills and knowledge in computers and electronics (-2.51, interacting with computers (-2.36), and telecommunications (-2.19) is the need for further education and training. These skills are critical in a knowledge-based economy and are essential to promote additional training.

Table 25

Skill and Knowledge Gaps for Dislocated Workers in Information Technology Occupations

Critical Skill & Knowledge Needs	NE Iowa Dislocated Workers	O*NET Average Level	Skills Gap
Computers & Electronics	2.81	5.32	-2.51
Interacting with Computers	2.42	4.78	-2.36
Telecommunications	0.85	3.04	-2.19
Updating & Using Relevant Information	3.68	5.17	-1.49
Communication with Supervisors, Peers, or Subordinates	3.41	4.74	-1.33
Engineering & Technology	2.64	3.97	-1.33
Customer Service	2.78	4.08	-1.30
English Language	2.70	3.99	-1.29
Getting Information	3.15	4.34	-1.19
Making Decisions & Problem Solving	3.53	4.62	-1.09
Identifying Objects, Actions, or Events	3.33	4.39	-1.06
Mathematics	3.24	4.11	-0.87

Question 6—*What education and training programs are needed to adapt the current skills set clusters to a knowledge-based economy?*

The numerical difference between the level possessed and the level required within a knowledge or work activity is not particularly practical outside of selecting in which areas there is a gap and ranking those areas in which additional training is needed. The selection of areas that require additional training is a function of efficient use of limited resources. Resources should be used in a way that resolves the largest gaps first and helps the highest number of people. With this in mind, the average numerical gap is found among the critical areas and those gaps larger than the average are selected for requiring additional educational or training resources.

Table 26 shows the areas in all three selected industries advanced manufacturing, information technology and biotechnology where additional training or education is needed. ‘Yes’ indicates the need for additional education and training for the individuals who are dislocated in northeast Iowa. The areas in which education and training are needed

in more than one industry are where resources will be most efficiently spent because they will help meet the training goals of multiple industries. The education and training resources should be spent in developing training programs for the following: communication with supervisors, peers, or subordinates; computer and electronics; English language; and interacting with computers. Additional education and training programs are needed in the following areas as a secondary training program: customer service; engineering and technology, getting information; identifying objects, actions, or events; and making decisions and solving problems.

Further this indicates there is no need for further training in mechanics and production for this group. The education and training needs are reflective of an associate degree for the majority of the occupations in order to have the high tech skill level and have the innovation skills for knowledge-based industries. The average level of gap between the skills possessed by the dislocated workers and the skills required by the occupations within the three industries was 1.17. It is in these areas where education and training resources will be most efficiently used when only considering the individually selected industry. To narrow further the list of education and training programs needed, the results should be investigated for those areas in which additional support is needed in more than one selected industry. It is in these inter-industrial critical areas that resources will benefit the largest number of people in the most diverse occupations.

Table 26

Critical Skill and Knowledge Needs by Occupation

Critical Skill & Knowledge Needs	Occupational Area		
	IT	Adv Mfg	Biotech
Administration & Management	-	Yes	-
Biology	-	-	Yes
Chemistry	-	-	Yes
Communication with Supervisors, Peers, or Subordinates	Yes	Yes	Yes
Computers & Electronics	Yes	Yes	Yes
Customer Service	Yes	-	Yes
Design	-	Yes	-
Documenting/Recording Information	-	-	Yes
Engineering & Technology	Yes	Yes	-
English Language	Yes	Yes	Yes
Getting Information	Yes	-	Yes
Identifying Objects, Actions, or Events	Yes	-	Yes
Interacting with Computers	Yes	Yes	Yes
Making Decisions and Solving Problems	Yes	-	Yes
Mathematics	Yes	-	-
Mechanics	-	-	-
Organizing, Planning, and Prioritizing Work	-	-	Yes
Processing Information	-	-	Yes
Production	-	-	-
Telecommunications	Yes	-	-
Updating and Using Relevant Knowledge	Yes	-	Yes

Note. Yes = Additional education and training needed

The final chapter will summarize and discuss the findings of this study, provide implications for research, policy and practice recommendations, and provide concluding thoughts for additional research and funding needs to build the skills and knowledge of workers to meet the demands of the current and future knowledge-based economy.

CHAPTER 5

DISCUSSION

In the past few years there has been a considerable amount of change in the economies of northeast Iowa, in the state of Iowa, and nationally. In order for northeast Iowa to be successful in economic development efforts, it is important to gain information about employers' needs as well as the skills and knowledge of the workforce in order to have a competitive advantage in a knowledge-based economy. This chapter provides a summary of the major findings of this study, presents a paradigm for assessment and training, and includes a model for policy makers to consider. Also provided are a discussion of suggestions for future research and study and implications for practice for a range of audiences including community college administrators and stakeholders, faculty, businesses, economic development staff, current and potential students, WIA providers, One Stop Centers, IWD administrators, federal and state legislators and policy makers.

Summary and Discussion of Results

Demographics

The analysis and finding of the data supports the belief of Valdez (1999) that the highest form of human capital development results from examining the whole individual in order to ensure a productive and meaningful study. This study focused on 477 individuals from northeast Iowa who completed the dislocated worker survey in 2009. The analysis of the results from the current study revealed that 60% of northeast Iowa respondents were males compared to 67.4% of males who were unemployed statewide in 2009. Borbely (2009); IWD (2009a); and the U.S. Department of Labor Bureau of Statistics (2009a, b) indicate that a higher percentage of males are laid off versus females nationally, based on the

traditional male occupations had the highest level of layoffs. The median age of the northeast Iowa dislocated worker respondents was 45 with 55% of the respondents in this study being between 45 and 64 years of age. In the state of Iowa, 22% of employees are between 45 and 64 years of age (IWD, 2009). The percentage of employees between the ages of 45 and 64 is cause for concern in northeast Iowa for two reasons.

The first concern is that these individuals will be eligible to retire in the next ten years making the need to replace skills and knowledge possessed by these workers critical for the economic growth of the region. The second concern is the need to develop job opportunities that match the skills and knowledge of the displaced workers so that individuals are employed in comparable jobs with comparable wages.

The education level of northeast Iowa dislocated worker respondents indicated 48% with a high school degree, 24% with education beyond high school, those with a trade certificate at 11%, and those with an associate degree at 8%. For bachelor's and post graduate degrees, less than ten respondents answered. The state of Iowa averages for education indicate 21.4% having some college beyond high school with 7.4% having an associate degree, 14.7% of the population having a bachelor degree and 6.5% with post graduate degrees (IWD, 2009f). The research done by Borbely (2008), Grubb and Lazerson (2004), and Markusen (2000) indicates that the more education or training the higher the wages and increased job security individuals will have and the increased likelihood to contributes to society's human capital.

The findings from this study of dislocated workers in northeast Iowa indicate a lower level of bachelor's and advanced degrees. This can be explained by the fact individuals with degrees are less likely to become unemployed. A significant finding in this sample indicated

females between the ages of 25-34 had an average education level at the associate degree and this was the only age group (male or female) that indicated an education level this high. The male age group of 18-24 had lower levels of education which indicates the majority of these males enter work immediately following high school and did not attend any additional training.

This finding raises questions about the need for additional vocational and technical training at the high school level and the need for community colleges to ramp up their training programs and career academics programs. Grubb (1996) closely examined the mid-skilled labor market and his research concluded the need to address the education and training programs developed at the community college and the need for restructuring of programs to include short term training programs and on the job training programs.

Further, this finding points to the need to develop and implement career paths to the community college diploma and non-credit training programs in order to further the skills and knowledge of young adults who are not interested in two- or four-year degree programs. Noy and Jacobs' (2009) research emphasized the need for contract non-credit training to meet the short term skills and knowledge needs and to promote the shift of the workforce demands for to a lifelong learning to meet the needs in a knowledge-based economy.

The median wage for the dislocated workers is $12.71 hourly and $45,500 for an annual salary. The data analysis shows females were paid less money especially in the age group of 45-64. This finding is consistent with the Iowa Gender Wage Equity Study (2008) that indicated females make on average 21.8% less than males in hourly wages and 35.25% less for salaried occupations. The findings indicated that females were willing to accept less money than corresponding male groups when asked what wage they are willing to accept for

a job. The analysis of wages indicates the need for information to be readily available for dislocated workers on emerging job demands, skills and knowledge needed for these occupations. Further, making wage data available is important in order for females to make an informed decision on their future training, wage projections potential and job security outlook in order to compete in a knowledge-based economy. Also, additional career counseling and discussion on career pathways are essential for females to view traditional and non-traditional job opportunities.

The tenure of employment of all dislocated workers studied was a mean of 10 years, with a significant difference among males and females in the age group of 45-54 where females had tenure of 15.97 years compared to 10.00 years for males. In the age group of 55-64, female tenure is 15.65 and male tenure was 9.48 years. This is interesting based on the fact that females were earning a lower wage at this age group. This finding also supports the need for females to consider non-traditional career options and the need for career advising and counseling to match current skills and knowledge to occupations that are emerging and have higher wage earnings. The research conducted by Coccia (1997) focuses on the need for non-traditional students to have solid career guidance that addresses real world salary potential. Clark (2000) focused on the need to promote non-traditional careers to students so they can earn more money and have increased job security, with the following themes: market career and technical programs; present career cluster in technical and professional occupations; and help students overcome stereotypes.

Assistance

Sixty percent of the dislocated workers indicated they needed assistance with "understanding how my skills and experience relate to new jobs" and 66% needed assistance

with “deciding what jobs I can do” overall. Further, 79% indicated needing assistance with finding a job. These three factors support the need for the development of a tool that individuals can use to assess their current skills and knowledge and map to potential emerging jobs and to the training required for these jobs. Fifty-one percent indicated they need assistance with tuition and books, 43% with transportation assistance, 12% with childcare costs, and 11% with dealing with loss of employment. Females indicated a higher mean on the variable “indicating the need for assistance”. Except for “finding a job” there was no significant difference between males and females. It is important to note, there is no inclusive information to support why females are more willing to ask for help and need additional assistance.

Although research indicates females attending college tend to enroll following a loss of a job, to better themselves, or as the result of being encouraged by a family member (Johnson, Schwartz & Bower, 2000) and are more likely to have dependents and earn less money so they will need additional financial assistance. Females tend to earn less money and are more likely to meet the financial eligibility guidelines for WIA services, especially if they are single or a single parent thus qualifying for additional funding for them to enter college. This finding supports the researcher’s proposal to develop a skills gap tool by using this research methodology to enable dislocated workers, employed workers, educational institutions, and WIA providers to understand how dislocated workers’ current knowledge and skills can translate to work in emerging occupations. The study results further indicate the need for financial assistance for transportation costs, tuition and books, child care and the small percentage wanting assistance with dealing with loss of employment.

Aspirations

Forty-three percent of the dislocated workers aspired to enroll in college. The findings indicated a significant difference between males and females. Females (mean of .93) wanting to enroll in college exceeded males (mean of .75). This finding is not surprising, but is alarming as it is important that both males and females upgrade their knowledge and skills in order to be employable and to decrease their risk of being unemployed again if they do not increase their knowledge and skills.

This cycle continues to occur in rural Iowa. When a business closes, the individuals affected by the closure have the goal of getting employed as soon as possible. This is evident in a mean of .99 of males and females indicated that they planned to find new employment and with a mean of .82 of females and .78 of males wanted help to find available jobs. The need for career counseling as well as education and training in order to gain skills and knowledge to gain and maintain employment are crucial steps in guiding individuals to consider education as an option for job security.

Research conducted by Mincer (1958), Schultz (1971), and Thurow (1999) contend that human capital is at all time low and needs to increase in order for the U.S. States to be competitive in an global economy. The research supports the fact that knowledge and skills are essential for determining and building human capital in a knowledge-based economy.

Another aspiration that is noteworthy is the goal of “opening your own business”. Very few respondents answered this question with 24% saying ‘no’ although 7% indicated they were interested in this option. Of the individuals interested in opening a business, a mean of .31 of the 91 male respondents to this question indicated they would like to start their own business while a mean of .10 of the 58 females who responded to this question

indicated that they were interested in business ownership. The desire to open a business points to the need to develop training for entrepreneurial development and other training programs that will assist these individuals to be successful in starting their own business. The small business development centers of the community colleges can be extremely beneficial to individuals who are laid off and are considering opening their own business. The centers provide business plan development, marketing assistance, one on one counseling and referral to training needed for starting a business (Northeast Iowa Community College, n.d.).

Skills and Skills Gap

Research indicates the need to increase the knowledge and skills of current and future members of the workforce in order to increase earning potential and job security resulting in an increase in human capital regionally, statewide and nationally (Benson, 1978; Grubb, 1996; 2002; Grubb & Larerson, 2004). Data analysis for this study of dislocated workers in northeast Iowa indicates a high competitive advantage in advanced manufacturing knowledge and skills based on the education and experience of the laid off workers. This is not surprising based on the fact the majority of the individuals in the sample where laid off from manufacturing industries. What is revealing is the strong competitive edge the region has for the three emerging industries of biotechnology, advanced manufacturing, and information technology based on the extendibility of the core competency (Prahalad & Hammel, 1990).

Data analysis indicated a strong competitive edge with an LQ score of 1.0 or above. Businesses in northeast Iowa with a score higher than 1.5 include: farming, fishing and forestry; life, physical, and social science; and architecture and engineering. Northeast Iowa has a competitive advantage based on job growth beyond projections and a higher number of jobs requiring a higher degree of education and training in the following industries: farming,

fishing and forestry; community and social services; production; buildings and grounds cleaning and maintenance; transportation and material moving; construction and extraction; sales and related; healthcare practitioners and technical; and business and financial.

Further, the study results showed a high level of primary knowledge (the highest level) showing regional strengths in knowledge for mechanical and production industries and strengths in secondary knowledge in education and training, and mathematics. The work activity at the primary level (scoring high enough to be considered a strength) included the following: control machines and processes; handling and movement of objects; monitoring processes, material or surroundings, and the top five secondary work activities: communicating with supervisory personnel inside; establishing and maintain interpersonal; getting information; identify objects, action and events; and inspecting equipment, structures, material. These strengths are consistent with the skills and knowledge needed in emerging industries and are considered extendible to these industries.

The analysis of the findings of difference in skills between males and females in the study showed that males tend to have strengths in traditionally male occupations such as production; mechanical knowledge, and work activities: handling and moving objects; controlling machines and processes; operating vehicles and mechanical devises; and performing general physical activities. Females in the study showed strengths in traditionally female work activities: communicating with supervisors; documenting and recording information; interacting with computers; organizing, planning and promoting work; performing administrative activities; and scheduling work activities.

The study results allowed a comparison of the skills gaps of the current dislocated workers in northeast Iowa to the skills and knowledge needs of emerging industries. A

noticeable gap in knowledge for degreed professionals in the study included the following educational degrees: biology; chemistry; engineering and technology; design; computers and electronics; interacting with computers; and telecommunications. The gap for work activities (skills) was evident in: updating and using relevant information; communicating with supervisors; peers or subordinates; customer service; English language, getting information; making decisions and problem solving; indentifying objects, actions, or events; and mathematics. The majority of the work activity (skills) from which individuals would benefit include non-credit training and the opportunity for this training to carry forward credits if the individuals decide to continue with their education. It is essential that the identified gap is addressed with educational institutions, economic development leaders, and with potential students in order to develop and prepare fields of study through non-credit to credit programming. These activities will allow these dislocated workers to become employed in emerging occupations in biotechnology, advanced manufacturing and information technology.

The development of skills and knowledge could assist Iowa and the nation in building competitive assets (Thurow, 1999) in order to grow in a knowledge-based economy. Prahalad and Hammel (1990) suggest that the core competencies of knowledge and skills can be used repeatedly in different arenas, hence the notion of “extendibility “of skills into emerging occupations. Determining where gaps exist allows regions to develop the knowledge and skills needed in emerging occupations, with the other goal of promoting capacity learning. It is important to note that emerging occupations are not just in the three industries of advanced manufacturing, information technology and biotechnology highlighted in this study.

These three industries were chosen from the O*NET seventeen in-demand industries and from the current efforts of the Iowa Department of Economic Development to promote and fund these occupations. The skills and knowledge demonstrated exist in multiple and broad numbers of occupations and industries. This study does not address how the knowledge and skills would relate to the other 14 emerging in-demand industries from O*NET. The other 14 emerging in-demand industries include: aerospace; automotive; construction; education; energy; financial services; geospatial technology; green economy; health care; homeland security; hospitality; nanotechnology; retail trade; and transportation (U.S. Department of Labor, Education and Training Administration, n.d.).

It should be noted that these in-demand industries are similar to the sixteen National Association of State Directors of Career Technical Education Consortium clusters, the occupations that fall in O*NET in-demand clusters have more current and updated input from continuous data collection from businesses, wage records and research that proves growth in these in-demand occupations. The demand occupations are based on knowledge-based economy concepts of technology based, innovative approaches that require transferrable skills sets that are required for education (knowledge) and experience (skills) for future employment. This points to the need for dislocated workers to increase their skills and knowledge overall in order for the current and future workforce to be employable in a broad range of occupations (Markusen, 2000) which make up the knowledge-based economy.

Paradigm for Assessment and Training Model

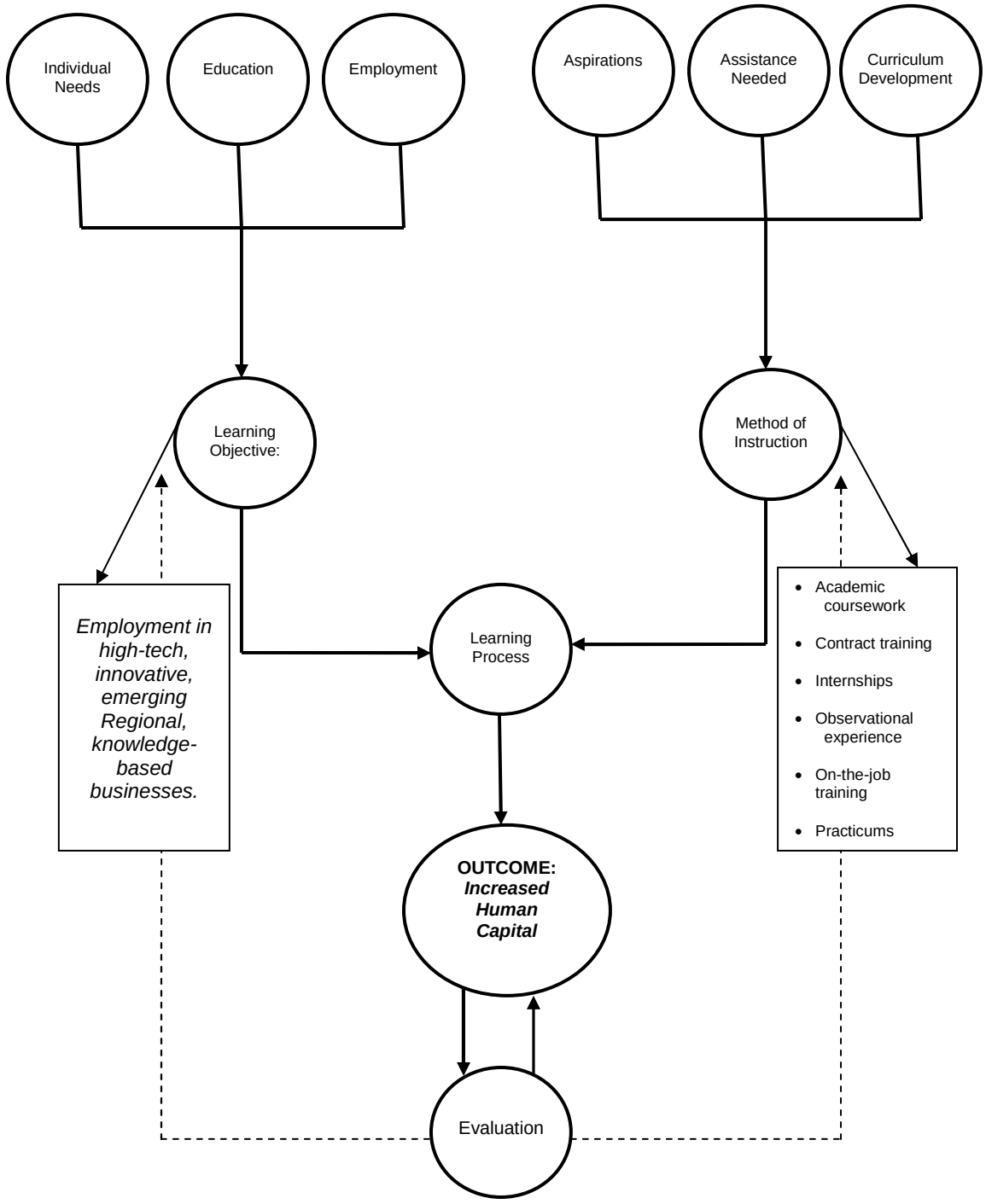
To illustrate the study findings regarding assessment and training, a paradigm model was developed by the researcher. The three primary targets are individuals' needs for

entering education, education content, and employment skills and knowledge needed for employees. The study findings discuss the individuals' skills and knowledge strengths and gaps and employment demands for occupations. These three factors stand alone but are connected to each other.

The learning objective can be employed in high-tech, innovative occupations to become employed in emerging new industries. An assessment of an individual's knowledge and skills and their potential interests can be matched to the training program and with the potential outcome to be matched to an emerging occupation where the individual has proven knowledge and skills. To further the model, it is important to address the individuals' aspirations, the assistance they will need while in training, and curriculum development to meet the demands of the individuals in non-credit and credit training. These three factors stand alone but are connected as well and all three must be addressed in order to determine the method of instruction. The method of instruction will depend on the needs of the individual for further education. These needs can range from academic coursework to on-the-job training programs. Both assessment and training activities are vital to the learning process and lead to the outcome of increasing the human capital of individuals. The model is not complete without continuous evaluation of the learning objectives and method of instruction in order to refine and enhance the efficiency and effectiveness of this model. The paradigm for assessment and training model is shown in Figure 1.

Figure 1

Paradigm for Assessment and Training Model



Implications for Practice

Business

Research indicates the higher the unemployment rate, the lower the knowledge and skills of the individuals affected by the lay off and the lower the unemployment rate, the higher the skills and knowledge of the individuals affected by the layoff (Borbely, 2009, U.S. Department of Labor Bureau of Labor Statistics, 2009 a, b). In this researcher's opinion, incentives to increase the human capital of the business' workforce to prevent layoffs, increase business productivity, and lower the costs of unemployment insurance should be incentive enough to invest in training for employees. Unfortunately, this is not the case and lack of investment in training is part of the reason businesses are no longer competitive and have closed or moved operations overseas. It is should be an important part of business operations to address the challenge of building knowledge and skills for existing and unemployed workers. One way to address the investment in training is to provide incentives statewide, regionally, and nationally. The promotion of state and federal incentives for employers and employees is not a new concept and has been introduced to policy makers as noted in Nelson and Romer's (1996) study.

Incentives can be offered in the form of a tax cuts or tax credits that support education and training, similar to the state of Iowa's 260E and 260F training programs through the community college system and the Iowa Department of Economic Development. Cortright (2001) suggests that, in a new growth economy, it is critical to have the ability to grow the economy through increased knowledge rather than from physical work skills. The current study suggests that policy changes to support education and training are essential to education, businesses, and job seekers. This researcher believes it is critical for local, state,

and federal governments to step in and provide these incentives to move our economy towards a knowledge-based economy for economic survival in rural and state economies.

As noted earlier in the literature review, there are concerns that knowledge-based businesses are not going to be willing to invest if they can recapture their investment. The gap between private firms investing in knowledge leads to a gap in increased knowledge in a new growth economy therein lies why it is critical for lawmakers to address policies for economic development which focus on educational incentives for employers and for employees for the creation of knowledge (Nelson and Romer, 1996).

Community Colleges

The community college system is poised to assist regions, states and the nation to meet the demands of the knowledge-based economy in developing and preparing the mid- to high-level job skills and knowledge (Grubb, 2002; 1996) needed to grow the economy. Community colleges are known for having multiple missions. In today's economy, these missions are being challenged by funding cuts and the demands of increased enrollment. The multiple missions challenge administrators to make tough decisions regarding how to spend the funds allocated to the colleges. Concerns are raised by faculty and unions if funds are not spent on traditional core services. Vertical development with high school students and the horizontal missions of business contracting and other community partnerships seem not to gain the support from all who value the community college system (Bailey and Morest, 2004).

In this study, the analysis indicates the need for education and training in order to be successful in marketing the talents of the workforce to economic developers and for potential business development or expansion. The list of knowledge and skills training needs

identified by the study are perfects fits for community college non-credit and continuing education class offerings. The community college can offer these classes to a group of dislocated workers through contract training or other forms on non credit training. The training programs could be taught by a trained professional in the field who has up-to-date course content and direct links to the working operations of these industries (Noy, Jacobs, Korey, Bailey, & Hughes, 2008). Having a member of the faculty sit in on the training to learn about business operations would be extremely helpful.

The need for additional training in the following areas: administration and management; biology; chemistry; design; and engineering and technology could be initiated in non-credit training programs in community colleges and transition into a credit program at a two- or a four-year program providing the ideal career path. This path is considered be a horizontal path of the community colleges according to Bailey and Morest (2004). To provide successful transition from non-credit to credit programs (core programs), it is essential for credit and non-credit faculty and administration to work together in order for students to continue to a degree program and to maintain potential to transfer to a four year program. The ability for individuals to receive life credit based on life experience is available from many community colleges. For example, someone who has worked as an electrician, but has not earned a degree, can be given credit when entering a community college electrical program for work experience. Credit will be given toward the degree requirements based on documentation such as a portfolio.

The challenges facing community colleges planning to develop and implement additional training programs, include funding for curriculum development, funding for equipment and technology, and, more importantly, the need to provide remedial

programming, career advising, meet the needs of non-traditional students with children or dependents who challenge the traditional structure of community colleges (Bailey& Jacobs, 2009).

The community college has served non-traditional students for years, though current enrollment increases from recent downturns in the economy have challenged the colleges to be prepared to meet the needs of these students. Career guidance advising is absolutely critical for the success of all students as are retention efforts aimed and helping students clearly understand the importance of completing education and training in order to earn a living wage (Clark, 2000). Advisors must be aware of current high-demand occupations, the skills required and the potential wages for these occupations in the region in order to give accurate, timely and reliable information for the student to make an informed decision of what training will be required to meet the end result of employment. The need for adequate advising staff, along with appropriate knowledge of high-demand jobs, emerging occupations and skills and knowledge needed for these occupations are essential tools for advisors that simply are not available at this time.

The assessments that are used for entrance into college help address the individual's knowledge gaps but there are limited assessments available for career counseling. NICC offers the Kuder Interest Inventory assessment that matches skills, interests, and work value and has features that allow those who use the assessment to search for occupations and make careers plans for different professions. However, the tool does not tie to emerging occupations or to high-demand occupations in the region or state. Further, there is a need for advisors or counselors to assist non-traditional students. Students approach attending college with multiple issues including overcoming job loss and having dependents at home which

requires flexibility in class schedules and for using ancillary services such registration, financial aid, book store, cafeteria and administrative offices. It is important for these students to ensure that these services are available at times other than the traditionally held hours at the community college (Flint & Frey, 2003; Hamm, 2004; Johnson, Schwartz, & Sullivan, 2000; Kasworm, 2003; Kilgore, 2003; J. White, 2001; M. White, 2003).

In this study only 12% of the respondents indicated they needed assistance with childcare. However, this does not take into account that many may have children at home as 106 (22%) respondents indicated they have children. The additional responsibility of being a parent and attending college is an issue that needs to be addressed. Non-traditional students have a higher likelihood of attending school part time. Bailey and Jacobs (2009) report almost two thirds of community college students attend school part-time greatly decreasing their chances of completing a degree program. Students who attend college part-time are working a full-time or part-time job due to the additional costs of having dependents at home, house payments and insurance which are not typical expenses for traditional aged students (Kilgore, 2003).

Community colleges have traditionally been concerned with outcomes of increased enrollment of students and number of credits enrolled each semester. The focus has not been on the retention of students or on success once they leave the institution. Efforts to assess whether former students are employed in occupation for which they attended college and if the skills obtained meet the current workforce demands are almost nonexistent. With the need to be training for the knowledge-based economy, the follow-up on employment and meeting the demands of the current employment market are critical to assure the success of non-credit and credit training for community colleges. The private business competition for

non-credit training is growing rapidly and there is a market for these training programs if community colleges are unable to provide timely, up-to-date curricula that meets current workforce demands. One way to accomplish this is by having students fill out the worker survey when they enter the workforce or before they graduate to establish a good indication of the skill sets that are available to potential businesses.

Workforce Investment/Iowa Workforce Development/Trade Adjustment Act

The federal WARN policy is enacted when 50 or more employees are being laid off. These layoffs trigger the rapid response team to engage in services with the business. Though the current process has served dislocated workers well, with a few refinements the process could serve many more individuals and provide valuable data to those serving workers who lose their employment. Requiring worker surveys to be completed at each rapid response event and a recommendation that businesses with fewer than 20 or more employees laid off triggers the rapid response team services would allow each IWD region and the state of Iowa to collect data that are reflective of the skills and knowledge of dislocated workers throughout the state and from varying industries.

The worker survey tool, if completed by a greater variety of individuals from multiple occupations, will present a more accurate picture of the skills and knowledge sets of workers in Iowa. This information coupled with community college students completing the survey prior to graduation would provide more accurate and reliable information for businesses who want to expand or locate in Iowa. Policy changes from Iowa Workforce Development and to the federal WARN act to include language are recommended. The changes would require a worker survey instrument to be administered when 20 or more individuals are laid off rather than 50 or more workers. This change would be relatively inexpensive and extremely

valuable for growing the knowledge-based economy in Iowa. Further, this instrument should be mandated to be given out at all One Stop offices across the state for any individual who applies for unemployment. It is noted that in order for this to be successful funding would have to be provided to IWD and other state agencies across the nation to analyze the data, and update quarterly results on-line for easy use by businesses, college personnel, economic developers, and job seekers. Making this information available would allow job seekers to map their skills and knowledge to potential high demand high wage job opportunities in the region they reside and to compare between states or nationally.

The WIA and TAA programs provide strict guidelines for training reimbursement programs that can be funded with federal dollars. The concept of skills gap training that would be offered through non-credit training that could lead to a degree program or contract training, on the job training and observation training would not be eligible for program funding to the individual. Additionally, individuals must meet income eligibility if they are laid off and their spouse is working they may not be eligible for the training program dollars. Further, if the individuals do not follow the strict guidelines of TAA program of attending a program and decide to discontinue for a semester, they are no longer eligible. These federal policy guidelines are not conducive to meeting the regional or state demands to build the skills and knowledge of the workforce and they force individuals to enter into a degree program which is not always the best solution since individuals are not always able to obtain a job in the field when they complete the degree program.

The need to address policy change is critical. What is funded needs to be determined at the local level by the regional workforce investment boards based on the employment demand occupations and the programs must have flexibility for the WIA provider to fund

non-credit training which leads to employment in specific emerging occupations. The U.S. Governmental Accountability Office (2008) made a recommendation to increase the counseling and coaching in WIA and One Stop Centers and to develop talent plans that meet the local demand of industries.

Iowa Workforce Development's Regional Research & Analysis bureau is a leading state organization in providing up-to-date labor market data on current labor availability, educational outcome studies, employer need assessments, benefits analysis, and occupational growth projections and reports geographically on labor demand, skills availability, and commuting patterns. Most of these tools are funded through special federal appropriations in addition to a nominal charge paid by communities requesting the reports. This division of IWD is poised to continue to be a leader and has the opportunity to provide a cutting edge tool that will assist in determining dislocated workers' potential skills and knowledge needs, skills gaps, and education needed by geographic area. This tool could have a major impact on the ability to address the skills demand in a knowledge-based economy. This has not been done in any other state to this degree.

It is essential that Iowa dedicate a funding source to ensure further development of this tool in order for job seekers, economic developers, educational institutions, future businesses, expanding businesses and legislators to have a tool that can easily assess the skills and knowledge of talent in the state of Iowa and regionally. The challenge with using the existing data sets is that the data which is collected differs from data collected by other state agencies due to methodology differences, timeliness, and data validity which are legitimate concerns (Ranney & Betancur 1992). The methodology set forth in this study is solid, empirically sound, and uses multiple sources to validate the data and results. It is

based on currently available workforce information and is regionally specific versus using state and metropolitan areas that are utilized by the federal government. The methodology is also reflective of emerging high-demand job occupations in a knowledge-based economy.

These factors provide a tool that can be used just in time to focus on the need to build the skills and knowledge level of our existing workforce and that can address future skills and knowledge needs to assist in retaining current employers and attracting new employers in Iowa. The need for funding for this project is critical and needs to be addressed with policy makers. This tool has the possibility to make a real difference in developing skill sheds for economic growth and has the potential to be the tool that can guide economic developers statewide. Further, this tool could help promote the non-credit training needs for community colleges in meeting the local demands of current and potential businesses.

Two full time staff for the Labor Market Research Economists at $50,000 per year and $100,000 to develop the On-line tools is the estimated need. This is a fairly inexpensive cost when one looks at the potential information that could be made available to educators, community colleges, WIA One Stop advisors, businesses, the Iowa Department of Economic Development, and job seekers.

The Iowa Department of Economic Development (IDED) has made a considerable investment in the use of the Battelle studies for advanced manufacturing, information technology, and biotechnology that were conducted in 2005 and 2006. The state of Iowa has invested money in the Iowa Values Fund, which promotes business expansion funds for businesses in these three industries and meets the average wage threshold for the county. Jobs established with Iowa Values Fund dollars must average at least $14.00 per hour and include a benefit package for workers. The Iowa Values Fund is a good program and has

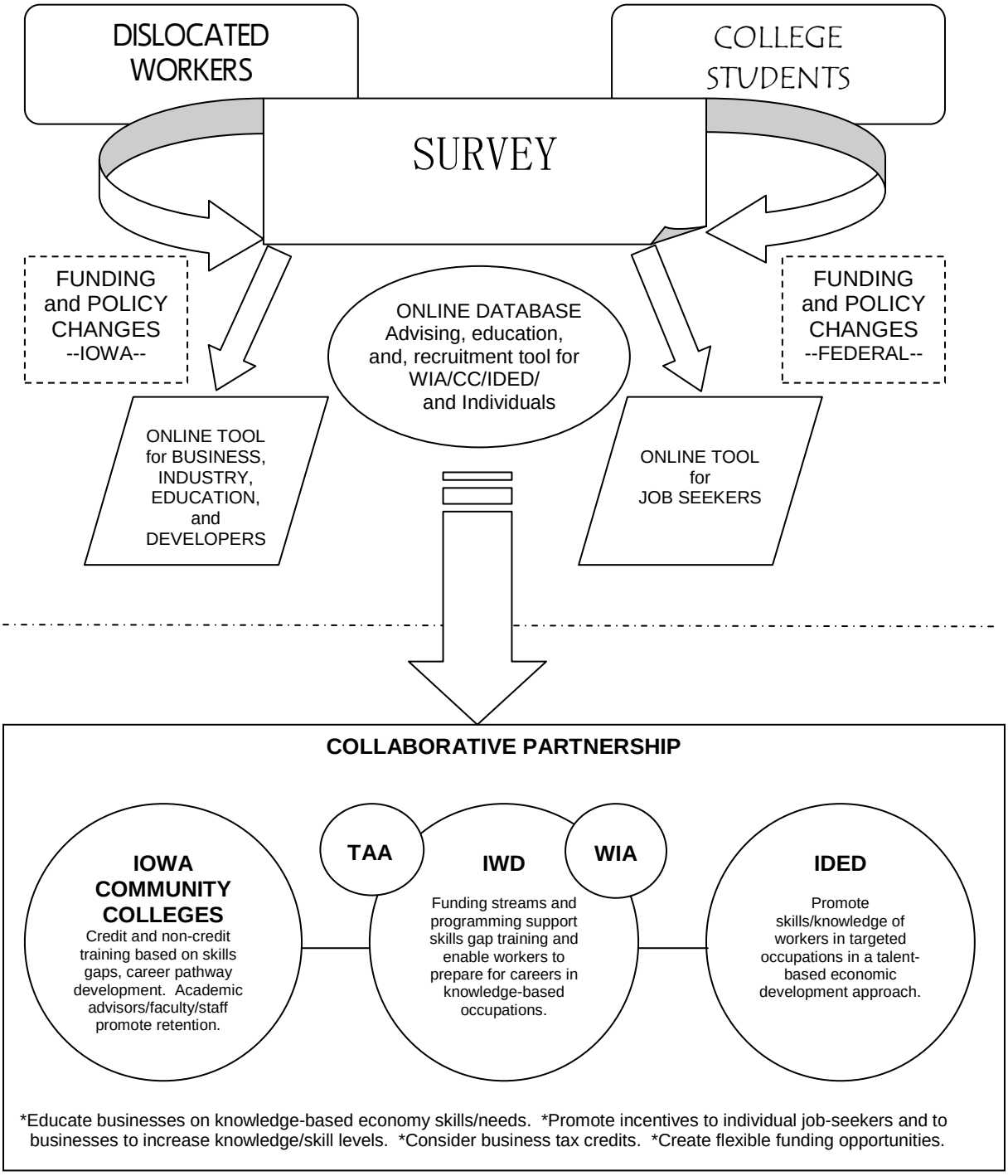
proven return on investment based on providing incentives for business such as IBM in Dubuque. This researcher believes that developing IWD skill sheds data into an on-line tool coupled with multiplying the number of individuals being surveyed would provide complimentary missing pieces to promoting and retaining businesses in Iowa.

It is essential that IDED partner with IWD to develop and implement this tool as they have in the past with the laborshed analysis that is now used for all business expansion and prospect reports and is known nationwide for the progressive innovative approach to demonstrating labor availability. The Iowa Values Fund has the potential to pay for the development and implementation of the online skills shed tool and the ability to help promote the population of the tool through promoting use of the survey to community colleges for use with students and to businesses when layoffs occur.

The model in Figure 2 illustrates a potential roadmap for equipping Iowa's workforce for a knowledge-based economy. The model focuses on the need for dislocated workers and college students to fill out the worker survey, the data obtained from the survey will be used by IWD to develop an online database tool. The tool will be used for advising, business recruitment, and to aid determining educational training needed in the region and state. The whole model is focused on partnerships between community colleges, WIA/IWD/TAA and IDED. The model points out the need for policy changes and funding for training and development for online tools and incentives for businesses to promote educational training important for employees to build the skills and knowledge of the existing workforce.

Figure 2

Roadmap for Equiping Iowa's Workforce for a Knowledge-Based Economy



Suggestions for Future Research

One concern with this study is that the majority of the respondents were from a manufacturing or advanced manufacturing facility where mass layoffs occurred in 2009. This skews the data. Having a sample with individuals laid off from multiple industry sectors would prove to be a worthy study. However, it is important to recognize the high level of skills in advanced manufacturing sectors and how this aids the region in having a competitive edge in emerging occupations. This can also extend to other emerging industries with limited education and training. Further, this study and the tool proposed for use based on the study, currently only pertain to the dislocated worker respondents in northeast Iowa. Focusing on the whole potential employee population to determine skills and knowledge would allow a much broader study. The first step in expanding the results is to involve community college participants due to their current partnership with One Stop centers. This is an ideal place to start in replicating this study to determine the value of the use of the tool and to obtain findings that will relate the skills and knowledge of Iowa's potential workforce population currently attending community colleges. This study could provide a strong and more accurate picture of the current and future potential of talent.

Another interesting demographic is that 40% of the respondents were from Fayette County in Region One. This county had a high level of employment in the automotive industry and a large manufacturing company that closed and sent the limited work they had remaining overseas, entitling the individuals to lay off TAA program services. The TAA training programs these individuals had available to them provide the most money and have the best benefits for training. It would be interesting to do further research to determine the numbers of individuals who attended training and fields of study they chose.

The worker survey instrument used would be enhanced if the following survey elements were included: *marital status*; *status of caring for adult dependents*; *first generation college attendee*; *for enrollees in education and training—full-time or part-time attendance*; and *importance of degree attainment versus job demand specific training*.

Future research on the outcomes of the training provided based on recommendations in the knowledge-based economy would provide additional insight into the outcomes of the skill shed methodology and provide valuable input regarding the usefulness of the online tool as well as shedding light on any refinements and enhancements to the tool needed. Another useful inquiry would be a qualitative study of non-traditional students' career advising experiences pertaining to assessment and education outcomes which would provide valuable insight to community colleges and the WIA One Stop centers.

Further research on development and implementation of non-credit and credit programs, how the two sides of community colleges core programs and horizontal training programs partner to implement these programs of study and an examination of the outcomes from the training provided to determine if the training is meeting the needs for a knowledge-based economy. Credit for life experience, on the job training, contract, observation experiences, internships, practicums, and other methods of instruction could be researched to determine the best approaches for non-credit and credit programs.

Conducting a qualitative study with individuals in the 18-24 age group with special emphasis on the reasons they do not continue education could prove beneficial for addressing counseling and advising at the high school level. This study would be important in understanding the development of knowledge and skills in this age group in order to provide

the opportunity for the individuals to have a higher degree of job security and earnings potential.

Lastly, a longitudinal study on the outcomes of individuals after attending training could provide answers to the following inquires:

- Are the individuals employed in the occupation for which they received training?
- Did non-credit training provide assistance in obtaining employment?
- Are the individuals using the knowledge learned in the programs and are the businesses satisfied with the training provided?
- Have the non-credit and credit programs attended increased the individuals' knowledge and skill sets and enabled them to meet the demands of the knowledge-based economy?

Conclusions

The purpose of this study was to compare the relationships between knowledge levels, transferrable skills, and skill needs of dislocated workers in northeast Iowa to the knowledge and skill needs of area businesses and to outline and develop a paradigm for assessment and training and a model road map for equipping Iowa's workforce in a knowledge-based economy.

This study has significant findings and a well defined model that supports the promotion of human capital and identifies *knowledge and skills gaps* in northeast Iowa. The skills gap model developed can be used to analyze human capital in the state of Iowa and can assist in building upon the existing knowledge-based economy. The increase in human capital will impact the economic potential of dislocated workers and workers in general in the state of Iowa. The notion that economic change can happen anywhere to be competitive

and the importance of finding out what industries and occupations that are available in a concentrated region (Porter, 1990) can assist a region in being successful. Romer (1994) suggests areas that support skills and knowledge development, especially innovative products developments have the potential to build clusters of business in the region that use shared knowledge and skills to succeed in the knowledge-based economy. The spillover of knowledge is boundless for economic development and can promote additional innovation in regions if knowledge is readily accessible (Porter, 1990). The challenge is to encourage businesses to spend additional resources on the education and training of the existing workforce and to partner with community colleges and public and private institutions to develop career pathways into emerging occupations.

An example of a business start-up in northeast Iowa based on skills and knowledge of the workforce is IBM's move to Dubuque which was based on strong public-private partnerships, a competitive business model, and the talent and skills of the workers. This example can be emulated in elsewhere in the state of Iowa, regionally, and in multi-state collaborations in the Midwest if community colleges and public and private universities address curriculum development to meet the local demands for growth in emerging industries, examine the skills of the workforce and potential workforce, develop strong partnerships, and enhance career pathways with K-12 educational systems (Kotkin & Zimmerman, 2007).

Research indicates that being successful in keeping young talent and building the current workforce requires enabling individuals to become lifelong learners and supporting the growth of the region's economy through investments in knowledge and skills development in regional businesses. These steps are crucial to building high-demand

occupations now and into the future. The Generation Iowa Commission (2008) study results indicate the next generation's number one factor for staying in Iowa is having a workplace that is compatible to skill sets and the growth of these skill sets—in other words—opportunity for lifelong learning made available at businesses and incentives for individuals to participate in upgrading their knowledge and skills. This researcher believes that having a paradigm in place to address assessment and training and a model to follow that maps out a the way to build the skills and knowledge to met the skills demand in a knowledge-based economy are the first steps to moving closer to ensuring a thriving knowledge-based economy in Iowa.

Based on research and work experience, this researcher believes that community colleges need to enhance partnerships with federal and state organizations to assist in the identification and mapping of knowledge and skills needed for emerging jobs in high-demand occupations. These partnerships will assist in motivating dislocated workers to attend further training in order to secure positions that have self-sustaining family wages and which will assist them in excelling in a knowledge-based economy. Community colleges cannot foster dislocated workers' success in employment without partnerships with WIA One Stop Centers, IWD labor market research, and local businesses and funding opportunities that these partnerships make possible.

The end of this dissertation is only the beginning for this researcher, now that the research is done, it is time to start taking action to effect change by implementing new policies for dislocated workers from WARN notices to implementation of the dislocated worker survey tool. The first step to be taken is to set up meetings with officials from IWD, IDED, WIA providers, and community college administrators along with local businesses in

order to share the findings of this research and to suggest the need to make changes in current policies and practices and to underscore the urgency of identifying funding sources that can make available the tools and processes outlined in this study to those who need them most—dislocated workers.

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APPENDIX A

DISLOCATED WORKER SURVEY NORTHEAST IOWA

COMPANY NAME Worker Survey

All information from this survey is strictly confidential. Results of this survey will be shared with Dislocated Worker Staff only.

Today's Date:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Home Phone: ( ) _____ Cell Phone: ( ) _____

e-mail address: _____

Age: _____ Gender: ❑ Male ❑ Female

Most Recent Job Title: _____

Additional Skills: _____

Hourly Wage/Salary: $ _____ Hr / Yr

Years/Months of Employment: _____

When looking for employment opportunities which advertising medium do you use? (circle top two)

Local Iowa Workforce Development Center Local Newspapers Regional Newspapers

Networking through Friends Internet (what site) _____

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Highest Grade in School Completed (check one below):

❑ Less Than 9th Grade
❑ Some High School, no diploma
❑ High School Diploma (including GED)
❑ Some Education Beyond High School
❑ Associate Degree Completed
❑ Trade Certification Completed
❑ Vocational Training Completed
❑ Undergraduate Degree Completed
❑ Postgraduate Degree Completed

Other Training / Certification:

Future Plans:

Search for another job? ❑ Yes ❑ No

Open your own business? ❑ Yes ❑ No

Retire? ❑ Yes ❑ No

Enroll in school/education ❑ Yes ❑ No

What type of education/training would you pursue? _____

Unsure? ❑ Yes ❑ No

How many children do you have living at home? _____

Are you currently enrolled in school? ❑ Yes ❑ No

If yes: ❑ High School or GED ❑ Post-High School

What is the lowest wage you will accept at your new job? $ _____

Please indicate below the things that you are able to do on a computer:

❑ Access the Internet

❑ Send and receiving E-mail

❑ Write letters or other documents

❑ Do financial record keeping or bookwork

❑ None of the things listed above

Are you interested in receiving basic computer instruction? ❑ Yes ❑ No

Do you require any special accommodations at the workplace? ❑ Yes ❑ No

---

I would like individual assistance with the following:

❑ Finding out what jobs are available

❑ Understanding how your skills and experience relate to new jobs

❑ Deciding what jobs you can do

❑ Learning how to find a new job

❑ Developing a resume

❑ Filling out job applications

❑ Dealing with your loss of employment

❑ Paying moving expenses

❑ Budgeting and paying your bills without a job

❑ Helping your family through this current situation

❑ Deciding which school would be best for me

❑ Tuition and books

❑ Child care for your children while you go to school

❑ Transportation expenses to and from school

Workshops Available: Please rate these workshops in order of importance to you (1 to 4):

❑ *Your Successful Job Search* ❑ *Budgets and Finances*

❑ *Coping with Change* ❑ *Job and Career Options*

What is the best time of the day to schedule workshops?

❑ *Morning* ❑ *Afternoon* ❑ *Evening*

Survey Instructions:

Insert the company name at the heading of the document and also at the top of the second page. The intent is to limit the survey to one page, front and back.

Page one **cannot** be altered. Page two cannot be altered below the question: "Workshops Available: ….."

The upper two thirds of page two contain suggested questions which may be valuable in assessing the needs of the effected workers. However, this portion of the survey may be altered to accommodate local needs.

After completion, photocopy page one and send/fax it to:

Paula Nissen, Executive Officer 2
Workforce Data & Business Development
Iowa Workforce Development
430 E. Grand Avenue
Des Moines, IA 50309
515.281.9656 fax

The lower section of page two should be shared with the Iowa Advantage service provider in the local Region.

If there are questions regarding this document, contact your Regional Rep.

APPENDIX B

AFFIDAVIT OF NONDISCLOSURE WITH IWD

APPENDIX L. COPY OF AFFIDAVIT OF NONDISCLOSURE SIGNED BY WENDY MIHM-HEROLD

AFFADAVIT OF NONDISCLOSURE

Doctoral Student (Job Title)	January 5, 2010 (Date of Assignment to Project)
Iowa State University (Organization, State or Local Agency or Instrumentality)	
1636 2656 Ave. Fort Atkinson, IA 52144 (Organization or Agency Address)	Iowa Workforce Development Dataset (Data Base or File Containing Individually Identifiable Information*)

I, Wendy Mihm-Herold, do solemnly swear (or affirm) that when given access to The subject data base or file, I will not –

(i) use or reveal and individual identifiable information for any purpose other than statistical purposes specified in the survey, project, or contract;

(ii) make any disclosure or publication whereby a sample unit or survey respondent could be identified or the data furnished by or related to any particular person could be identified; or

(iii) permit anyone other than the authorized individuals to examine the individual reports.

(Signature)

* Request all subsequent follow-ups that may be needed. This form cannot be amended, so access to databases not listed will require submitting notarized Affidavits.

City/County of Allamakee Commonwealth/State of Iowa
Sworn to and subscribed before me this 12th day of Jan, 2010. Witness my hand and official Seal.

LISA L. LENSING
Commission Number 151185
My Commission Expires
April 20, 2010

(Notary Public/Seal)

APPENDIX C

IOWA STATE UNIVERSITY IRB APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 2/26/2010

To: Wendy Mihm-Herold
1636 265th Ave
Fort Atkinson, IA 52144

CC: Dr. Larry Ebbers
N256 Lagomarcino Hall
Frankie Laanan
N225A Lagomarcino

From: Office for Responsible Research

Title: Regional Competitive Advantage of Iowa's Workforce: Mapping the gap between current skills and needs of next generation industries.

The Co-Chair of the ISU Institutional Review Board (IRB) has reviewed the project noted above and determined that the project:

☐ Does not meet the definition of research according to federal regulations.

☒ Is research that does not involve human subjects according to federal regulations.

Accordingly, this project does not need IRB approval and you may proceed at any time. We do, however, urge you to protect the rights of your participants in the same ways you would if IRB approval were required. For example, best practices include informing participants that involvement in the project is voluntary and maintaining confidentiality as appropriate.

Please also know that **any change** to this project must be communicated to the IRB to determine if the project has become research with human subjects requiring IRB approval.

APPENDIX D

CODE BOOK FOR STUDY

Code Book for Study

Variable List	Definitions	Values
Address	Address	Verbatim
City	City	Verbatim
State	State	Verbatim
Gender Recode	Gender	1=Male, 2=Female
qa3c	County Number	FIPS Code
qa3rc	IWD Region	Region Number
Age	Age	Number
Job Title	Job Title	Verbatim
Job Title SOC	SOC Code	Search O*Net for numbers
Hourly Wage	Hourly Wage	Dollar
Annual Salary	Annual Salary	Dollar
Years Employed	Years Employed	Numbers
Advertising Media Used:	Local IWD Centers	1=Yes, 0=No (not coding used on actual database)
	Local Newspapers	1=Yes, 0=No (not coding used on actual database)
	Regional Newspapers	1=Yes, 0=No (not coding used on actual database)
	Networking	1=Yes, 0=No (not coding used on actual database)
	Internet	1=Yes, 0=No (not coding used on actual database)
	Internet Site Used	1=Yes, 0=No (not coding used on actual database)
Highest Grade in School Completed	Education Level Completed	Choice
Miles willing to commute (No data)	Miles willing to commute	Number
Would you be willing to relocate within the State for employment (No data)	Would you be willing to relocate within the state	1=Yes 0=No
Future Plans:	Search for another job	1=Yes 0=No
	What type of job?	1=Yes 0=No
	Open own business	1=Yes 0=No (coding includes 1-4)
	What type of business?	1=Yes 0=No
	Enroll in School/Education	1=Yes 0=No
	Retire	1=Yes 0=No
	What plans during retirement?	Verbatim
How many children living at home	Number of children at home	Number

Are you currently attending school	Currently attending school	1=Yes 0=No
What is lowest wage you will accept at your new job	Lowest wage willing to accept	Dollar
What is the lowest salary you will accept at your new job	Lowest salary willing to accept	Dollar
Please indicate the things that you are able to do on a computer:	Access the internet	Choice
	Send and Receive Email	Choice
	Write Letters or Other Documents	Choice
	Do Financial Record Keeping or Bookwork	Choice
	I can do none of the things listed on a computer	Choice
Are you interested in receiving basic computer instruction?	Interested in receiving basic computer instruction?	1=Yes 0=No
Do you require any special accommodations at the work place?	Do you require special accommodations?	1=Yes 0=No
I would like individual assistance with the following:	Finding out what jobs are available	1=Yes 0=No
	Understanding how your skills and experience relate to new jobs	1=Yes 0=No
	Deciding what jobs you can do	1=Yes 0=No
	Learning how to find a new job	1=Yes 0=No
	Developing a resume	1=Yes 0=No
	Filling out job applications	1=Yes 0=No
	Dealing with your loss of employment	1=Yes 0=No
	Paying moving expenses	1=Yes 0=No
	Budgeting & paying your bills without a job	1=Yes 0=No
	Helping your family through this current situation	1=Yes 0=No
	Deciding which school would be best for me	1=Yes 0=No
	Tuition & Books	1=Yes 0=No
	Child care for your children while you go to school	1=Yes 0=No
	Transportation expenses to & from school	1=Yes 0=No
	Other assistance	Verbatim
Please rate these workshops in order of importance to you:	Your successful job search	Ranked in order of importance – 1, 2, 3, 4
	Coping with change	
	Budgets and finances	
	Job & Career Options	
Which is the best time of day to schedule workshops	Time of day you would like workshops	Choice
Age	Age Recode	1 = 18-24 2 = 25-34 3 = 35-44 4 = 45-54 5 = 55-64
Hourly wage	Hourly wage recode into ranges	1 = Lowest thru $5.15 2 = $5.16-$5.99 3 = $6.00-$6.99 4 = $7.00-$7.99 5 = $8.00-$8.99 6 = $9.00-$9.99 7 = $10.00-$10.99
Annual Salary	Annual salary recode into ranges	
Hourly Desired	Hourly desired wage recode into ranges	

Annually Desired	Annual desired salary recode into ranges	8 = $11.00 - $11.99 9 = $12.00 - $12.99 10 = $13.00 - $13.99 11 = $14.00 - $14.99 12 = $15.00 thru Highest

APPENDIX E

O*NET OCCUPATIONAL KNOWLEDGE VARIABLES

O*NET Occupational Knowledge Variables

Administrative and management	Knowledge of principles and processes involved in business and organizational planning, co-ordination and execution. This includes strategic planning, resource allocation, manpower modeling, leadership techniques and production methods
Clerical	Knowledge of administrative and clerical procedures and systems such as word processing systems, filing and records management systems, stenography and transcription, forms design principles and other office procedures and terminology
Economics and accounting	Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data
Sales and marketing	Knowledge of principles and methods involved in showing, promoting and selling products or services. This includes marketing strategies and tactics, product demonstration and sales techniques and sales control systems
Customer and personal service	Knowledge of principles and processes for providing customer and personal services including needs assessment techniques, quality service standards, alternative delivery systems and customer satisfaction evaluation techniques
Personnel and human resources	Knowledge of policies and practices involved in personnel/human resource functions. This includes recruitment, selection, training and promotion regulations and procedures; compensation and benefits packages; labor relations and negotiation strategies; and personnel information systems
Production and processing	Knowledge of inputs, outputs, raw materials, waste, quality control costs, and techniques for maximizing the manufacture and distribution of goods
Food production	Knowledge of techniques and equipment for planting, growing and harvesting of food for consumption including crop rotation methods, animal husbandry and food storage/handling techniques
Engineering and technology	Knowledge of the design, development, and application of technology for specific purposes
Computers and electronics	Knowledge of electric circuit boards, processors, chips and computer hardware and software, including applications and programming
Design	Knowledge of design techniques, principles, tools and instruments involved in the production and use of precision technical plans, blueprints, drawings and models
Building and construction	Knowledge of materials, methods and the appropriate tools to construct objects, structures and buildings
Mechanical	Knowledge of machines and tools, including their designs, uses, benefits, repair and maintenance
Mathematics	Knowledge of numbers, their operations and interrelationships including arithmetic, algebra, geometry, calculus, statistics and their applications
Physics	Knowledge and prediction of physical principles, laws and applications including air, water, material dynamics, light, atomic principles, heat, electric theory, earth formations and meteorological and related natural phenomena
Chemistry	Knowledge of the composition, structure and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques and disposal methods
Biology	Knowledge of plant and animal living tissue, cells, organisms and entities, including their functions, interdependencies and interactions with each other and the environment
Psychology	Knowledge of human behavior and performance, mental processes, psychological research methods and the assessment and treatment of behavioral and affective disorders
Sociology and anthropology	Knowledge of group behavior and dynamics, societal trends and influences, cultures, their history, migrations, ethnicity and origins
Geography	Knowledge of various methods for describing the location and distribution of land, sea and air masses including their physical locations, relationships and characteristics
Medicine and dentistry	Knowledge of the information and techniques needed to diagnose and treat injuries, diseases and deformities. This includes symptoms, treatment alternatives, drug properties and interactions and preventive health-care measures
Therapy and counseling	Knowledge of information and techniques needed to rehabilitate physical and mental ailments and to provide career guidance including alternative treatments, rehabilitation equipment and its proper use and methods to evaluate treatment effects
Education and training	Knowledge of instructional methods and training techniques including curriculum design principles, learning theory, group and individual teaching techniques, design of individual development plans and test design principles
English language	Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition and grammar
Foreign language	Knowledge of the structure and content of a foreign (non-English) language including the meaning and spelling of words, rules of composition and grammar and pronunciation
Fine arts	Knowledge of theory and techniques required to produce, compose and perform works of music, dance, visual arts, drama and sculpture
History and archaeology	Knowledge of past historical events and their causes, indicators and impact on particular civilizations and cultures
Philosophy and theology	Knowledge of different philosophical systems and religions, including their basic principles, values, ethics, ways of thinking, customs and practices and their impact on human culture
Public safety and security	Knowledge of weaponry, public safety and security operations, rules, regulations, precautions, prevention and the protection of people, data and property
Law, government and jurisprudence	Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules and the democratic political process
Telecommunications	Knowledge of transmission, broadcasting, switching, control and operation of telecommunications systems
Communications and media	Knowledge of media production, communication and dissemination techniques and methods including alternative ways to inform and entertain via written, oral and visual media
Transport	Knowledge of principles and methods for moving people or goods by air, rail, sea or road, including their relative costs, advantages and limitations

Note: Data source—US Department of Labor, Education and Training Administration, O*NET system.

APPENDIX F

RESPONDENT JOB TITLES AND CODES

Respondent Job Titles and Codes

Code	Job Title	Response
132011	Accountants and Auditors	1
512099	Assemblers and Fabricators, All Other	115
493023	Automotive Service Technicians and Mechanics	1
519192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	2
519121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	2
512021	Coil Winders, Tapers, and Finishers	2
439011	Computer Operators	2
514011	Computer-Controlled Machine Tool Operators, Metal and Plastic	12
131051	Cost Estimators	1
434051	Customer Service Representatives	5
514031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	3
514032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1
173023	Electrical and Electronic Engineering Technicians	1
492094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	1
472111	Electricians	7
512023	Electromechanical Equipment Assemblers	2
512031	Engine and Other Machine Assemblers	1
119041	Engineering Managers	1
431011	First-Line Supervisors/Managers of Office and Administrative Support Workers	1
511011	First-Line Supervisors/Managers of Production and Operating Workers	10
472121	Glaziers	3
514033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, & Tenders, Metal & Plastic	1
514191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	1
434161	Human Resources Assistants, Except Payroll and Timekeeping	1
113040	Human Resources Managers	1
172112	Industrial Engineers	5
499041	Industrial Machinery Mechanics	1
113051	Industrial Production Managers	1
537051	Industrial Truck and Tractor Operators	19
519061	Inspectors, Testers, Sorters, Samplers, and Weighers	2
372011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1
515021	Job Printers	1
537062	Laborers and Freight, Stock, and Material Movers, Hand	19
514034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1
514041	Machinists	18
499042	Maintenance and Repair Workers, General	9
514081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	37
514193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	1
515022	Prepress Technicians and Workers	5
519199	Production Workers, All Other	71
435061	Production, Planning, and Expediting Clerks	8
472211	Sheet Metal Workers	1
435071	Shipping, Receiving, and Traffic Clerks	4
514111	Tool and Die Makers	6
251194	Vocational Education Teachers, Postsecondary	1
518031	Water and Liquid Waste Treatment Plant and System Operators	1
435111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	1
514121	Welders, Cutters, Solderers, and Brazers	1
514122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	64
131022	Wholesale and Retail Buyers, Except Farm Products	2
	Missing	19