ARE SCHOOLS PREPARING STUDENTS FOR THE REGIONAL WORKFORCE? TEACHER AND EMPLOYER PERSPECTIVES

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Abstract

The changing demographic landscape in the upstate New York region has prompted a unique opportunity to survey the perceptions of high school teachers and employers related to the knowledge, skills and abilities required and those that are acquired by high school graduates and entry level employees respectively. The survey asked teachers in the regional high schools of the Warren/Saratoga/Washington/Hamilton/Essex BOCES, Chief Executive Officers (CEOs) and Human Resource Managers who are members of the Saratoga County Chamber of Commerce to rate the degree of importance and proficiency of high school graduates or entry level employees on the specific knowledge, skills and abilities using the definitions of knowledge, skills and abilities developed by the U.S. Labor Department O*Net. The results were analyzed within each group for gaps in preparation and between groups for similarities or differences in perception. This study expands the existing research about workforce preparation and can enrich the conversation between employers and educators. Findings were that there were significant differences in most variables between the perceptions of employers and teachers about what knowledge, skills and abilities are required for the workplace and the degree to which high school graduates or entry level employees have acquired those attributes. There was general agreement by both groups that literacy skills, communication skills and basic employability skills were required. Teachers believed high school graduates had acquired attributes to a greater degree than employers in all categories.

Keywords: workforce preparation; perceptions of employers and teachers; 21st century knowledge, skills and abilities; proficiency of high school graduates

CHAPTER I

Introduction

Statement of the Problem

In recent times, the increasing pressure for a competitive workforce in the United States in this global economy has cast a long shadow on both the educational systems that prepare students and on the workforce itself. The question of whether the nation is preparing our young people to compete in the race for economic competitiveness is the subject of much research by a number of national policy groups such as the National Center on Education and the Economy (2007), The Education Trust (2004), The Conference Board with The Partnership for 21st Century Skills (Casner-Lotto, 2006), as well as support from foundations such as The Gates Foundation. "To respond effectively to changing workplace needs, students need to understand that fewer entry-level, livable-wage jobs are available to new workers lacking basic skills" (Feller, 2003, p.4).

This national discussion has an urgent regional focus. The recent emergence of the Capital Region of New York State as one of the premier technology research and development regions of the world has caused it to be renamed as Tech Valley. Along with this emergence, the regional business organizations, governmental agencies and education systems have begun a dialogue on how to craft a regional vision that will keep pace with the workforce demands that such cataclysmic change will foster. A Chief School Officers' Standing Committee on Tech Valley Initiatives in the Washington/Saratoga/ Warren/ Hamilton/ Essex (WSWHE) Board of Cooperative Educational Services (BOCES) was created in 2005 with the charge to develop a framework for long range planning and program recommendations to respond to workforce

preparation needs in the twenty-first century. For a definition of BOCES please see definitions of terms section. The most pressing reason for this comprehensive BOCES investigation is the impending arrival of a chip fabrication plant in Saratoga County. The 31 school districts comprising the WSWHE BOCES as well as two districts from the adjacent Capital Region BOCES are represented on this committee. The committee's work for the past two years has been focused on research and collecting comparative data regarding the impact of the nanotech businesses on the local community, particularly on educational organizations. A study was commissioned in 2006 by the Tech Valley Standing Committee on behalf of the 33 districts, entitled, *Technology Need Assessment: Preparing for Tech Valley Occupations in the School Districts of the Washington-Saratoga-Warren-Hamilton-Essex BOCES* (Zettek, 2006). Follow up with *Study Two: Strategies to Develop a 21st Century Workforce: Regional Analysis* (Mitchell, 2008) extended the research. Both studies were conducted by the Center for Governmental Research (CGR). CGR is a not for profit bureau of municipal research, working with government, business and nonprofit leaders who drive public policy action and organizational change by providing fact-based, objective research and analysis and making recommendations. The purpose of the first study in 2006 was to assess the educational programs of the high schools in the region to determine if they were aligned with the expected demand of a high tech workplace and outline recommendations. It provided a framework for the districts to identify how best to align curriculum with the needs of industries that are likely to grow in the region (Zettek, 2006). The limitation of this first study was that the focus was on the labeled course offerings from each district's course catalogue. The explicit information about what skills are being taught in all courses at the high school level was not explored. The degree to which students acquire these skills was also not addressed.

The second study, commissioned by the WSWHE BOCES in 2008, identified six recommendations that would respond to the expected acceleration of workforce demand for highly skilled employees. The study was limited in that the findings were based on a limited sample of educators that made themselves available to the research team for surveys and interviews. There was not a direct connection or comparison to the responses of educators and those of key individuals in the business sector. Changes to curriculum, programs and policy that occurred after the report was completed were not included (Mitchell, 2008).

The findings and recommendations of both studies were shared with the four regional community colleges, the Saratoga County and Adirondack Regional Chambers of Commerce, the State University of New York System Administration's Business and Education Leadership Cooperative, Saratoga and Adirondack County School Board Associations and with the University of Albany's College of Nanoscale Science and Engineering. The recommendations from the studies and the dialogue with regional community stakeholders pointed to a need for further research about the current perceptions of business and education about the knowledge, skills and abilities required for life beyond high school and how well graduates and employees acquire these attributes. Continuing investigation on several aspects of how to best prepare and educate our students for these employment opportunities will be needed. In both the national and regional investigatory work, there is little or no direct comparison of the perceptions of employers and educators using the same survey design. The research on the relative existence of the skills identified as important by either employers or educators is generally based on standardized test scores, which do not account for the existence of the "soft skills" such as problem solving, work ethic and interpersonal skills described as necessary to the workforce of

the future. Consistently, from the employer perspective, a positive outlook, adaptability and flexibility are valued attributes (Carnevale, 2008).

The preponderance of the existing research indicated that the connection between the education and business sector would be a reasonable next step. Connections with the local leadership of the Warren-Saratoga-Washington-Hamilton-Essex Board of Cooperative Educational Services and the Saratoga County Chamber of Commerce were productive in confirming that the study could be useful in providing comparative data about the perceptions of educators and employers in the region.

Purpose of the Study and Research Questions

The purpose of this quantitative study was to determine if there was any difference in expectation between the regional business community in the Saratoga county region and high school teachers regarding workforce preparation for the 21st century. The same survey instrument was administered to members of the Chambers of Commerce in Saratoga County and to randomly selected high school teachers in school districts of the 31WSWHE BOCES and the BOCES vocational education teachers.

The research questions that were addressed included:

1. Is there any difference between educators and employers on their perceptions about:
    a. Knowledge required for the 21st century workforce?
    b. Knowledge acquired by an average current high school graduate/entry level job seeker?
2. Is there any difference between educators and employers on their perceptions about:
    a. Skills required for the 21st century workforce?
    b. Skills acquired by an average current high school graduate/entry level job seeker?

3. Is there any difference between educators and employers on their perceptions about:
    a. Abilities required for the 21st century workforce?
    b. Abilities acquired by an average current high school graduate/entry level job seeker?

If the teachers and employers believe that the same knowledge, skills and abilities are important and that high school graduates and entry level employees are proficient in them, workforce preparation in the region should be adequate to meet the demand. The greater the disagreement between the surveyed populations, the more likely it will be that the gap in workforce skill preparation will negatively impact both students as future employees, and employer's ability to remain competitive in the regional marketplace. Retaining a young, qualified workforce in the region is advantageous to the regional economy and sustaining the high educational quality in the region.

Significance of the Study

The internal differences between required and acquired knowledge, skills and abilities in both surveyed populations can identify the gaps in preparation and provide useful information and the potential to develop appropriate responses in the areas of curriculum or teacher professional development. This research can be used to identify the areas of commonality in perception and increase the respective understanding about the differences between the educator and employer perspectives. The dialogue about how to expand the conversation and improve the articulation between the education and business communities can foster initiatives and partnerships to expand the opportunities for and achievement of students, which will ultimately have the effect of creating and sustaining a workforce that is responsive to the needs of the 21st century.

The review of literature was focused on research on educator perceptions, employer perceptions, the economic realities the future workforce will face and the recommendations contained in the literature regarding how to respond to the future workforce requirements.

Definitions of Terms

Board of Cooperative Educational Services (BOCES) is a public organization that was created by the New York State Legislature in 1948 to provide shared educational programs and services to school districts. Its role is to partner with school districts to provide a broad range of services that can help meet the evolving needs of learners of all ages. BOCES services are created when two or more school districts decide they have similar needs that can be met by a shared program. The WSWHE BOCES has 31 component school districts and is the second largest of the 38 BOCES regions in New York State.

Workforce preparation is the extent to which students have the knowledge, skills and abilities to transition smoothly to the workforce.

Twenty-first century skills are the set of knowledge, skills and abilities identified as necessary by employers and educators covering a spectrum of skills and abilities ranging from critical thinking to creativity, innovation to leadership, global awareness to media and financial literacy.

Knowledge, Skills and Abilities are defined in Appendix G.

Limitations of the Study

The intent of the research was exploratory in nature. The existing demographics of the business community might not be representative of the type of future employment requiring 21st century knowledge, skills and abilities and therefore be less inclined to have requisite knowledge

of the relative importance of 21st century knowledge, skills and abilities to the workforce. The selection of the sample of high school teachers from the WSWHE BOCES may also not represent the profile of the teachers in the region, either by experience, subject area taught or size of district.

Limitations to the study were that the response rate of both groups was less than 50%. The participation of 124 teachers, or 42% of the surveyed population provided a reasonable sample size to conduct the analysis. The teachers who responded from each district were not in exact proportion to the 10% sample of the high school teachers in each district, although there were at least some respondents from each of the 28 districts surveyed. This should be factored into the interpretation of the results. Similarly, even though the employer response was 25% or 74 employers, appropriate statistical analysis could be conducted. The variety of businesses represented in the respondents may have had an effect on the results and readers should interpret results with this in mind.

External validity may be affected by certain factors. The interaction of selection and treatment could be evident in the types and kinds of businesses that responded. If they did not represent the same proportion in the other areas of the state or county, there would be limitations to the ability to generalize beyond the immediate region studied.

CHAPTER II

Literature Review

Educator Perspectives

There is increasingly common agreement that close alignment of the knowledge, skills and abilities in the education system with the expectations of employers will increase the opportunities and choices of students after they leave high school (American Diploma Project, 2004; Alliance for Excellent Education, 2008; Carnevale & Desrochers, 2003; Feller, 2003; Partnership for 21st Century Skills, 2006; National Center on Education and the Economy, 2007). Silva contends, "An emphasis on what students can do with knowledge, rather than what units of knowledge they have, is the essence of 21st century skills" (2009, p.1). This implies expecting that students are proficient in a suite of thinking and reasoning skills, and application of specific content.

The American Diploma Project(2004) spent two years gathering scientifically valid substantiation to determine the knowledge and skills in English and mathematics that are necessary for high school graduates to be successful either in post high school education or in high growth, highly skilled jobs (The American Diploma Project, 2004). One of the projects in this multi-faceted research involved both statistical analysis of employment data and extensive research involving over 300 faculty members from two- and four-year postsecondary institutions, front line managers in high growth, high skilled occupations, and high school educators. They designed questions to identify relevant connections and alignment between what students learn in high school and the knowledge and skills necessary for successful transition to employment. Well paid, skilled jobs and highly paid professional jobs represent 62% of all the jobs over the next several years (The American Diploma Project, 2004).

The Alliance for Excellence in Education is a national policy, advocacy and research organization. The findings in their 2008 report "From No Child Left Behind to Every Child a Graduate" concluded that in order for students to be prepared for the workforce, they need the advanced skills to learn, adapt and excel in the current and future economy. The contention that in this increasingly global society, when technology and innovation have an impact on almost every facet of life in communities around the world, it is difficult to fathom that the American educational system continues to rely on a model from the last century (Alliance for Excellent Education, 2008). The data show that only a third of students entering ninth grade can expect to graduate in four years having acquired the proficiencies necessary for postsecondary education or the workforce. One third will graduate with deficiencies in knowledge, skills and abilities that will impede their success in future post high school choices, and one third will not graduate (Alliance, 2008). The identified skills necessary, whether preparing for college or the workforce, are defined as strong content knowledge, critical thinking and problem solving, communication and collaboration, initiative and self-direction, leadership and responsibility (Alliance, 2008).

Carnevale and Desrochers (2003) conducted an investigation of forces that have motivated and sustained education reform since the 1980's focused on standards and implementation. They identified and described trends in an effort to inform education policy. Their study suggests that the United States is becoming bipolarized, suggesting a deep divide in educational attainment between the students with economic and societal advantage and the disadvantaged. Accelerating the skill requirements for workers benefits the most educated, skilled individuals. The least educated and skilled have increasing difficulty finding employment in good paying jobs. Some post-secondary education or training is increasingly being expected in a wider range of job categories. Male high school graduates and dropouts' earnings have

declined since the 1980's. Despite the fact that female labor force participation is increasing overall, the earnings gap between females with high school or less and college graduates has increased overall. The effect of this discrepancy is magnified in a recession. The slower economic growth combined with the increasing skill demand creates a "competitive pressure cooker fueled by educational attainment" (Carnevale & Desrochers, 2003, p. 5). There are a decreasing proportion of jobs at every skill level. The result is a bumping of higher skilled applicants to lower skilled jobs, with the lowest skilled worker left with virtually no employment options. The United States relies on education as the equalizer, providing economic opportunity for all as a mandate. The core belief in this society is that individuals determine their own access to income and benefits through educational attainment. The increasing demand for an educated workforce with post secondary education will accelerate income differentials between the most and least skilled workers thus, "threatening the egalitarian base at the core of America's culture" (Carnevale & Desrochers, 2003, p.6).

In a survey conducted by Peter D. Hart Research Associates (P. D. H., 2005) interviews with 1,487 public high school graduates were conducted, 58% enrolled in a two or four year college and 42% graduates not enrolled in college, some who had attended and subsequently withdrawn. A group of 400 employers with personnel responsibilities were interviewed, as well as 300 college instructors. The high school graduates concluded that although most felt they were well prepared for their current challenges, substantial numbers cite gaps in preparation for the skills and abilities expected of them. They reported that there was a general lack of high expectations in high school and believed that higher standards for high school graduation would have had a positive impact on their post high school choices. The employers, college instructors

and students agree that higher expectations and tougher course requirements would have better prepared them for the realities of life after high school.

The National Association of System Heads (NASH) (National Association of System Heads, 2002) conducted phone surveys with higher education officials in all 50 states on K-12 curriculum alignment. The result was very little consensus between K-12 and higher education's views on essential coursework for college. There was much variation on high school graduation requirements across the country.

According to Kim and Rojewski, "A high school diploma is increasingly becoming an inadequate level of preparation to fulfill the higher skills demanded in the ever growing informational technology and global business service industries" (Kim & Rojewski, 2004, p.210). Zucker and Dawson's (2001) study to determine whether college credits and degrees resulted in higher earnings used the High School and Beyond's 1992 follow up survey. When controlled for fourteen other factors that might have an effect on employment, such as socioeconomic status, high school achievement, post-secondary experiences and early work experiences, the findings were that, "a baccalaureate or associate degree was shown to contribute significantly to earnings", and that "the economic returns of some college credits . . .were negligible irrespective of the number of credits completed" (Zucker & Dawson, 2001, p. 2). According to the National Association of System Heads (2002, p.4) "Without a two-year degree, students are not likely to be prepared for today's much less tomorrow's workplace." The skills cited that are necessary for the global workforce are personal qualities such as cooperation, integrity and honesty, basic competence skills and creative thinking skills. The skills once required primarily for management level opportunities are now critical for individuals at all levels of employment (Kim & Rojewski, 2004). These critical employability skills are very

amenable to being taught and are best learned when they are explicitly included among instructional goals, according to Cotton (1993-94).

There are some contrary views regarding the workforce need for post-secondary education. Bracey (2008) cites the Bureau of Labor Statistics projection that by 2016, 59.2% of jobs will require only a high school diploma, 17.3% will require a bachelor's degree and 4.4% will require a master's degree or higher. "Only about half of U.S. students who enroll in four year colleges after high school manage to earn a bachelor's degree within six years. The fallacy is that students are counted whether or not they ever enrolled in a four year college" (Bracey, 2008, p.103).

The findings of the annual state progress report by Achieve, Inc. (2008) show that states are making significant progress aligning graduation standards to postsecondary and industry expectations since the last report in 2004. There is less progress in establishing P-20 data and accountability systems or high school assessments that align to the career and college ready standard goals. New York State has accomplished all of the key policies recommended with the exception of the longitudinal P-20 accountability system. Only Texas and Louisiana have comparable results and no states have all five policies in place (Achieve, Inc., 2008).

The first Center for Governmental Research (CGR) analysis commissioned by the Tech Valley Standing Committee of the Washington/Saratoga/Warren/Hamilton/Essex BOCES in 2006 began to inform the 31 component school districts and BOCES about existing structures and their alignment with potential needs in the workforce. This study by the Center for Governmental Research was commissioned by the Tech Valley Standing Committee of Chief School Officers of the WSWHE BOCES to identify how to assist students in preparing for the high tech jobs of the future as a result of regional Tech Valley initiatives. The report provides a

framework for the districts to identify how best to align curriculum with the needs of industries that are likely to grow in the region (Zettick, 2006).

Using the Department of Labor job classifications from the North American Industry Classification System (NAICS) for the seven industry groups that either already have a presence in Tech Valley, or are potentially coming to the region, CGR developed a comprehensive list of desired academic courses that are likely to provide the skills needed to work in these occupations. This list was then compared to the lists of courses currently provided by the districts and the BOCES to determine the degree of alignment.

The report provided a template for districts and BOCES that can be a method to align course offerings with demand for future employability skills needed by employees as the region incorporates new industries in the nanoscale sciences. General analysis was that computer science skills and engineering skills are likely to be in high demand and the districts and BOCES are anticipating that demand appropriately. The areas of computer programming and chemistry are expected to have a high job growth and are offered at a disproportionately lower rate (Zettek , 2006).

Upon the completion of this first study in 2006, CGR conducted a second phase of work completed in 2008 to continue the investigation of labor market requirements with particular attention to the skills needed for success in the 21st century workplace. The purpose of Study Two was to assist the districts and BOCES in identifying actions that will build capacity in the system to respond to the expected change in workforce demand in the region. Measures used in gathering and analysis of data were interviews and surveys conducted with teachers and administrators in the WSWHE BOCES between May 2007 and December 2007. There was also

a review of supply and demand in the regional labor market and analysis of the district technology plans.

The six recommendations contained in "Study 2: Strategies to Develop a 21st Century Workforce" were defined. They were:

> Craft a regional vision for regional 21st century workforce preparation; develop career pathways for students K-12; develop design specs for curriculum to support 21st century learning; promote professional development that encourages application of the 21st century knowledge, skills and abilities; promote partnerships with business, government and higher education; and conduct an awareness campaign throughout the region to garner support and enthusiasm for this work (Mitchell, 2008, pp. 44-56).

These recommendations, along with considerations of the limitations of the research outlined, form the foundation for action research by the Tech Valley Standing Committee, using this research design as a component.

Employer Perspectives

The research about business and employer perceptions of the knowledge, skills and abilities for the future workforce is consistent with the education studies. "Today's knowledge economy requires that the citizenry and workforce be able to harness information and communication technologies in order to remain competitive on a global scale" (Knox, 2006). A joint effort by The Conference Board, Corporate Voices for Working Families, The Partnership for 21st Century Skills and the Society for Human Resource Management in 2006 was designed to gain a better understanding of the readiness of new entrants to the workforce. In an effort to

define the skills gap, they asked the business community to define the current state of workforce readiness for new entrants and to assess their current levels of proficiency in the areas most critical to success in the 21st century economy. The four participating organizations collected data through an in depth survey, asking respondents to rate the importance of 20 areas of basic knowledge and applied skills to the job success of new entrants to their workforces. The response from 431 employers across the United States represented a wide range of industrial classifications. To provide further insight, twelve in-depth interviews were conducted with employer respondents representing a variety of industries, regions and sizes of firms about expectations for employees.

The Conference Board, Corporate Voices for Working Families and The Partnership of 21st Century Skills in 2006 commissioned a study titled "Are They Really Ready to Work?" The findings of this collaborative study were that the most important skills cited by employers were professionalism, work ethic, oral and written communications, teamwork, collaboration, critical thinking and problem solving, (Casner-Lotto, 2006). The basic knowledge and skill requirements for entry level jobs are increasing. The results may be an indication that the types of jobs available for high school graduates will be less available in the future, due to the increasing demand for higher skill levels. Applied skills were rated as very important to success in the workplace, even more than basic knowledge and skills for high school, two year and four year college graduates. These findings suggest that literacy skills are not rated as very important for high school graduates, 40% or less. This poses a question about the value that employers place on a liberal education. If employers indicate that they value innovation and creativity, which are based on foundation knowledge in other content areas, the low rating of literacy is counterintuitive (Casner-Lotto, 2006).

The research of Daggett and McBride (2002) involved collecting authentic workplace and employment materials and professional reading materials from a variety of businesses. These documents were analyzed for use by entry level, intermediate or advanced level employees. Readability levels of these documents were either at or above the level of many of the materials high school students are exposed to in their curriculum. They also found that a large number of the most challenging reading tasks were required for all job levels (Daggett & McBride, 2002)

Barton (2006) analyzed the relationship between three literacy levels, prose, document and quantitative, measured by the National Adult Literacy Study (NALS) and literacy levels required to perform more than 2200 jobs. Occupations with the fastest rate of growth had the highest literacy requirements. The average requirements for all jobs were the same for all three literacy areas and the same in 1986, 1996 and the current study. His conclusion that job vacancies were a more appropriate measure for projecting employment opportunities than average employment, is centered on the fact that employment projections are based on how many jobs will exist in occupations, rather than how many vacancies will need to be filled. Jobs requiring hard physical labor may have more turnover. The proportion of high paying jobs and long tenure jobs are included in the percentage of all jobs, despite the fact that vacancies in these jobs may be at a slower rate, thus overstating the percentage of jobs requiring advanced degrees (Barton, 2006).

A study by VanHorn and Dautrich (2000) surveyed 400 New Jersey employers about the adequacy of preparation of the graduates of the state's colleges and universities. The results indicate that many believe that graduates with associate and bachelor's degrees are prepared for the workforce. In sixteen skill areas, level of proficiency was rated. Most believed that recent graduates are well prepared in communication skills and in the soft skills of integrity, teamwork,

honesty and metacognition. Fewer believe that they are well prepared in analytic skills, critical thinking, problem solving, judgment, decision-making as well as time and resource management (VanHorn & Dautrich, 2000). The most important function of higher education was split regarding two year or four year colleges, according to VanHorn and Dautrich. For two year colleges, one-third said that the function was to prepare students for specific careers; one-third said it was to provide general knowledge and skills; and one-fourth said it was for general work preparation. About half of the employers believed that the most important function of a four year college was to preparation for a specific career. Only one quarter said it was for general knowledge and skills; and one-fifth said it was for general work preparation (VanHorn & Dautrich, 2000).

Cotton (1993-94) cited findings drawn from 63 documents pertaining to the topic of employability skills. These 41 studies, reviews and evaluations address the skills and traits employers values most; explore why employability skills have become so important for the workplace; and identify educational practices that are effective in developing these traits in students. The other 22 documents are opinion pieces, curriculum guides, program descriptions and guidelines for program development that complement the findings in the research.

Subjects in the research on employer perspectives are most typically CEOs or personnel officers. Subjects in the research on effective practices included instructors and secondary students in vocational and regular classroom (Cotton, 1993-94). This was a synthesis of research that involved both educators and business people; however the studies were either of one or the other. There was no investigation designed to use the same instrument on segments of both populations to determine if there was any alignment of perceptions of necessary knowledge, skills and abilities.

Cotton's findings indicate that employers want entry level employees to possess an array of basic, higher order, and affective employability skills. Employers value these generic employability skills above specific occupational skills. Employers also find far too many entry-level job applicants deficient in employability skills, and want the public schools to place more emphasis on developing these skills. The value of employability skills has increased to the point of assigning them an even higher priority than job-specific technical skill by employers. They are understandably distressed to find so many entry-level job applicants lacking these skills. This demand for basic, higher order and affective employability skills reflects profound changes in the American workplace. The consequences of failing to address this deficit will be far reaching, Cotton concludes (Cotton, 1993-94). A study by the Hudson Institute found that only 20% of the present workforce has the training and skills to meet the demand of 60% of the future jobs (Schaffner & VanHorn, 2003).

A research project by Deloitte Consulting, L.L.C. (2005) is the fourth iteration in a series of surveys designed to learn more about how manufacturers plan their human capital strategies and barriers they encounter. It is the result of collaboration between the National Association of Manufacturers (NAM), the Manufacturing Institute's Center for Workforce Success and Deloitte Consulting. There is a detailed analysis of the breadth and depth of the skill shortage and the increase in employee performance requirements.

The findings of this NAM (2005) survey were based on the responses of 800 out of 8,000 National Association of Manufacturers' members who were Chief Executive Officers, Chief Operating Officers, presidents or senior executives of human resources. "The picture that emerges is both more complex and more disturbing than in the past, because it exposes a broadening gap between the availability of skilled workers and the employee performance

requirements of modern manufacturing" (Deloitte, 2005, p. i). The survey methodology combined qualitative and quantitative answers regarding the U.S. manufacturing workforce, current skills and skill deficits, types of skills training offered, delivery of training, needs and potential solutions. With a 10% response rate, generalizations may not be accurate due to the size of the sample and the fact that within the 10% a majority of companies participating had fewer than 500 employees (Deloitte, 2005).

The Deloitte 2008 Business in Education survey, conducted in August 2008, was an online survey of 300 business executives and 300 educators. An overwhelming majority of both groups (81%) agreed that educational quality in the United States would improve with increased involvement of business in education. There was disagreement in the type of involvement required. Of the business executive respondents, 41% indicate that involvement in curriculum was needed and 42% said that business should help set national education standards. Educators disagreed that this involvement was needed. Educators were interested in business involvement through financial contributions such as scholarships, equipment, and pro-bono services. There was general agreement among all respondents (66%) that without more active business involvement in education, the competitiveness of the United States' economy will be jeopardized (Deloitte, 2008).

These investigations provide a general national context within which this proposed regional study can be compared. Findings indicated that the skill shortages were reported for more than 80% of surveyed companies. These skill shortages are impacting manufacturer's abilities to achieve production levels, increase productivity and meet customer demands. Workforce requirements have increased which is affecting the ability of businesses to compete in a global economy as indicated by nearly 75% of respondents. The findings in the survey indicate

that there are broadening gaps between the availability of skilled workers at the same time that employee performance requirements of modern manufacturing are increasing (Deloitte, 2008). It is interesting to note that as the skill needs increase, the deficiency in basic employability skills remains high. Basic employability skills include attendance, timeliness and work ethic. This is consistent with Cotton's findings twelve years earlier (Cotton, 1993). This suggests the need for change in approaches in education and public workforce systems has been a continuing source of concern.

A worldwide program of research and analysis by the New Commission on Skills of the American Workforce concluded in 2007 included five economic and labor market studies, eight international industry studies, a series of comparative education studies; and studies of state workforce development systems. The methodology ranged from focus groups, public opinion research and expert interviews. It builds on the 1990 report by the Commission. Skills needed were determined to be a high level of preparation in basic skills, including mathematical reasoning, technology, science and the arts; comfort with ideas and abstractions; creativity and innovation; analysis and synthesis skills; self-discipline, organizational skills, the ability to learn quickly and work as a member of a team; flexibility and adaptability to changes in the labor market (National Center on Education and the Economy, 2007). According to a 2006 study by Casner-Lotto, the skills cited by employers as being the most critical were professionalism and work ethic; oral and written communications; teamwork and collaboration; and critical thinking and problem solving. Similarly to other research (Deloitte, 2005; Cotton, 1993; Casner-Lotto, 2006) these soft skills were valued more than basic skills.

Research with contrary findings was reported by Milner (2007). In 1993 a survey of community leaders, including chief executive officers (CEOs), elected officials, school leaders,

and health administrators in a small metropolitan area of North Carolina was conducted to assess the leaders' ideas about the knowledge and skills required for high school graduates, particularly in the core content areas and computer science. Of the twenty-four items posed for respondents to opine on the necessity of the skill for all or most employees, only six were identified as important. Only correct usage, punctuation and spelling, and use of the calculator or computer were reported to be essential for entry level employees by most of the respondents. Ten years later the same leadership group was asked to respond to the survey a second time with little difference in result. The same six items were reported as of the greatest value, with the only curricular area identified with a significant increase in importance being strong support for computer knowledge. Social studies concepts were not rated highly in either survey. Particularly the community leaders did not have increasing expectations for high school graduates in the area of science (Milner, 2007). More specifically, Milner (2007) found that:

> The community leaders seem to have a casual attitude about what schools must do to prepare students for Friedman's fast-approaching flat world of work. The leaders in this study did not seem to be caught up in breaking the mold; they instead seemed to perceive schools as less than essential to our economic well-being (p. 49)

This is inconsistent with the other survey results in the same time frame. There seems to be a disconnected perspective between this leadership group and others across the United States regarding the general trend of higher expectations for all students.

Economic Realities

If the United States has to be competitive in the global marketplace, the foundational work must begin in the educational system. As Bob Wise, Alliance for Education President

stated in *From No Child Left Behind, to Every Child a Graduate*, "The best economic stimulus package is a high school diploma" (Alliance for Excellent Education, 2008, p.14). The research report concludes that our national capacity to be competitive in the global economy is dependent on an education system that can produce graduates who can meet the growing demand for high level skills. This is supported by other sources (Alliance for Excellent Education, 2008; Kim & Rojewski, 2004). "At some point everyone has to put an occupational point on their educational pencil" (Carnevale, 2008, p.4). Carnevale and Desrochers are in agreement that meeting high standards in the education system is a prerequisite for economic growth and social inclusion in the 21st century. "Knowledge has become the engine of growth among nations, and individuals need a solid academic foundation in order to meet the increasing skill demands on the job" (Carnevale, 2003, p.2). The innovative excellence that has been a hallmark of the U. S. economy is fading. Forty-eight percent of the U.S. patents granted in 2004 originated in foreign countries, according to the U.S. Patent and Trademark Office, yet in 1964, patents with foreign origin were 18% of the total (Partnership for 21st Century Skills, 2006). A study by the Information Technology and Innovation Foundation (ITIF) evaluated 16 indicators of innovation and competitiveness among 40 countries and found that the United States ranked 6th overall. In progress over the last ten years, the American economy ranked last (Daggett, 2009).

The relative position of the U.S. in the world's educational standings continues a slow decline, while the structure of the global economy evolves (National Center on Education and Economy, 2007). Gaps exist between the skills of graduates and the required skills of businesses. The 2002 National Assessment of Educational Progress (NAEP) results found that 75% of 12th graders were not proficient in writing. The Partnership for 21st Century Skills found

that 80% of employers in the fastest growing industries use writing assessments as part of the hiring process (Partnership for 21st Century Skills, 2006).

Compounding this problem is that among the general trends in the labor force, as reported by the U.S. Department of Labor, Bureau of Statistics in 2002 the demographics of the labor force have changed. It is growing more slowly and is becoming older, with more women working today than in the past. Racial and ethnic minorities are the fastest growing part of the labor force and will comprise a proportionately higher percentage of the workforce by 2020 (Kelly & Prescott, 2007). Immigrants are found at both ends of the education scale. The positive correlation between education and earnings is documented. Some jobs with above average earnings do not require a bachelor's degree, but most require substantial training. Employees who are skilled in technology are in demand (Feller, 2003). "As a nation, we have not been successful at enrolling and graduating individuals who come from certain segments of our population—the segments that also turn out to be those growing the fastest" (Kelly & Prescott, 2007, p.34).

Carnevale (2008) has done significant research in the area of workforce preparedness for a changing economy. He concludes:

> As the structure of the U.S. economy has shifted from an industrial economy to a postindustrial service economy, new skill requirements have emerged. In general, the demand for specific academic and vocational skills has been augmented with a growing need for general skills, including learning, reasoning, communicating, general problem solving skills and behavioral skills (p.2)

Another dynamic to consider is that the structure of work in the United States is changing. A century ago, the nation led the world in "vertical integration", that is corporations

controlled every facet of the process, from raw materials to retail sale, according to the National Center on Education and the Economy (2007). Today, the U.S. corporations' focus is on "deconstruction", meaning analyzing production as a process and outsourcing components depending on efficiency and effectiveness (National Center on Education and Economy, 2007). "Where a century ago the brute strength of physical labor made the economy move, today fiber optics, satellites and Pentium chips carry our most precious resources—the data and ideas of the information revolution" (Schaffner & VanHorn, 2003, p. 67). Relevant variables to a nation's workforce development are government, environment, human capital, social capital, and level of economic development. The status of these in U.S. is strong and supports education. Factors that may impact this are economically steady growth; increasing dependence on foreign governments; becoming more racially diverse; an aging population with fairly large educational attainment; increasing instability of family life that may erode social capital; a deficit at an all time high; and an increasing trade imbalance (Kim & Rojewski, 2004).

There is an established link between higher levels of cognitive skill, defined by performance on math and science tests, and economic growth, as found by Hanushek, Jamison, Jamison and Woessmann as one component of the 2008 report by the Alliance for Excellent Education. Their research results indicated that a highly skilled workforce can raise economic growth by about two thirds of a percentage point every year (Alliance for Excellent Education, 2008). The earnings of college educated workers, compared with high school graduates have increased from about 43% to 62% since 1979, despite the larger pool of college educated workers (Carnevale & Desrochers, 2003). Highly paid, professional jobs and well paid, skilled jobs represent 62% of the available jobs in the next ten years (American Diploma Project, 2004). The demand for college educated workers is increasing at a faster rate than the supply. This may

signify that jobs for high school graduates will disappear with the increasing skill requirements. A post high school degree is becoming a necessity (Casner-Lotto, 2006). In this recently slowing economy, the competition for all jobs may exacerbate the difficulty for high school graduates to find sustainable employment. The Partnership for 21st Century Skills (2006) reports that of the 30 fastest growing occupations noted by the U.S. Bureau of Labor Statistics in 2006-07, two thirds will require postsecondary education. NASH concurs that more than two-thirds of good paying, growing jobs require post secondary education. By 2008, the growth rate of jobs requiring advanced skills is twice that of those with a basic skill requirement (NASH, 2002). Specifically, 8 require a two year associate degree, 10 require a bachelor's degree and two require doctoral degrees. There is predicted to be a shortage of 27.9 million employees by the year 2031 based on demographic trends and labor force participation rates (Kim &Rojewski, 2004). This continuing pressure on the supply side will force the American education system to respond with higher expectations for a growing population of students. "The single largest barrier to college entrance for African Americans, Hispanics and Native Americans still is failure to graduate from high school" (Kelly & Prescott, 2007, p.36). The increasing emphasis on the performance of minorities in the education system is evidence of the recognition of this discrepancy.

Another pressure point on the demand side is the aging workforce. The retirement of the baby boomers with postsecondary education will increase the demand for skilled workers over the next 20 years. Shortages of workers with some college level skills could increase to more than 14 million by 2020 (Carnevale & Desrochers, 2003). Barton (2008) disagrees with this assessment. He contends that the baby boomers who graduated from college were part of the workforce increasing numbers, thus inflating the perceived requirement for a college degree. In reality more college graduates were in jobs that did not require a degree.

> This creates a problem of underemployment for college graduates. The National Center for Education Statistics longitudinal study of bachelor's degree recipients reports that four years after receiving a degree, 40% of those not enrolled in graduate education say they are employed in a job where a college education is not required (Barton, 2008, p.20).

Rojewski & Lasonen (2004) characterize globalization as unfettered capitalism, and refer to a "growing economic interdependence of nations from around the world brought about by an increased and liberalized trade of goods and services, creating new social realities that ultimately result in new avenues of action," (p. 2). As the global economy increases in size and complexity, and the economies of each nation become increasingly integrated, the primary edge for the U.S. will be human capital (Carnevale & Desrochers, 2003). Characteristics of a global economy include "shifting from high volume mass production to high value production, from standardization to customization" (Rojewski & Lasonen, 2004, p.4); increasing need for highly skilled, innovative and creative workers; the increasing importance of information handling; "a premium placed on personnel who can manage knowledge as opposed to people; and the pressure to innovate, doing it better, faster, cheaper and continuously" (Rojewski & Lasonen, 2004, p. 5). Americans are the minority in the global workforce. In order to remain viable and sustain economic growth, they must find their own niche.

The World Economic Forum ranks the U.S. first out of 131 nations in global competitiveness due to market efficiency, business community sophistication, and capacity for innovation. Despite this current standing, a ranking of 34th in health and primary education is a cause for concern. "An inadequately educated workforce" is considered to be the fifth most problematic issue for business conducted in the U.S. (Alliance for Excellent Education, 2008).

The Skills Gap 2005 Survey found that, "the vast majority of American manufacturers surveyed continue to experience a serious shortage of qualified employees that is causing significant impact to business and the ability of the country as a whole to compete in a global economy" (Deloitte, 2005, p. 4).

There is a related, perhaps even greater consequence. It is one of equity and equality. Doyle states that, "the American middle class is 'shredding'. It is much more accurate to say there is a clear divide between those who have some college and those who do not. The former are becoming ever better off. The latter are sinking fast" (Doyle, 2007, p. 733). Those who lack the knowledge, skills and abilities to attain an economically sound status in society are more likely to drop out, not only of school, but of the mainstream of the culture and economy (Carnevale, 2003). If the dropouts in the class of 2008 had stayed in school and graduated an additional $319 billion in wages, taxes, and productivity over the course of their lifetimes would have been added to the economic base (Alliance for Excellent Education, 2008; Carnevale, 2003). People with college degrees earn more than people without, called the wage premium by economists. The wage premium has risen since 1980, at a slower rate in the 1990's. Access to college affects this wage premium, based on ethnicity and economic disadvantage (Barton, 2008).

A third consequence is the magnification of this effect in a recession. If there are fewer jobs at all skill levels, the higher skilled workers will move to lower skilled jobs. This will minimize the employment opportunities for the least skilled worker (Carnevale, 2003). Workers at all skill levels need to possess a sense of global awareness and an understanding of the new cultural, competitive, and economic factors that influence how the economy functions (Rojewski & Lasonen, 2004). The basic tenet of this democracy is the belief that each individual has the

opportunity to determine access to compensation, based on their willingness to achieve academic proficiency. Increasing the gap between the highest and lowest skilled workers will have the impact of "threatening the egalitarian base at the core of America's culture" (Carnevale, 2003, p.6).

Preparedness of Students for Success in the Workforce

Much has been written and discussed about the urgency of the United States to respond to the pressures of the global economy for continued competitiveness and workforce stability. The focus on education is the ground zero of this response.

As stated by Posner (2002):

> What our 21st century citizens need are trained minds and a passion for creative endeavor. And by a trained mind I mean not only the ability to think, to gather data, to formulate models, to test hypotheses, to reason to conclusions, and so on. I mean, most importantly, the desire for and habit of thinking (p. 317).

A core group of principles must be the backbone of any decision-making related to ensuring the competence and success of every student in the education system. Agreement by The Alliance for Excellent Education (2008), Carnevale and Desrouchers (2003), Rojewski & Lasonen (2004) outlined a number of factors critical in any policy change. High expectations for all students who have acquired skills that prepare them for college or the workplace is essential. There should be an emphasis on long term preparation for productive careers that will be subject to increasing technological change and economic reorganization. Educational organizations must work toward implementation of individualized approaches at both the student and school levels to reverse the poor performance of students and schools accessing necessary supports and interventions. It is necessary to effectively align curriculum and assessments within and between

K-12 systems and postsecondary institutions including development of a network of pathways to work or further study. Increased access to postsecondary education for increasing numbers of students should be a goal. State of the art professional development for teachers and administrators to ensure they have the tools to effect change is necessary. Collaboration among secondary, two-year and four-year postsecondary programs would create interconnected systems. There should be flexibility as the ultimate standard for systems of accountability when change is persistent and effective use of data and research to make informed decisions about policy and practice. Finally allocation of assets and resources in an efficient and effective manner is critical for implementation of sustainability. What is needed for high school graduates in the 21st century is beyond the traditional approach. Even with a traditional high school diploma, students will be underprepared for postsecondary success. Rigor must include both core subject mastery and confidence with 21st century skills and content. Integration of both should be the foundation of high school redesign (Partnership for 21st Century Skills, 2006). Barton's (2006) analysis of the projected job openings by the U.S. Bureau of Labor Statistics through 2012 determined that entry level workers need the basic soft skills along with a basic 9th grade level of mathematics and reading to earn a middle class wage.

Rojewski (2002) outlined four practices that define the "new vocationalism". Since there are expected to be shorter, flatter career ladders, pre-employment training should be more general and less job specific. Managers are becoming brokers or facilitators, therefore career and technical education programs will need content integrated with occupational courses. Schools should be structured differently, with career academies, school within a school concepts or career clusters. Finally, there should be direct applications to the real world of work or higher education options for students (Rojewski, 2002).

Implementing reforms will be difficult during times of fiscal challenge. These will force hard choices and focus on priorities. Carnevale and Desrochers (2003) state that "preparation for college begins in preschool, and increasing access to postsecondary education requires increases in investment in the quantity and quality of education throughout the entire preK-16 system" (Carnevale & Desrochers, 2003, p.5).

Employers must understand the importance of human capital as a business investment and implement new and non-traditional approaches to dealing with skills retention challenges in the workforce. Awareness by the general public of what companies' workforce needs are forecast to be will necessitate their increasing engagement and dialogue with public education; working with educators on curricula; and giving schools opportunities to learn about manufacturing. In return, individuals must take responsibility for their own employability (Deloitte, 2005). Recommendations in the report, *Tough Choices, Tough Times: The Report of the New Commission on the Skills of the American Workforce* concurred with the general recommendations mentioned and included the provision of high quality universal early childhood education and recruitment of the next generation of teachers from the top third of the high school graduates going on to college as additional points to consider (National Center on Education and the Economy, 2007). The system of public education must do more than prepare students for college or for the workforce. It should connect education to the central mission of building democracy or becoming better stewards of our planet (Meier, 2008). "The focus is still unremittingly on preparing students to 'fit into' the future rather than to shape it" (Meier, 2008, p.510).

There is consensus that emerging jobs will require postsecondary training (Deloitte, 2005; Kim & Rojewski, 2004; Carnevale & Desrochers, 2003; Alliance for Excellent Education, 2008; Cotton, 1993-4; The American Diploma Project, 2004; Casner-Lotto, 2006).

"Costs to reform of this nature are high. K-12 education spending would need to increase by more than $50 billion to achieve targeted goals. Resources for high needs subgroups are intensive and twice the costs of the average per pupil expenditure" (Carnevale & Desrochers, 2003, p.6).

The U.S. Chamber of Commerce has created a Work Readiness Credential with four categories of skills: Communications; interpersonal skills; decision-making; and lifelong learning skills, including proficiency in technology (Barton, 2008). This is one response to the workforce preparation issues that is being implemented across the country and locally being considered for the Saratoga County region. Innovative partnerships are emerging, such as the one between United Parcel Service (UPS) and the Annie E. Casey Foundation. The project goal was to provide learning and work opportunities for children leaving the public child welfare system in Baltimore, Maryland, offering them authentic job experiences that led to permanent employment (Donlevy, 2001).

At the commencement of research creation of a state of the art wafer manufacturing facility in the county was in the development stage. At the conclusion of the research the construction of the plant was a reality, with groundbreaking held in June, 2009. Global Foundries states in their Fact Sheet, "This project will create approximately 1,400 new direct semiconductor manufacturing jobs once full scale production is achieved, with an average annual salary of $60,000 per year . . . and an additional 5,000 indirect jobs in the region" (Global Foundries, 2009, n.p.). In a study by TechAmerica, the largest technology trade association in

the country, New York State employs 304,200 people in high tech related jobs, making it the third largest cyberstate in the country (Allen, 2009). Another study by Bizjournals, a unit of The Business Review, analyzed the high tech capabilities of every market with more than 500,000 residents and found that Albany, New York was the top tech city in upstate New York and ranked 38th in the nation (Springer, 2009).

The urgency of the problem combined with the preponderance of the literature on the impact of globalization on the American workforce creates a unique opportunity for response. Regionally, this is even more apparent by the recent flurry of collaborative efforts of Chambers of Commerce, Business Councils, state government offices and system leaders. The specific recommendations in the study by CGR are consistent with the recommendations in the literature (Mitchell, 2008). Identification of the specific commonalities and differences in perspective between educators and business is a foundational step to address the regional expectation that the education system adequately prepare students for post secondary options and ensure that they acquire the required knowledge, skills and abilities to contribute to the regional economy.

CHAPTER III

Methodology

The purpose of this quantitative study was to determine if there was any difference in expectation between the regional business community in the Saratoga County region and high school teachers regarding workforce preparation for the 21st century. Workforce preparation is defined as the extent to which students have the knowledge, skills and abilities to transition smoothly to the workforce. The same survey instrument was administered to members of the Chambers of Commerce in Southern Saratoga County and Saratoga County and to randomly selected high school teachers in school districts of the 31 Warren/Saratoga/Washington/Hamilton/Essex BOCES and the BOCES Vocational Education program.

The study was designed to answer the following basic research questions:

1. Is there any difference between educators and employers on their perceptions about:
    a. Knowledge required for the 21st century workforce?
    b. Knowledge acquired by an average current high school graduate/ entry level job seeker?
2. Is there any difference between educators and employers on their perceptions about:
    a. Skills required for the 21st century workforce?
    b. Skills acquired by an average current high school graduate/ entry level job seeker?

3. Is there any difference between educators and employers on their perceptions about:
    a. Abilities required for the 21st century workforce?
    b. Abilities acquired by an average current high school graduate/ entry level job seeker?

A self designed survey was used to collect data from the research participants. Given that the purpose of the study is based on the ability to quantify the relative agreement between two different populations, employing such a survey to assess the relationship between the perceptions of teachers and employers was determined to be a reasonable approach. Through use of a common instrument on each of the two sample populations, comparisons can be made.

Population and Sample

The population of this study comprised two groups. The first was the high school teachers of the WSWHE BOCES. All high school teachers in the 30 school districts (one school district has no high school program) and the Career and Technical Education teachers at the two BOCES sites were the targeted population. There were 1,499 teachers in the region at the time of the study. Each district was asked to supply a roster of high school teachers which was entered into a database by school district. A systematic random sample of every 5th name beginning with #1 (298 teachers) was solicited to participate.

The second group was the employers in Saratoga County who were members of the Saratoga County Chamber of Commerce. There were 2,874 members at the time of the study. The Saratoga County Chamber of Commerce provided a database of members. A systematic random sample of every 10th name beginning with #1 was solicited to participate, a total of 298 employers in the sample.

Data Collection

The purpose of the study was shared with the Chief School Officers of the Washington/Saratoga/Warren/Hamilton/Essex BOCES. A list of high school teachers and subject areas that they teach were requested from superintendents of the 30 component districts that serve students in grades 9-12 and the teachers of Career and Technical Education at the WSWHE BOCES. An alphabetical list of teachers from each district was put into a database, by district. The teacher population was a systematic sampling. Every fifth name of the alphabetical list by high school was identified to receive a survey. The surveys were numbered and the number of each survey was matched in the database to the name of the teacher invited to participate. Participants were told that the survey results would be confidential. Surveys were mailed to the superintendents of each district with an invitation to participate, a copy of the survey and a list of the teachers invited to participate. Superintendents were requested to distribute the surveys to identified teachers in each high school in individual sealed envelopes with return self-addressed stamped envelopes provided to the teacher to directly submit the surveys to the researcher. On a Likert scale of 1 to 9, teachers were asked to rate the importance of each of the knowledge, skills and abilities listed for 21st century workforce preparation. They were also asked to rate the extent to which an average high school graduate acquired the same knowledge, skills and abilities. When surveys were returned, the survey number was noted in the database to ensure that it was returned by the person to whom it was sent. This also facilitated the process of follow-up reminders to participants. The actual rating of each trait was recorded in a different database, stored separately to achieve anonymity. At the conclusion of the data collection, the linking file will be deleted. The responses were transferred to SPSS for review and analysis.

A list of business members of the Saratoga County Chamber of Commerce were sorted by type of business. The 298 employers were asked to rate the relative importance and existence of these traits in their entry level employees. First stratified sampling was employed to categorize businesses by type. A representative, systematic random sample of each type of the smaller businesses was taken by identifying every tenth business when there were more than ten in a business type and at least one of each business type when there were less than ten businesses to ensure that all businesses were represented in the sample. If there were less than ten businesses of one type, the first business was selected. Names of businesses and survey numbers were coded in a separate database to ensure confidentiality and allow for follow up reminders as needed. The surveys were mailed to the employers of each business. Surveys were returned in a self-addressed, stamped envelope directly to the researcher. To encourage participation, the Chamber President emailed survey recipients and encouraged them to complete and return the survey.

Reminders to both populations occurred after two weeks. The superintendents were asked to forward an email reminder to the teachers surveyed, since all districts protected the emails of the teachers in the district. The employers were emailed a reminder, since the email addresses were provided in the database.

Surveys were coded, with the number of the survey and the name of the participant kept in a separate database, password protected by the researcher. This data base information was stored on a single computer, not a server or a jump drive. That computer was only accessible to the researcher during the research year. Once the data collection was completed, the database was deleted as a file. The responses were logged in a separate data base and transferred to SPSS for review and analysis. This was done to ensure a representative sample and anonymity of responses.

Instrumentation

The knowledge, skills and abilities needed for the 21st century workforce as identified by the Occupational Information Network (O*NET) was used as the basis for the researcher self-designed survey instrument. O*NET is a comprehensive data base of worker attributes and job characteristics developed for the U.S. Department of Labor. The self-designed, paper /pencil survey was formatted for respondents to rate the knowledge, skills and abilities acquired and those acquired for each trait on a 1-9 Likert scale. On the scale, a rating of one indicated not important and a rating of nine indicated very important.

To mitigate the affect on internal validity by the selection of the participants, a random selection of the populations was built into the design for both groups. The spectrum of types and size of businesses may have had an effect on the results. The size of the high schools in the BOCES districts range from under 50 students to over 2000 students. The ability to generalize could be affected by the perceptions of teachers in smaller, more rural populations. This was controlled by the codifying of the surveys by district. The type and size of the business was also recorded. The risk of selection bias was also mitigated by the explanation of the intent of the study at the BOCES Chief School Officers' meeting and the Chamber of Commerce leadership, where the study design was presented. To avoid any advantage to one population in the study or individuals within a group, the definitions of terms used were provided with the survey. In addition, systematic random sampling in each high school and in the Chamber of Commerce mitigated selecting participants who were predisposed to respond in any prescribed manner. There is currently a great deal of publicity about the potential development of a chip fabrication plant in the region, which may have affected participant responses from both groups. During the time of the study, the decision about whether the plant will be built was determined. The

decision to move forward and the resultant publicity could have had an impact, since the survey administration occurred during this period. Responses of importance may have been impacted as a result of the general information participants had about this widely publicized event. Generalizations to other regions could be difficult to sustain. Types of businesses responding were not representative of the entire business community in the same proportion as the population of all businesses. In the same manner, size of high school student population may have affected the responses of the teacher population for purposes of generalizing results. There are high schools with extreme variations in student population, resources and programming. Using a percent of the high school teaching population was a method of controlling for this variability.

Prior to survey administration, the survey validity was tested by administering the survey to the 20 members of the Business/Education Committee of the Southern Saratoga County Chamber of Commerce, comprised equally of employers and educators in the Saratoga County region who were not being included as participants in the study but had a related interest in the study design and results. They were asked to provide feedback about the instrument. The purpose was to detect and correct any confusion in language, directions or content of the survey and to test the analysis technique.

Variables in the Study

The three research questions have one dependent variable and one independent variable each. The independent variable for all the three main research questions is the same-the respondents' group (educators/employers). The dependent variable for question one was "knowledge" as captured by survey items 1a through 1f. The dependent variable for research

question two was “skills” which is captured by items 2a through 2p. Finally, the dependent variable for research question three was “abilities” as captured by survey items 3a through 3l.

Steps of Data Analysis

Various statistical analysis techniques were employed to describe the respondents and to answer the research questions in this research project.

The demographic description of the research participants/respondents are presented in a table that includes frequencies and percentages by gender, experience, and employer title or subject area taught. Also the frequencies and percentages that describe the characteristics of the institutions are presented in a separate table.

Cronbach’s Alpha for internal consistency was conducted for the knowledge, skills and ability subscales/components. The items identified to be significant (reliable) were then added to make up each component.

To analyze the differences between the perceptions of educators and employers on knowledge, skills and ability acquired and required for the 21st century workforce, a Chi Square Goodness of Fit test was conducted to determine whether the observed proportions for the categorical variables differed from hypothesized proportions. During the process of reviewing the data returned, it became clear that the statistical measure most appropriate would be the Chi Square. Using nine categories for analysis would result in too few responses in the extreme categories, making it difficult to generate meaningful statistics. Consequently, the responses were consolidated into three more general groups. The 1-3 responses were recoded as Low; responses of 4-6 were recoded as Medium; and responses of 7-9 were recoded as High. This recoding generated a larger pool of responses in each category, making the Chi Square analysis statistically stronger. These results were analyzed based upon the degree to which any difference

was significant. The significance level was set at 0.05. A comparison of the observed responses with expected responses determined the degree of alignment of perceptions.

CHAPTER IV

Analysis of Data

This chapter presents the analysis of the survey data collected to respond to the research question about whether there is any difference in perception between the regional business community in the Saratoga County region and high school teachers regarding the knowledge, skills and abilities required for the 21st century and the degree to which high school graduates or entry level employees have acquired these attributes.

The analysis begins with a review of the demographic characteristics of the teacher and employer respondents. A discussion of the internal consistency and reliability of the attributes in the survey instrument will follow. The statistical tool applied to the data will be described and the results of the statistical analysis presented for each of the categories of knowledge, skills and abilities related to the perceived importance and the perceived degree of attainment of the attributes. General results across categories conclude the analysis.

Demographic Description

A total of 298 surveys were distributed to high school teachers in 28 of the 31 school districts in the WSWHE BOCES, and a sampling of teachers who were part of the career and technical education program at the BOCES. One district did not have a high school program and two districts chose not to participate. There were 298 surveys distributed to employers. Responses were received from 28 districts with a response rate of 42% (n=124). A total of 25% (n=74) of the 298 surveys mailed to employers were returned completed. Of the teacher respondents, 70.2% (87) were female and 29.8% (37) were male. Of the employer respondents who reported gender, 78.1% (50) were male and 21.9% (14) were female.

Additional demographic information reported by respondent teachers were experience, subject area taught and type of district. As indicated in Table 1, 48.7% of the teachers had 10 or less years of teaching experience and 41.3% had more than 10 years. About the same number of teachers had either five years or less or more than 25 years of experience, 26 and 27 respectively.

Table 1

Teacher Demographic Table

Description	Frequency	Percent
Years of Experience		
1-5	26	22.2
6-10	31	26.5
11-15	14	12.0
16-20	10	8.5
21-25	9	7.7
25+	27	23.1
Total	117	100.0
Subject Area Taught		
English	16	12.9
Math	19	15.3
Social Studies	13	10.5
Science	19	15.3
Special Education	9	7.3
Technology	2	1.6
Other	46	37.0
Total	124	99.9

Regarding subject area taught, 54% (67) of the teachers were teaching in a core content area of English, Math, Social Studies or Science. The next largest area reported was the Other category, with 37% (46).

The respondents almost evenly represented rural and suburban districts, with 56.3% (67) of teacher respondents from rural school districts, and 43.3% (52) from suburban districts.

Of employer respondents who reported business location, 57.1% (40) represented businesses in Saratoga Springs, New York. An additional 21.5% (15) were from other

municipalities within Saratoga County. The job title of 58.7% (37) of respondents was Partner/Owner, President or CEO, as indicated in Table 2.

Table 2

Employer Demographic Table

Description	Frequency	Percent
Title		
Partner/Owner	20	31.7
President	11	17.5
Manager	11	17.5
CEO	6	9.5
Human Resources Director	5	7.9
Other	10	15.9
Total	63	100.0
Type		
Service	26	36.0
Health	6	8.0
Business/Finance	7	10.0
Construction/Architect	6	8.0
Legal	4	5.0
Technology	3	4.0
Manufacturing	2	3.0
Real Estate	3	4.0
Other	16	22.0
Total	73	100.0

Service industries such as Retail, Food/Restaurant/Catering, Not for Profits and Hotels/Motels represented 36% (26) of the respondents. The next largest reported category was Other at 22% (16). Banks/Financial, Accounting and Business Organizations accounted for 10% (7) of respondents. Healthcare industries represented 8% (6) of respondents as did construction trades, including Architects and Engineers (6).

Employer respondents were asked to report the education level required for an entry level position in their business. As shown in Table 3 below, almost half (45.6%) reported that a high school diploma was the entry level requirement and 35.1% (20) respondents indicated that a two or four year degree was needed.

Table 3

Education Required for Entry Level Position

Description	No	Percent
Education Entry Level		
High School	26	45.6
4 Year College	12	21.1
2 Year College	8	14.0
No Minimum	7	12.3
Masters Degree +	3	5.3
Masters Degree	1	1.8
Total	57	100.0

Internal Consistency Reliability

Research Variables

There were three categories of attributes in the survey design, knowledge, skills and abilities, organized as sections 1, 2 and 3 respectively. In the knowledge category, the survey items 1a through 1f were designed to be subsets of knowledge. For skills, survey items 2a through 2p were the specific indicated subsets. The ability category had the subsets designated as 3a through 3l. The survey instrument used a Likert scale of 1-9 for the two research questions for each attribute.

Reliability Analysis

Cronbach's Alpha was used to determine whether the attributes under the major categories of knowledge, skills and abilities were consistent with one another and that they represented the construct being measured. A high value represents confidence that the attributes clearly represent the construct. The Cronbach's Alpha for the Knowledge construct was .843. For the Skills construct it was .934 and for the Abilities construct is was .907. As the figures show, all the three constructs were highly reliable. The items used were identified by The

Occupational Information Network of the U.S. Department of Labor, O*NET database website (The National Center of O*Net Development, 2008).

Results

Results were analyzed using the Chi Square Goodness of Fit test. If the fit between the observed and expected is poor, then the Chi Square value is large and the null hypothesis can be rejected. The null hypothesis for the first research question is that there is no difference in perception between high school teachers and employers regarding the knowledge required for and the knowledge acquired by high school graduates/entry level employees. For the second question, the null hypothesis is that there is no difference between the perceptions of the two groups regarding the skills required and those acquired by high school graduates/entry level employees. The null hypothesis for the third research question is that there is no difference in perception between high school teachers and employers regarding the abilities required for and those acquired by high school graduates/entry level employees. In this study the independent variable is the group, either educator or employer. The "knowledge", "skills" and "abilities" as defined in each construct are the dependent variables. Significance was measured at the $p < .05$ level, $p < .01$ level or no significant difference reported. Each independent variable was compared in two dimensions, the perceptions of each group about the knowledge, skills or abilities required for graduates or entry level employees and their perceptions about the knowledge, skills or abilities acquired by the respective populations.

Knowledge Results

Research Question 1a Knowledge Required

The first research question, 1a, asked if there was any difference between educators and employers on their perceptions about knowledge required for the 21st century workforce. The

null hypothesis states that there is no difference between educators and employers in their perception about the knowledge required for the 21st century workforce. The responses of the employers and teachers about the knowledge required dimension indicate significant differences ($p<.001$) in perceptions between the groups on each of the six categories, as indicated in Table 4.

Table 4

Chi Square Table on Knowledge Required

	Employers		Teachers			
Description	No	%	No	%	Chi Square	Significance
Business/Management					17.439	p<.001
Low	12	16.2	5	4.1		
Medium	26	35.1	24	19.7		
High	36	48.6	93	76.2		
Total	74	100.0	122	100.0		
Manufacturing/Production					50.781	p<.001
Low	37	51.4	9	7.4		
Medium	21	29.2	49	40.2		
High	14	19.4	64	52.5		
Total	72	100.0	122	100.0		
Engineering/Technology					61.237	p<.001
Low	21	7.4	4	3.3		
Medium	28	40.2	12	9.8		
High	24	52.5	106	86.9		
Total	73	100.0	122	100.0		
Math/Science					43.630	p<.001
Low	12	16.4	1	.8		
Medium	25	34.2	10	8.3		
High	36	49.3	109	90.8		
Total	73	100.0	120	100.0		
Health Services					64.858	p<.001
Low	32	44.4	4	3.3		
Medium	22	30.6	24	19.7		
High	18	25.0	94	77.0		
Total	72	100.0	122	100.0		
Arts/Humanities					38.171	p<.001
Low	27	37.0	6	4.9		
Medium	28	38.4	47	38.5		
High	18	24.7	69	56.6		
Total	73	100.0	122	100.0		

Teachers generally rated all knowledge required categories at higher levels than employers. The percentage rated as high ranged from 52.5% (64) to 90.8% (109) for teachers and 19.4% (14) to 49.3% (36) for employers. Both groups had the highest ratings for the Math/Science Knowledge category and the lowest for Manufacturing/Production Knowledge.

Engineering/Technology Knowledge, although rated highly by 86.9% (106) of teachers, was perceived as less important by employers, with only 52.5% (24) rating it at a high level. The information being provided to high school teachers in the region regarding the influx of high tech employment opportunities for graduates may have impacted this result. Employer respondents were primarily from retail, health care and service industries. Their perceptions about required skills for their particular business may influence their responses.

Employers and teachers both had the greatest frequency of low ratings for Manufacturing/Production Knowledge. The value of knowledge categories in general was less important to employers for entry level employees. Contradicting the response from employers, teachers were more likely to rate all knowledge categories as being required to a larger degree. Only one teacher respondent (.8%) rated Math/Science Knowledge as being low.

Research Question 1b Knowledge Acquired

Research question 1b asked if there was any difference between educators and employers on their perceptions about knowledge acquired by an average current high school graduate/entry level job seeker. The null hypothesis states that there is no difference between educators and employers about their perceptions of the knowledge acquired by high school graduates/entry level employees. The null hypothesis was disproven because there was a statistically significant difference between teachers and employers in their perceptions of the knowledge acquired by an

average current high school graduate/entry level job seeker. All categories in the knowledge domain for knowledge acquired were statistically significant at p<.001 level, as indicated in Table 5. Teachers reported a higher degree of acquired knowledge attributes than employers did for entry level employees, although both groups had lower percentages reporting at the high acquired knowledge levels than for the required levels.

Although 90.8% (109) of teachers believed that Math/Science knowledge was highly required, only 45.8% (55) reported that high school graduates had acquired this knowledge. This discrepancy was consistently observed in all categories under the knowledge domain. Math/Science Knowledge was rated at the highest percentage by teachers, followed by 40% (48) for Arts/Humanities, 33.3% (40) for Engineering/ Technology, 21.8% (26) for Business/Management, 19.3% (23) for Health Services and 17.5% (21) for Manufacturing/Production.

Employers reported a lower percentage of entry level job seekers with acquired knowledge than the percentage reported of required knowledge in all categories in the knowledge domain as well. While 49.3% (36) of employers believed that Math/Science was highly required, only 20% (14) reported that entry level job seekers had acquired that knowledge. This was consistent in all categories within the knowledge domain.

The greatest differences between teachers and employer perceptions of acquired knowledge were response rates in the high range for Arts/Humanities Knowledge at 40% (48) and 11.6% (8) respectively and Math/Science Knowledge at 45.8% (55) and 20% (14) respectively. Manufacturing/Production acquired knowledge was the category with the lowest percentage reported high (Teachers=17.5% (21), Employers=4.6% (3)). Employer respondents

reported a low acquired knowledge level for Health Services at 52.2% (35) as compared to teacher respondents at 13.4% (16).

Table 5

Chi Square Table on Knowledge Acquired

	Employers		Teachers			
Description	No	%	No	%	Chi Square	Significance
Business/Management					13.416	p<.001
Low	29	40.8	21	17.6		
Medium	27	38.0	72	60.5		
High	15	21.1	26	21.8		
Total	71	100.0	119	100.0		
Manufacturing/Production					23.353	p<.001
Low	41	63.1	33	27.5		
Medium	21	32.3	66	55.0		
High	3	4.6	21	17.5		
Total	65	100.0	120	100.0		
Engineering/Technology					19.447	p<.001
Low	28	41.2	20	16.7		
Medium	33	48.5	60	50.0		
High	7	10.3	40	33.3		
Total	68	100.0	120	100.0		
Math/Science					16.238	p<.001
Low	14	20.0	8	6.7		
Medium	42	60.0	57	47.5		
High	14	20.0	55	45.8		
Total	70	100.0	120	100.0		
Health Services					32.417	p<.001
Low	35	52.2	16	13.4		
Medium	25	37.3	80	67.2		
High	7	10.4	23	19.3		
Total	67	100.0	119	100.0		
Arts/Humanities					45.710	p<.001
Low	32	46.4	8	6.7		
Medium	29	42.0	64	53.3		
High	8	11.6	48	40.0		
Total	69	100.0	120	100.0		

In summary, there is a significant difference between employers and teachers on their perceptions about the knowledge required for the 21st century workforce. This is a rejection of

the null hypothesis which stated that there was no difference in perception between the two groups. Regarding the knowledge acquired by high school graduates or entry level employees, employers and teachers had significant differences in perception as well, thus rejecting the null hypothesis.

Skills Results

Research Question 2a Skills Required

Research question 2a asked if there was any difference between educators and employers on their perceptions about the skills required for the 21st century workforce. The null hypothesis states that there is no difference in perception between educators and employers about the skills required for the 21st century workforce. Of the sixteen skills comprising the skills dimension, there were five areas in which no significant difference was reported between teachers and employers. These were in Social Skills, Active Learning, Monitoring, Active Listening and Speaking. Generally in these skills were overwhelmingly perceived to be highly valued by both groups, with less than 2% of respondents in either group rating them in the low category.

The remaining eleven skills had significant differences reported by teachers and employers. Significance at the $p<.05$ level were Basic Skills, Cross-Functional Skills, Learning Strategies and Writing. The skills of Complex Problem Solving Skills, Technical Skills, Systems Skills, Reading Comprehension, Math Application and Science Application were significant at $p<.001$, and Critical Thinking Skills were significant a the $p<.01$ level as reported in Appendix A, Table 6, Chi Square Table on Skills Required.

The primary differences between groups in the Basic Skills, Cross-Functional Skills, Learning Strategies and Writing Skills were in the degree to which each group reported these

skills as high (7-9) or medium (4-6) on the rubric. There was general agreement in the low category (1-3). Teachers rated these skills more highly than employers, who responded more frequently with ratings in the 4-6 range. For example, Basic Skills were reported as highly required by 95.9% (116) of teachers and only 81.1% (60) of employers. The remaining 17.6 % (13) of employers rated Basic Skills in of moderate importance. This was consistent in the other three skills grouped as significant at this level. It would be reasonable to conclude that both groups had some degree of priority on these skills as required.

With the exception of Reading Comprehension which most patterns the results at the .05 level, these six skills had greater differences between the groups in the low ratings. Only between .8% (1) and 2.5% (3) of teachers reported Complex Problem Solving Skills, Technical Skills, Systems Skills, Critical Thinking Skills, Math Applications and Science Applications in the low category. The employer respondents had more variability, rating these skills as low to a greater degree, from 5.4% (4) to 27% (20) as low priorities. The greatest discrepancy was in Science Applications, with 27% (20) of employers reporting this as of low importance for entry level job seekers.

Research Question 2b Skills Acquired

Research question 2b asked if there was any difference between educators and employers on their perceptions about the skills acquired by an average current high school graduate/entry level job seeker. The Null Hypothesis states that there is no difference between educators and employers about the skills acquired by high school graduates/entry level employees. As indicated in Table 8 results for the required skills, there was similarly not a significant difference between teachers and employers in Social Skills, Active Listening, Writing and Speaking in

terms of skills acquired. Reading Comprehension was included in this group of skills, with 92.4% (110) of teachers reporting graduates having acquired this skill to a moderate or high degree, compared to 89.7% (61) of employers. This commonality by both groups about an important key skill of reading comprehension suggests some general agreement about a primary function of education.

Statistically significant differences at the $p<.05$ level were found for Basic Skills, Cross Functional Skills, Complex Problem Solving Skills, Systems Skills and Active Learning. In each skill area, the degree to which these skills were perceived to be acquired was less for employers than for teachers and less than what was perceived to be required by both groups. The largest degree of difference was in Basic Skills, with 60.2% (71) of teacher respondents reporting that graduates had acquired these skills to a high degree and 35.3% (24) of employers with that perception of entry level job seekers. This compares to 95.9% (116) of teachers and 81.1% (60) of employers perceiving Basic Skills as highly required.

Technical Skills, Critical Thinking Skills, Learning Strategies and Monitoring, were found to have significant differences between the groups at the $p<.01$ level with Math Applications and Science Applications significant at the $p<.001$ level. Although there was agreement between the two groups about the high need for Monitoring (Teachers=72.5% (87) and Employers= 61.6% (45)), only 30.3% (36) of teachers and 16.9% (11) of employers perceived that graduates/entry level job seekers had this skill to a high degree. The greatest difference in perception about whether graduates/entry level job seekers had acquired the skills at a high level was for Science Applications (Teachers=39.8% (47) and Employers=9.4% (6)), Math Applications (Teachers=42.7% (50) and Employers=17.9% (12)) and Technical Skills

(Teachers= 43.7% (52) and Employers=17.9% (12)), with differences of 30.4%, 24.8% and 25.8% respectively. More detailed results are included in Appendix B, Table 7, Chi Square Table on Skills Acquired.

The null hypothesis was confirmed for cross-functional skills, critical thinking skills, learning strategies, reading comprehension and writing. The eleven other skills were found to have significant differences in perception between employers and teachers as to the degree to which they are required for the workforce, rejecting the null hypothesis. For skills acquired by high school graduates/entry level employees there were five skills for which the null hypothesis was proven, with no significant difference in perception found. These were cross functional skills, monitoring, reading comprehension, writing and speaking. There were eleven skills for which the null hypothesis was disproven.

Abilities Results

Research Question 3a Abilities Required

Research question 3b asked if there was any difference between educators and employers on their perceptions about abilities required for the 21st century. The null hypothesis states that there is no difference between the perceptions of educators and employers about the abilities required for the 21st century workforce. Of the twelve abilities included in the survey, there were four for which there was no statistically significant difference reported between teachers and employers, thereby proving the null hypothesis. These were Verbal Abilities, Idea Generation/Reasoning Abilities, Memory and Attentiveness. Less than 2% of respondents in each group reported these abilities as of low importance.

Significant differences at the $p<.05$ level were found for Cognitive Abilities and Endurance. Employers reported Endurance as a low required ability with 18.1% or 13 responses. This may be connected to the type of work being evaluated by the employer for entry level job seekers. Combining the medium and high ratings for Cognitive Abilities, 97.3% (71) of employers and 100% (113) of teachers perceived this as a required ability to a moderate or high degree.

Three abilities were found to have significant differences between the perceptions of teachers and employers at the $p<.01$ level. These were Psychomotor Abilities, Sensory Abilities and Perceptual Abilities. Flexibility/Balance/Coordination, Quantitative Abilities and Spatial Abilities were found to be significant at the $p<.001$ level. The perceptions of teachers and employers regarding the required abilities at a high level differed most greatly in areas of Psychomotor Abilities (24.6% difference), Spatial Abilities (23.8% difference), Quantitative Abilities (21.8% difference) and Perceptual Abilities (20.5% difference). Consistently teachers perceived these abilities to be important to a higher degree than employers. Specific information is included in Table 8.

Table 8
Chi Square Table on Abilities Required

Description		Employers No	%	Teachers No	%	Chi Square	Significance
Cognitive Abilities						7.042	p<.05
	Low	2	2.7	0	0		
	Medium	10	13.7	7	5.8		
	High	61	83.6	113	94.2		
	Total	73	100.0	120	100.0		
Psychomotor Abilities						13.810	p<.01
	Low	8	11.0	3	2.5		
	Medium	30	41.1	30	25.0		
	High	35	47.9	87	72.5		
	Total	73	100.0	120	100.0		
Endurance						8.350	p<.05
	Low	13	18.1	7	5.8		
	Medium	27	37.5	42	35.0		
	High	32	44.4	71	59.2		
	Total	72	100.0	120	100.0		
Flexibility/Balance/Coordination						18.184	p<.001
	Low	19	26.4	6	5.0		
	Medium	25	34.7	53	44.2		
	High	28	38.9	61	50.8		
	Total	72	100.0	120	100.0		
Sensory Abilities						14.181	p<.01
	Low	6	8.3	0	0		
	Medium	30	41.7	37	30.8		
	High	36	50.0	83	69.2		
	Total	72	100.0	120	100.0		
Verbal Abilities						3.616	Not significant
	Low	1	1.4	1	.8		
	Medium	10	13.5	7	5.8		
	High	63	85.1	113	93.4		
	Total	74	100.0	121	100.0		
Idea Generation/Reasoning Abilities						5.688	Not significant
	Low	1	1.4	1	.8		
	Medium	10	13.5	5	4.2		
	High	63	85.1	113	95.0		
	Total	74	100.0	119	100.0		
Quantitative Abilities						20.294	p<.001
	Low	12	16.7	1	.8		
	Medium	14	19.4	16	13.4		
	High	46	63.9	102	85.7		
	Total	72	100.0	119	100.0		
Memory						.221	Not significant
	Low	1	1.4	1	.8		
	Medium	11	14.9	20	16.7		
	High	62	83.8	99	82.5		
	Total	74	100.0	120	100.0		
Perceptual Abilities						12.141	p<.01
	Low	4	5.6	1	.8		
	Medium	21	29.2	16	13.3		
	High	47	65.3	103	85.8		
	Total	72	100.0	120	100.0		
Spatial Abilities						19.189	p<.001
	Low	10	14.1	1	.8		
	Medium	27	38.0	33	27.5		
	High	34	47.9	86	71.7		
	Total	71	100.0	120	100.0		
Attentiveness						.125	Not significant
	Low	1	1.4	1	.8		
	Medium	3	4.1	5	4.1		
	High	70	94.6	115	95.0		
	Total	74	100.0	121	100.0		

Research Question 3b Abilities Acquired

Research question 3b asked if there was any difference between educators and employers on their perceptions about the abilities acquired by an average current high school graduate/entry level job seeker. The null hypothesis states that there is no difference between the perceptions of educators and employers about the abilities acquired by high school graduates/entry level employees. As Table 9 indicates, two of the abilities that were determined to have no significant difference in perceptions between teachers and employers concerning abilities acquired were the same as in those required, Memory and Attentiveness. There was agreement that these abilities were highly required and acquired by high school graduates/entry level job seekers. Endurance and Flexibility/Balance/Coordination were abilities reported to have similar patterns of response between teachers and employers, with no significant difference.

Significant at the $p<.05$ level were Verbal Abilities, and Spatial Abilities. The difference between groups at the low importance level for Verbal Abilities of 11.3% accounted for the discrepancy. Spatial Abilities perceptions between each group differed by 17.9% at the high importance level.

There were five of the twelve abilities in this domain for which there were significant differences at the $p<.01$ level. They were Psychomotor Abilities, Sensory Abilities, Idea Generation/Reasoning Abilities, Quantitative Abilities and Perceptual Abilities. Generally in these areas, there was at least a 14 percentage point difference in how the employers perceived the acquired ability and the teachers' perception at the high level. Cognitive Abilities was significant at the $p<.001$ level with 24.4 points difference at the high level. Teachers and

employers had lower perceptions of acquired ability in all components than perceived required abilities, despite the differences between the two groups.

Table 9
Chi Square Table on Abilities Acquired

Description		Employers No	Employers %	Teachers No	Teachers %	Chi Square	Significance
Cognitive Abilities						16.430	p<.001
	Low	10	14.9	3	2.6		
	Medium	39	58.2	54	46.2		
	High	18	26.9	60	51.3		
	Total	67	100.0	117	100.0		
Psychomotor Abilities						10.401	p<.01
	Low	8	12.1	4	3.4		
	Medium	38	57.6	53	45.3		
	High	20	30.3	60	51.3		
	Total	66	100.0	117	100.0		
Endurance						3.057	Not significant
	Low	9	13.8	8	6.8		
	Medium	36	55.4	63	53.8		
	High	20	30.8	46	39.3		
	Total	65	100.0	117	100.0		
Flexibility/Balance/Coordination						5.997	Not significant
	Low	9	13.8	8	6.8		
	Medium	35	53.8	51	43.6		
	High	21	32.3	58	49.6		
	Total	65	100.0	117	100.0		
Sensory Abilities						9.394	p<.01
	Low	7	10.4	4	3.4		
	Medium	37	55.2	48	41.0		
	High	23	34.3	65	55.6		
	Total	67	100.0	117	100.0		
Verbal Abilities						8.284	p<.05
	Low	10	14.7	4	3.4		
	Medium	35	51.5	62	53.0		
	High	23	33.8	51	43.6		
	Total	68	100.0	117	100.0		
Idea Generation/Reasoning Abilities						11.194	p<.01
	Low	11	16.4	4	3.4		
	Medium	37	55.2	63	53.8		
	High	19	28.4	50	42.7		
	Total	67	100.0	117	100.0		
Quantitative Abilities						12.430	p<.01
	Low	11	16.7	4	3.4		
	Medium	42	63.6	71	61.2		
	High	13	19.7	41	35.3		
	Total	66	100.0	116	100.0		
Memory						1.726	Not significant
	Low	3	4.4	4	3.4		
	Medium	42	61.8	62	53.0		
	High	23	33.8	51	43.6		
	Total	68	100.0	117	100.0		
Perceptual Abilities						6.654	p<.01
	Low	6	9.2	5	4.3		
	Medium	44	67.7	59	50.4		
	High	15	23.1	53	45.3		
	Total	65	100.0	117	100.0		
Spatial Abilities						6.654	p<.05
	Low	7	10.8	7	6.0		
	Medium	45	69.2	65	56.0		
	High	13	20.0	44	37.9		
	Total	65	100.0	116	100.0		
Attentiveness						.075	Not significant
	Low	6	8.8	9	7.7		
	Medium	40	58.8	70	59.8		
	High	22	32.4	38	32.5		

In summary, there were four required abilities for which the null hypothesis was proven. These were verbal abilities, idea generation/reasoning ability, memory and attentiveness. Eight others were shown to disprove the null hypothesis, indicating that there were significant differences in perception between employers and teachers about the abilities required for high school graduates/entry level employees. Similarly, for abilities acquired by high school graduates/entry level employees there were four abilities which proved the null hypothesis and had no significant difference in perception between the two groups. These were endurance, flexibility/balance/coordination, memory and attentiveness. The eight other abilities were determined to negate the null hypothesis and found significant differences in perception between the two groups.

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CHAPTER V

Summary of Findings, Conclusions and Recommendations

This research was designed to gather information about the knowledge, skills and abilities necessary for the 21st century workplace, particularly in the Saratoga County region of New York State. Previous work by regional groups such as the Chamber of Commerce of Saratoga County and the WSWHE BOCES Tech Valley Standing Committee identified strengths and needs in the preparation of students for the high tech workforce. This employment reality created a need to determine whether teachers and employers had aligned perceptions about what was required and what knowledge, skills and abilities were acquired by high school graduates or entry level employees. This formed the foundation for the research questions posed in the study.

1. Is there any difference between educators and employers on their perceptions about:
    c. Knowledge required for the 21st century workforce?
    d. Knowledge acquired by an average current high school graduate/entry level job seeker?
2. Is there any difference between educators and employers on their perceptions about:
    e. Skills required for the 21st century workforce?
    f. Skills acquired by an average current high school graduate/entry level job seeker?
3. Is there any difference between educators and employers on their perceptions about:
    a. Abilities required for the 21st century workforce?
    b. Abilities acquired by an average current high school graduate/entry level job seeker?

A survey was developed by the researcher using the knowledge, skills and abilities identified by the United States Department of Labor. There were six knowledge, sixteen skills,

and twelve abilities components assessed on this survey instrument. Each of the 34 components was also rated in two domains, required and acquired attributes. It was administered to a random sample of 298 high school teachers in the 31 school districts of the WSWHE BOCES and 298 employers from the Chamber of Commerce of Saratoga County. Responses were received from 28 districts with a response rate of 42% (n=124). A total of 25% (n=74) of the 298 surveys mailed to employers were returned completed.

Results were analyzed using a Chi Square Goodness of Fit test to determine the difference in perception between the two groups on each of the six questions posed. Significance at the $p<.001$, $p<.01$ level, $p<.05$ level or no significant difference was determined for each of the dependent variables.

Summary of Findings

The major findings were that there were significant differences between the perceptions of teachers and employers on the knowledge, skills and abilities required for the 21st century workforce. Teachers perceived that many knowledge, skills and abilities are required for high school graduates to a higher degree than employers perceived these knowledge, skills and abilities as requirements for their entry level employees. Exceptions were in the areas of social skills, active learning, monitoring, active listening and speaking, verbal abilities, idea generation and reasoning abilities, memory and attentiveness. These are most generally considered to be the ancillary soft skills that both groups agree on relative importance.

In the required domain, there were significant differences in perception between teachers and employers in all six knowledge attributes, eleven skills and eight abilities, for a total of 24 out of 34 components or 71% of the required categories. Based on these results, there is a

significant difference between the perceptions of teachers and employers on the knowledge, skills and abilities required for the 21st century workforce.

There were also significant differences between the perceptions of teachers and employers about the knowledge, skills and abilities acquired by an average current high school graduate/entry level employee. Teachers generally perceived that high school graduates have acquired the necessary knowledge, skills and abilities to a greater degree than employers believed their entry level employees have acquired those same skills. Both groups, however, perceived a discrepancy between the knowledge, skills and abilities required and those acquired,

For the acquired domain there were significant differences in perception between teachers and employers on all six knowledge components, eleven skills and four abilities, for a total of 25 out of 34 components or 73.5% of the acquired categories. Based on these results, there is a significant difference between the perceptions of teachers and employers about the knowledge, skills and abilities acquired by an average current high school graduate/entry level employee.

Within the knowledge category, there was a significant difference in perception between teachers and employers about the knowledge required for high school graduates/entry level employees. In every attribute surveyed, teachers had a stronger perception than employers about the degree to which knowledge attributes were required. Regarding acquired knowledge, the teachers and employers had significantly different perceptions about the acquired knowledge of high school graduates/entry level employees.

Although teachers and employers perceived high school graduates/entry level employees to have less acquired knowledge than required, there were significant differences for all

knowledge attributes about the degree to which they had attained the required knowledge. Teachers perceived high school graduates to have a greater degree of acquired knowledge than employers believed entry level employees had acquired.

Teachers and employers agreed that certain skills are required for high school graduates or entry level employees. These were primarily in social skills, responsibility and communication. Other skills surveyed showed significant differences in the perception of their importance. These were complex problem solving, technical skills, system skills, critical thinking skills, and math and science applications. Employers generally perceived these to be less important than teachers. Another cluster of skills were of moderate to high perceived importance by both groups, namely basic skills, cross-functional skills, learning strategies, writing skills and reading comprehension.

Patterned in similar fashion to required skills, teachers and employers agreed that high school graduates/entry level employees had acquired social skills and literacy skills to a moderate or high degree. There were significant differences in perception between the two groups about the degree to which high school graduates/entry level employees had acquired basic skills, cross-functional skills, system skills and active learning. Basic skills showed the greatest degree of difference. The most difference in perception of acquired skills between the two groups was in technical skills, and science and math applications. The results of both groups indicate perceptions that high school graduates/entry level employees had acquired skills to a lesser degree than what was perceived to be required.

Teachers and employers agreed that verbal abilities, idea generation/reasoning abilities, memory and attentiveness were very necessary for high school graduates/entry level employees.

Cognitive abilities were also valued, yet teachers had more responses at the high end of the rating scale. Differences in perception were found for psychomotor, coordination, sensory, quantitative, perceptual and spatial abilities, with teachers perceiving these abilities to be of higher importance than employers.

There was agreement that memory and attentiveness were acquired at a high level, along with endurance and coordination. Differences in perception about the abilities acquired by high school graduates/entry level employees were significant for cognitive, psychomotor, sensory, idea generation/reasoning, quantitative and perceptual abilities. Generally teachers believed high school graduates had acquired these abilities to a higher degree than employers found in entry level employees. For example, both employers and teachers perceived idea generation/reasoning to be highly required, 85.1% (63) and 95.0% (113) respectively. Yet only 28.4% (19) of the employers perceived their entry level employees to have acquired this ability to a high degree, as opposed to 42.7% (50) teachers. This pattern is true for perceptual abilities as well.

Conclusions

There are significant differences between employers and teachers regarding what is required for high school graduates to be successful in the workforce. Generally teachers and employers agreed about the importance of literacy, social skills or "soft skills" and cognitive abilities as requirements for high school graduates or entry level employees. Teachers generally valued the aspects of a comprehensive curriculum much more than employers. The knowledge attributes of arts/humanities and health services were perceived of higher importance, perhaps because of the New York State standards and emphasis on applied curriculum.

Teachers generally believed that high school graduates have acquired skills to a greater degree than employers report for entry level employees. Employers' perceptions about required knowledge, skills and abilities were consistently lower than teachers about the need for higher order attributes such as critical thinking, technical skills, and math or science applications. Given the variety of types of work represented, there may be less need for these specific skills for their entry level employees.

Consistently across all knowledge, skills and abilities variables, both groups indicated that high school graduates/entry level employees had acquired the knowledge, skills and abilities to a lesser degree than the perceived required level. Only 35.3% (24) of employers believed that their entry level employees had acquired basic skills as opposed to 60.2% (71) of teachers' perceiving that high school graduates had basic skills. This may be a factor of the type of entry level employee that some of these businesses hire, since 45.6% (26) reported that the education level for an entry level position was a high school diploma. They may be recruiting a smaller demographic of the total population of high school graduates. This would indicate that the minimum standard for a high school graduate is not perceived to be adequate for the workforce.

These conclusions are consistent with Study 2 (Mitchell, 2008) and with the existing research of educators and employers regarding the knowledge, skills and abilities required for high school graduates and employees. Both groups consistently place basic skills, communication, collaboration, cooperation and core character traits such as integrity, responsibility and honesty at the forefront of essential competencies (Alliance, 2008; Carnevale, 2008; Kim & Rojewski, 2004; Cotton, 1993-94; Casner-Lotto, 2006; VanHorn & Dautrich, 2000; National Center on Education and the Economy, 2007). In the study completed, while

77% (57) of employers highly valued critical thinking skills and overwhelmingly 95.1% (116) of teachers felt strongly about this as a required skill, there was still a significant difference between the groups about the relative importance of critical thinking. Very few in either group placed a low value on this skill.

Systemic Recommendations and Improvements

The findings of this research indicate several foundations that can be built upon for the future. There is opportunity for educators and employers to effectively communicate their priorities for education and the development of a strong employment base. The agreement of the two groups on key core attributes is a beginning. Collaboration between business and education should continue. Facilitating improved communication between the groups would bring greater understanding of the need for a comprehensive curriculum for all students and the rationale for that priority. Creating a well rounded graduate involves more than simply basic content. The arts and humanities; health and wellness; and character and citizenship are contributory skills and enrich the community in which an employee resides. Such a forum would also create awareness by educators of the changing workforce demands and allow for more direct connections for students between the curriculum and their future aspirations. This includes the development of strong career pathways programs. Particularly for the students who may not have an aspiration for post secondary education, this articulation of the possibilities may motivate them higher achievement and higher aspirations.

There should be follow up research that is more targeted to the high tech strand of the business sector. The broad scope of businesses surveyed in this study leaves room for further detail on the knowledge, skills and abilities necessary for the future workforce of this region in

the growth occupations. Focused qualitative research on select, high impact businesses moving into this area would provide specific awareness, information and direction for educators.

Professional development for educators on the 21st century careers and the importance of connecting the curriculum to the potential workforce is recommended as another method of building bridges between education and employment. There is no longer a separate curriculum for students bound for the workplace or for post secondary education. The skills required for the workplace are consistent with the requirements for college entrance. Literacy skills at high levels are necessary for entry level employees. Teachers need to develop interactive and collaborative techniques to engage all learners and to problem solve with each other when students are not responding to the curriculum. Differentiating instruction, adapting the curriculum and integrating the content are areas that continue to require professional development, particularly at the secondary level.

Additional research about how guidance counselors are providing information about future workforce opportunities is recommended. This study surveyed a broad range of high school teachers. The role of the counselor in linking students, teachers and employers has not yet been maximized as a resource to comprehensively address regional workforce needs. A regional steering committee that can link administrators and counselors with regional businesses to develop regional internships, externships, career exploration initiatives and outreach opportunities is proposed as a starting place. Every student should have multiple opportunities to explore interests and develop goals based on real experiences.

The alignment of the curriculum with 21st century knowledge, skills and abilities is occurring in selected pockets of the region. The necessary work at the state level to integrate this

approach into the state standards and assessments would provide greater flexibility to districts that look to create more integrated curriculums and practices in the schools. The Regents specific courses do not lend themselves to an integrated model easily. Models of success should be researched, garner approval from the State Education Department and communicated widely to demonstrate support for these efforts. There are currently ten states that have adopted the framework for 21st century learning developed by the Partnership for 21st Century Skills as part of a pilot program (Daggett, 2009).

Educators and employers have much in common. The human resources necessary for the 21st century workforce are sitting in classrooms today. The silo nature of the function of these sectors should be collapsed to a model of interdependent collaboration, each understanding and respecting the role and needs of the other. At the center of this model is the student, with a web of supports, experiences and opportunities that flow in and out of the system to explore as he or she determines how best to grow into a place in the community, in the workplace and become a contributing member of society as an adult.

The purpose of this study was to determine if the educational systems in the region are preparing students for the 21st century workforce. Indications from the research are that although there are some aspects of agreement, there is a need to improve the communication, collaboration, articulation and growth opportunities in order to prepare students for the regional workforce.

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APPENDIX A

Table 6
Chi Square Table on Skills Required

	Employers		Teachers			
Description	No	%	No	%	Chi Square	Significance
Basic Skills					11.949	p<.05
Low	1	1.4	1	.8		
Medium	13	17.6	4	3.3		
High	60	81.1	116	95.9		
Total	74	100.0	121	100.0		
Cross Functional Skills					11.069	p<.05
Low	1	1.4	2	1.7		
Medium	16	21.6	7	5.8		
High	57	77.0	112	92.6		
Total	74	100.0	121	100.0		
Social Skills					2.529	Not significant
Low	1	1.4	2	1.7		
Medium	9	12.3	7	5.8		
High	63	86.3	111	92.5		
Total	73	100.0	120	100.0		
Complex Problem Solving Skills					15.647	p<.001
Low	4	5.4	2	1.7		
Medium	18	24.3	8	6.6		
High	52	70.3	112	91.8		
Total	74	100.0	122	100.0		
Technical Skills					27.499	p<.001
Low	8	11.0	1	.8		
Medium	26	35.6	16	13.1		
High	39	53.4	105	86.1		
Total	73	100.0	122	100.0		
Systems Skills					19.162	p<.001
Low	14	19.7	3	2.5		
Medium	18	25.4	23	19.2		
High	39	54.9	94	78.3		
Total	71	100.0	120	100.0		
Critical Thinking Skills					14.803	p<.01
Low	5	6.8	1	.8		
Medium	12	16.2	5	4.1		
High	57	77.0	116	95.1		
Total	74	100.0	122	100.0		
Active Learning					1.265	Not significant

	Low	1	1.4	1	.8	
	Medium	8	10.8	8	6.6	
	High	65	87.8	113	92.6	
	Total	74	100.0	122	100.0	
Learning Strategies					7.773	p<.05
	Low	3	4.1	1	.8	
	Medium	20	27.0	17	14.2	
	High	51	68.9	102	85.0	
	Total	74	100.0	120	100.0	
Monitoring					4.016	Not significant
	Low	3	4.1	1	.8	
	Medium	25	34.2	32	26.7	
	High	45	61.6	87	72.5	
	Total	73	100.0	120	100.0	
Reading Comprehension					15.739	p<.001
	Low	1	1.4	1	.8	
	Medium	15	20.5	4	3.3	
	High	57	78.1	117	95.9	
	Total	73	100.0	122	100.0	
Active Listening					.234	Not significant
	Low	1	1.4	1	.8	
	Medium	4	5.4	8	6.6	
	High	69	93.2	112	92.6	
	Total	74	100.0	121	100.0	
Writing					11.228	p<.05
	Low	2	2.7	1	.8	
	Medium	18	24.3	10	8.2	
	High	54	73.0	111	91.0	
	Total	74	100.0	122	100.0	
Speaking					1.202	Not significant
	Low	2	2.7	1	.8	
	Medium	7	9.5	10	8.2	
	High	65	87.8	111	91.0	
	Total	74	100.0	122	100.0	
Math Applications					31.254	p<.001
	Low	8	10.8	1	.8	
	Medium	28	37.8	15	12.4	
	High	38	51.4	105	86.8	
	Total	74	100.0	121	100.0	
Science Applications					59.441	p<.001
	Low	20	27.0	1	.8	
	Medium	29	39.2	17	14.2	
	High	25	33.8	102	85.0	
	Total	74	100.0	120	100.0	

APPENDIX B

Table 7

Chi Square Table on Skills Acquired

	Employers		Teachers			
Description	No	%	No	%	Chi Square	Significance
Basic Skills					11.340	p <.05
Low	6	8.8	4	3.4		
Medium	38	55.9	43	36.4		
High	24	35.3	71	60.2		
Total	68	100.0	118	100.0		
Cross Functional Skills					8.884	p <.05
Low	8	11.8	6	5.0		
Medium	45	66.2	63	52.9		
High	15	22.1	50	42.0		
Total	68	100.0	119	100.0		
Social Skills					2.027	Not significant
Low	7	10.4	8	6.7		
Medium	34	50.7	53	44.5		
High	26	38.8	58	48.7		
Total	67	100.0	119	100.0		
Complex Problem Solving Skills					10.714	p<.05
Low	16	23.5	11	9.2		
Medium	37	54.4	74	62.2		
High	15	22.1	34	28.6		
Total	68	100.0	119	100.0		
Technical Skills					13.011	p<.01
Low	14	20.9	14	11.8		
Medium	41	61.2	53	44.5		
High	12	17.9	52	43.7		
Total	67	100.0	119	100.0		
Systems Skills					8.733	p<.05
Low	18	26.9	15	12.9		
Medium	37	55.2	61	52.6		
High	12	17.9	40	34.5		
Total	67	100.0	116	100.0		
Critical Thinking Skills					10.714	p<.01
Low	19	27.9	12	10.0		
Medium	34	50.0	68	56.7		
High	15	22.1	40	33.3		
Total	68	100.0	120	100.0		
Active Learning					7.056	p<.05

	Low	11	16.2	8	6.8	
	Medium	39	57.4	60	50.8	
	High	18	26.5	50	42.4	
	Total	68	100.0	118	100.0	
Learning Strategies					11.426	p<.01
	Low	15	22.1	10	8.4	
	Medium	39	57.4	61	51.3	
	High	14	20.6	48	40.3	
	Total	68	100.0	119	100.0	
Monitoring					11.981	p<.01
	Low	15	23.1	8	6.7	
	Medium	39	60.0	75	63.0	
	High	11	16.9	36	30.3	
	Total	65	100.0	119	100.0	
Reading Comprehension					.554	Not significant
	Low	7	10.3	9	7.6	
	Medium	34	50.0	58	48.7	
	High	27	39.7	52	43.7	
	Total	68	100.0	119	100.0	
Active Listening					.938	Not significant
	Low	10	15.2	13	10.9	
	Medium	35	53.0	62	52.1	
	High	21	31.8	44	37.0	
	Total	66	100.0	119	100.0	
Writing					4.288	Not significant
	Low	14	20.6	13	10.9	
	Medium	39	57.4	68	57.1	
	High	15	22.1	38	31.9	
	Total	68	100.0	119	100.0	
Speaking					1.365	Not significant
	Low	12	17.9	14	11.8	
	Medium	31	46.3	58	48.7	
	High	24	35.8	47	39.5	
	Total	67	100.0	119	100.0	
Math Applications					16.000	p<.001
	Low	12	17.9	6	5.1	
	Medium	43	64.2	61	52.1	
	High	12	17.9	50	42.7	
	Total	67	100.0	117	100.0	
Science Applications					39.697	p<.001
	Low	24	37.5	6	5.1	
	Medium	34	53.1	65	55.1	
	High	6	9.4	47	39.8	
	Total	64	100.0	118	100.0	

APPENDIX C

Table 10

Level of Significance Table for Knowledge

Knowledge	Required Significance	Acquired Significance
Business/Management	p<.001	p<.001
Manufacturing/Production	p<.001	p<.001
Engineering/Technology	p<.001	p<.001
Math/Science	p<.001	p<.001
Health Services	p<.001	p<.001
Arts/Humanities	p<.001	p<.001

APPENDIX D

Table 11

Level of Significance Table for Skills

Skills	Required Significance	Acquired Significance
Basic Skills	p<.05	p<.05
Cross Functional Skills	p<.05	p<.05
Social Skills	No significant difference	No significant difference
Complex Problem Solving Skills	p<.001	p<.05
Technical Skills	p<.001	p<.01
Systems Skills	p<.001	p<.05
Critical Thinking Skills	p<.01	p<.01
Active Learning	No significant difference	p<.05
Learning Strategies	p<.05	p<.01
Monitoring	No significant difference	p<.01
Reading Comprehension	p<.001	No significant difference
Active Listening	No significant difference	No significant difference
Writing	p<.05	No significant difference
Speaking	No significant difference	No significant difference
Math Applications	p<.001	p<.001
Science Applications	p<.001	p<.001

APPENDIX E

Table 12

Level of Significance Table for Abilities

Abilities	Required Significance	Acquired Significance
Cognitive Abilities	p<.05	p<.001
Psychomotor Abilities	p<.01	p<.01
Endurance	p<.05	No significant difference
Flexibility/Balance/Coordination	p<.001	No significant difference
Sensory Abilities	p<.01	p<.01
Verbal Abilities	No significant difference	p<.05
Idea Generation/Reasoning Abilities	No significant difference	p<.01
Quantitative Abilities	p<.001	p<.01
Memory	No significant difference	No significant difference
Perceptual Abilities	p<.01	p<.01
Spatial Abilities	p<.001	p<.05
Attentiveness	No significant difference	No significant difference

APPENDIX F

SARATOGA SPRINGS CITY SCHOOL DISTRICT
MACFADDEN ADMINISTRATION BUILDING
3 BLUE STREAK BLVD., SUITE 204
SARATOGA SPRINGS, NEW YORK 12866-1232

JANICE M. WHITE
Telephone: (518) 583-4708
Superintendent of Schools
Fax: (518) 584-6624

E-mail:
j_white@saratogaschools.org

"Every One, Every Child, Every Day!"

January 5, 2009

Dear Superintendent:

As I explained at the Chief School Officer's meeting in November, 2008, the survey attached was developed as a component to a doctoral research report being completed with the approval of Sage Graduate School. Both the BOCES District Superintendent and the Saratoga County Chamber of Commerce have agreed to the purpose and design of the research. The purpose of the study is to determine if there is any difference in expectation between the regional business community in the Saratoga County region and high school teachers in the Warren/Saratoga/Washington/Hamilton/Essex (WSWHE) BOCES region regarding workforce preparation for the 21st century.

Your assistance is requested to distribute the surveys to the identified high school teachers in your district listed on the enclosed roster. A random sample of 20% of the 1500 high school teachers in the WSWHE BOCES have been selected to participate. Surveys are numbered to correlate to the identified teacher and to protect the individual participants from identification. Responses will be confidential and collective results will be used for research purposes. Any reporting of the data will be in the aggregate without identifying the individual ratings of respondents. There is a reference section enclosed which will define the terms used in the survey for clarification.

The findings and recommendations will be presented to the WSWHE BOCES and the Saratoga Chamber of Commerce. Your support and encouragement of teachers to respond will provide valuable information that will inform employers and educators in the region. I am requesting that completed surveys be returned in the self-addressed, stamped envelope provided by February 1, 2009.

The return of this survey indicates consent that the information may be used for the purposes indicated in the study. This project is approved by the Instructional Review Board of Sage Graduate School. If you have any questions, I can be reached at (518) 583-4708. Your support is appreciated.

Sincerely,

Janice White

APPENDIX G

Janice White
36 Tyler Drive
Saratoga Springs, New York 12866

Dear Survey Participant:

The survey attached was developed as a component to a doctoral research report being completed with the approval of Sage Graduate School. Both the BOCES District Superintendent and the Saratoga County Chamber of Commerce have agreed to the purpose and design of the research. The purpose of the study is to determine if there is any difference in expectation between the regional business community in the Saratoga County region and high school teachers in the Warren/Saratoga/Washington/Hamilton/Essex (WSWHE) BOCES region regarding workforce preparation for the 21st century.

Surveys are numbered to protect the individual participants. There is no need to put your name on the survey. Responses will be confidential and collective results will be used for research purposes. Any reporting of the data will be in the aggregate without identifying the individual ratings of respondents. There is a reference section enclosed which will define the terms used in the survey for clarification.

The findings and recommendations will be presented to the WSWHE BOCES and the Saratoga Chamber of Commerce. Your participation will provide valuable information that will inform employers and educators in the region. Please return the completed survey in the self-addressed, stamped envelope provided by February 13, 2009. \

The return of this survey indicates consent that the information may be used for the purposes indicated in the study. This project is approved by the Instructional Review Board of Sage Graduate School. If you have any questions, I can be reached at (518) 583-4708. Your support is appreciated.

Janice White
Educational Leadership Doctoral Program
Sage Graduate School

APPENDIX H

TEACHER PERCEPTIONS OF KNOWLEDGE, SKILLS AND ABILITIES OF HIGH SCHOOL GRADUATES

If you are not the person indicated on the envelope of this survey document, please indicate that in the space provided and return the blank survey in the envelope. Thank you.

I received this survey and am not the individual to whom it is addressed. _____

Teacher Response#_____ Male____ Female_____

Subject Area_____ Years of Experience _____
Circle Grade Level(s) Currently Teaching: 9/10/11/12

District Name_____ High School Enrollment _____

Rural_____ Urban____ Suburban_____ (Check one)

KNOWLEDGE, SKILLS AND ABILITIES

Please indicate a response by placing an X in the columns on the left regarding the degree of importance of each item is in preparing students for the 21st century workforce. In the columns on the right, indicate to what degree this quality exists among current high school seniors in your district.

	Rate your perception of the importance of the following attributes in preparing students for the 21st century workforce. A rating of 1 indicates not important. A rating of 9 indicates very important.									**Rate your perception of the proficiency of the12th grade students in your high school on the following attributes. A rating of 1 indicates not proficient. A rating of 9 indicates very proficient.**								
1.KNOWLEDGE	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
a. Business and Management																		
b. Manufacturing and Production																		
c. Engineering and Technology																		
d. Mathematics/Science																		
e. Health Services																		
f. Arts and Humanities																		

2. SKILLS	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1
a. Basic skills																		
b. Cross-functional skills																		
c. Social skills																		
d. Complex problem solving skills																		
e. Technical skills																		
f. Systems skills																		
g. Critical Thinking																		
h. Active Learning																		
i. Learning Strategies																		
j. Monitoring																		
k. Reading Comprehension																		
l. Active Listening																		
m. Writing																		
n. Speaking																		
o. Mathematics Application																		
p. Science Application																		

3. ABILITIES	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1
a. Cognitive abilities																		
b. Psychomotor abilities																		
c. Endurance																		
d. Flexibility, balance and coordination																		
e. Sensory abilities																		
f. Verbal Abilities																		
g. Idea Generation and Reasoning Abilities																		
h. Quantitative Abilities																		
i. Memory																		
j. Perceptual Abilities																		
k. Spatial Abilities																		
l. Attentiveness																		

APPENDIX I

EMPLOYER PERCEPTIONS OF KNOWLEDGE, SKILLS AND ABILITIES OF ENTRY LEVEL EMPLOYEES

Employer Response#_____ Position Title_____
Years of Experience: _____ Male ____ Female ____
Business Name_____ Number of Employees _____
City/Location _____
Entry Level Education Required _____ Entry Salary _____

KNOWLEDGE, SKILLS AND ABILITIES

Please indicate a response by placing an X in the columns on the left regarding the degree of importance of each item in preparing students for the 21st century workforce. In the columns on the right, indicate to what degree this quality exists among current entry level employees in your business.

	Rate your perception of the importance of the following attributes for your workforce. A rating of 1 indicates not important. A rating of 9 indicates very important.									**Rate your perception of the proficiency of your entry level employees on the following attributes. A rating of 1 indicates not proficient. A rating of 9 indicates very proficient.**								
1.KNOWLEDGE	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
a. Business and Management																		
b. Manufacturing and Production																		
c. Engineering and Technology																		
d. Mathematics/Science																		
e. Health Services																		
f. Arts and Humanities																		

2. SKILLS	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1
a. Basic skills																		
b. Cross-functional skills																		
c. Social skills																		
d. Complex problem solving skills																		
e. Technical skills																		
f. Systems skills																		
g. Critical Thinking																		
h. Active Learning																		
i. Learning Strategies																		
j. Monitoring																		
k. Reading Comprehension																		
l. Active Listening																		
m. Writing																		
n. Speaking																		
o. Mathematics Application																		
p. Science Application																		

3. ABILITIES	9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1
a. Cognitive abilities																		
b. Psychomotor abilities																		
c. Endurance																		
d. Flexibility, balance and coordination																		
e. Sensory abilities																		
f. Verbal Abilities																		
g. Idea Generation and Reasoning Abilities																		
h. Quantitative Abilities																		
i. Memory																		
j. Perceptual Abilities																		
k. Spatial Abilities																		
l. Attentiveness																		

APPENDIX J

DEFINITIONS OF SURVEY TERMS

Knowledge: Organized sets of principles and facts applying in general domains

Business and Management	Knowledge of principles and facts related to, human and material resource management in business administration and accounting organizations, sales and marketing, economics, and office information and organizing systems
Manufacturing and Production	Knowledge of principles and facts related to the production, processing, storage, and distribution of manufactured and agricultural goods
Engineering and Technology	Knowledge of the design, development, and application of technology for specific purposes
Mathematics and Science	Knowledge of the history, theories, methods, and applications of the physical, biological, social, mathematical, and geographical
Health Services	Knowledge of principles and facts regarding diagnosing, curing, and preventing disease, and improving and preserving physical and mental health and well-being
Arts and Humanities	Knowledge of facts and principles related to the branches of learning concerned with human thought, language, and the arts

Basic Skills: Developed capacities that facilitate learning or the more rapid acquisition of knowledge

Cross-Functional Skills	Developed capacities that facilitate performance of activities that occur across jobs
Social Skills	Developed capacities used to work with people to achieve goals
Complex Problem-Solving Skills	Developed capacities used to solve novel, ill-defined problems in complex, real-world settings
Technical Skills	Developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems
Systems Skills	Developed capacities used to understand, monitor and improve social-technical systems
Resource Management Skills	Developed capacities used to allocate resources efficiently
Critical Thinking	Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
Active Learning	Understanding the implications of new information for both current and future problem-solving and decision-making.
Learning Strategies	Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things
Monitoring	Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action
Reading Comprehension	Understanding written sentences and paragraphs in work related documents

Active Listening	Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
Writing	Communicating effectively in writing as appropriate for the needs of the audience.
Speaking	Talking to others to convey information effectively
Mathematics Application	Using mathematics to solve problems
Science Application	Using scientific rules and methods to solve problems.

Abilities: Enduring talents that can help a person do a job.

Cognitive Abilities	Abilities that influence the acquisition and application of knowledge in problem-solving
Verbal Abilities	Abilities that influence the acquisition and application of verbal information in problem-solving
Idea Generation and Reasoning Abilities	Abilities that influence the application and manipulation of information in problem-solving
Quantitative Abilities	Abilities that influence the solution of problems involving mathematical relationships
Memory	Abilities related to the recall of available information
Perceptual Abilities	Abilities related to the acquisition and organization of visual information
Spatial Abilities	Abilities related to the manipulation and organization of spatial information
Attentiveness	Abilities related to application of attention
Psychomotor Abilities	Abilities that influence the capacity to manipulate and control objects
Endurance	The ability to exert oneself physically over long periods without getting out of breath
Flexibility, Balance, and Coordination	Abilities related to the control of gross body movements
Sensory Abilities	Abilities that influence visual, auditory and speech perception

From The Occupational Information Network of the U.S. Department of Labor, O*NET database website www.onetcenter.org/dl_files/ContentModel_Detailed.pdf